

PEP Tutorials: Using Cognitive Learning Theory  
in Creating Online Library Instruction

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### Abstract

This paper describes the creation of online tutorials that teach about the PEP (Psychoanalytic Electronic Publishing) Archive, a full-text bibliographic database, for two small, graduate-level psychoanalytic institutes. In creating the tutorials, the institutes' librarian used Camtasia Studio software and incorporated principles of cognitive learning theory. Research questions are, first, the practicality of creating and maintaining such online tutorials, and second, their effectiveness in providing PEP training. Methodology includes a literature review, pre-project survey, software choice and training, and preparation of recording scripts. The resulting tutorials do display features of cognitive learning theory, including learner control, encoding and individual differences, perception and attention, memory, and active learning. Conclusions are that for future projects, it would be best to create shorter tutorials along with additional, text-based training materials. The second research question is yet to be answered, and finding effective means of evaluation and assessment remains a challenge.

*Keywords:* tutorials; online instruction; library instruction; PEP (Psychoanalytic Electronic Publishing)

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## Introduction and Research Questions

The project goal is the creation of online tutorials that teach about the PEP (Psychoanalytic Electronic Publishing) Archive, a database of full-text psychoanalytic journal articles and books (<http://www.pep-web.org/>). The project's audience is graduate-level students at two New York City psychoanalytic institutes, for which PEP is the primary research tool: the Center for Modern Psychoanalytic Studies (CMPS), which offers a licensure-eligible Certificate in Psychoanalysis, and the New York Graduate School of Psychoanalysis (NYGSP), which issues a Master of Arts in Psychoanalysis. PEP is used to perform research for papers, retrieve many of the readings in class syllabi, and explore issues that arise in clinical work. Students and faculty at the institutes each receive web-based PEP accounts, administered and supported by the part-time librarian who serves both programs. This population numbers approximately 150, including 100 students and 50 who are faculty, fellows, or research assistants.

For an information resource to be useful, its audience must understand its content and how to extract what they need. Consequently, librarians are responsible not only for providing resources such as PEP, but educating their patrons in how to use them. In a small academic institution without formal information literacy classes or student orientations, and with a student body that attends evening classes and has limited time on campus, how can that education be provided effectively, efficiently, and conveniently? Current PEP instruction at CMPS and NYGSP is ad-hoc and inadequate. New students are emailed their account information and an offer of help, but while some ask questions or request face-to-face tutorials, most do not. Conversations with students reveal varying comfort and skill levels in research and database searching. While some use PEP without instruction, others seem apprehensive and reluctant to request assistance. Additionally, the PEP database is unusual in providing no subject indexing,

so users must be familiar with full-text searching techniques to use it effectively. Again, conversations suggest that few students are using techniques such as truncation, proximity searching, or ranking of search results. PEP itself doesn't offer a tutorial. While the database does provide online help pages, the link to them is small and badly placed, and students are often unaware it exists. During hours when students are most likely to be at home conducting searches, the institutes' librarian is unavailable to answer questions.

Web-based PEP tutorials appear to address many of these issues. They could be viewed at the students' convenience and in private, helping to make up for the library's limited hours, while clear chaptering could answer specific questions at point-of-need. The literature suggests that multimedia instruction, when based on principles such as those of cognitive learning theory, is effective for tutorials in general (Alessi & Trollip, 2001, pp. 19-31, 89-137) and online library instruction specifically (Booth, 2011, pp. 35-61; Oud, 2009). The research question is whether such tutorials can in fact successfully fulfill the CMPS/NYGSP community's need for PEP instruction. First, is it realistic for such a small library to create and maintain tutorials that integrate cognitive learning principles? And second, will the tutorials succeed in improving student understanding and use of the database?

The literature (Ergood, Padron, & Rebar, 2012; Gravett & Gill, 2010; Gustavson, Whitehurst & Hisle, 2011) indicates that for many librarians, creating an online tutorial is more difficult and time-consuming than anticipated. Learning new software, implementing principles of good instructional design, dealing with technical issues, conducting evaluations and assessments – all these factors contribute to making this a difficult task, however proficient librarians may be in the tutorial's subject matter. In these large academic libraries, creating tutorials is a group project, conducted within the framework of existing information literacy

programs and with the support of technology departments, among other assets. As the solo librarian at CMPS/NYGSP, I have no academic bureaucracy to contend with, but also no direct colleagues with whom to confer, or technical support beyond that provided by work study students and consultants. The tutorial will need to be created largely at home outside of work hours, as there is no private workspace or time away from staffing the library desk. PEP's homepage currently declares, "We have many exciting features coming in interim releases this year!" which suggests that the tutorial will soon require updating. The first part of the research question, then, will be answered by evaluating the creation process to determine its practicality.

Once created, the tutorial must be found and used by its intended audience. Students need to be first made aware of its existence, convinced of its potential helpfulness, and have reliable access to it online. The information included should be relevant to their needs, presented so as to maintain attention and instruct clearly, and incorporate choice and interactivity as much as possible. Effective surveys and feedback mechanisms are essential to evaluating the tutorial's effectiveness, which constitutes the second aspect of the research question.

## Literature Review

### Introduction

Online tutorials are web-based extensions of the information literacy instruction traditionally provided by academic libraries. As entities, tutorials can be described as discrete "learning objects." They are not, however, created or used in isolation, but rather in the context of human, institutional, technological, and pedagogic needs and realities. This review of recent library literature, which includes broad surveys as well as case studies, examines online library tutorial design and use in five stages: purpose, planning, pedagogy and instructional design,

creation and technology, and assessment and evaluation. It reflects multiple library narratives as they implement these steps within their own teaching environments.

### Purpose of Online Tutorials

Trends motivating academic libraries to create online tutorials include an increase in distance learning (Yang, 2009, p. 685), limited staff time for face-to-face instruction (Gravett & Gill, 2009, p. 67), and the need to engage effectively with the digital generation (Befus & Byrne, 2011, pp. 1-2). Web-based instruction has proven to be as effective as that occurring in the classroom (Su & Kuo, 2010, p. 322; Smith, 2010, p. xvi). Compared with face-to-face instruction, advantages of the digital format include flexible, “point-of-need” availability, opportunities for independent learning, repetition of lessons as needed, closed-captioning, and accommodation of varied skill levels and learning styles, including visual and auditory (Bowles-Terry, Hensley & Hinchliffe, 2010, p. 19).

Subject matter ranges broadly; in their survey of tutorials, Su & Kuo (2010) find that “The content scope varied considerably, from one or two topics to a comparable scope of a credit-based course” (p. 322). Primary tutorial subjects are academic skills, particularly information retrieval strategies, followed by information literacy concepts, such as identifying quality information sources (Suo & Kuo, 2010, p. 323). Smith (2010) lists broad potential topics, including general research skills, information literacy, database searching, Internet technology and navigation, software applications, and academic integrity, along with local content, such as library orientations, searching the library catalog, and skills needed for specific disciplines, classes, or assignments (pp. 15-25). A common theme is the demand for instruction at “point-of-need,” accessible through mobile devices and around the clock, “quickly, succinctly,

understandably, and on demand” (Nagra & Coiffe, 2010, p. 6). At the University of Illinois, for example, librarians designed videos less than three minutes long, “created to guide students through specific and discrete tasks” such as locating books in the online catalog (Bowles-Terry, Hensley & Hinchliffe, 2010, p. 18). In contrast, other libraries use tutorials to provide comprehensive instructional programs. To fulfill standards for the university’s regional reaccreditation process, East Carolina University librarians developed a “six module multimedia tutorial focused on the teaching of information literacy skills,” supplementing gaps in their classroom instruction program (Gustavson, Whitehurst & Hisle, 2011, p. 732). Other tutorials are created for specific audiences within an institution, such as those designed to increase retention of at-risk first year students at Detroit’s Wayne State University (Befus & Byrne, 2011).

A developing trend is to view tutorials and their components as learning objects, characterized by Mestre (2012) as “...a reusable instructional resource, usually digital and web-based, that is developed to support learning” (p. 261). Graham (2011) maintains that because much library information literacy instruction is generic, reusable learning objects can be productively shared and re-purposed across institutions, sharing expertise rather than “keeping our materials in silos” (p. 141), although intellectual property rights must be considered. Kelley (2012) describes how her library adapted the Research 101 tutorial, created by the University of Washington and made available through a Creative Commons license, in preference to creating original content.

## Planning the Tutorial

The planning, or “preproduction,” phase for web-based instruction includes both a needs analysis and the project design, and should take approximately two-thirds of the time allotted for the entire project (Smith, 2010, pp. 32-33). Needs analysis encompasses a survey of information needs, available resources, and people who will be affected by the project. These include the audience, normally students; clients, such as colleagues or faculty; and stakeholders, who are not directly involved in the project but have “an interest in the outcome,” such as the university IT department, administration, trustees, or even government representatives (Smith, 2010, pp. 34-35). Following needs analysis, the design process consists of brainstorming for ideas, determining content, creating scripts and storyboards, and sometimes prototyping (Smith, 2010, pp. 35-40). Before releasing their information literacy program to the entire college, for example, The College of DuPage recruited volunteers for a summer-long pilot, enabling them to correct “...issues that had gone unnoticed by the Instruction Committee in our months of creating and reviewing” (Kelley, 2012, p. 6).

Based on a literature review and their own experiences, Nagra & Coiffe (2010) present a detailed 15-point model of questions to answer when developing online tutorials, covering not only the basics but issues such as budgeting, professional development, and marketing. They assert that step-by-step planning and project management will “provide clarity and direction for not only the design but for overcoming the unforeseen and inevitable hiccups and snags...” (Nagra & Coiffe, 2010, p. 14). Graham (2011) takes a broad perspective, offering guidelines for designing information literacy materials that will make effective reusable learning objects, shareable across institutions.

Reports of the planning process reflect interdependency within library departments, the university at large, and outside requirements, describing consultation with faculty and the evaluation of existing instructional offerings, along with relevant standards. For geography tutorials at the University of Leeds, librarians consulted with the “academic responsible for overseeing the distance learning courses in the school of geography” and reviewed “QAA (Quality Assurance Agency) subject benchmark statements for geography” to clarify desired learning outcomes (Thornes, 2012, p. 85). At East Carolina University, librarians identified gaps in student learning, using information gathered during formal assessment cycles. Results were evaluated using accreditation standards from the Southern Association of Colleges and Schools (Gustavson, Whitehurst & Hisle, 2011, p. 730). Other papers refer to the Information Literacy Competency Standards for Higher Education, issued in 2000 by the Association of College and Research Libraries (Su & Kuo, 2010; Blummer & Kritskaya, 2009).

Beyond consulting with faculty, librarians sometimes collaborate with instructional technologists (Thornes, 2012), university administration, other librarians, graphic designers, programmers, and outside experts (Blummer & Kritskaya, 2009, pp. 204-206). At Florida Atlantic University, librarians describe an elaborate planning process, where “the team prepared project documents, reviewed literature, and established protocols for procedures, timelines, and project expectations” (Ergood, Padron & Rebar, 2012, p. 99), fact-checking their scripts with other university librarians and incorporating feedback from supervisors (p. 102).

### Pedagogy and Instructional Design

Instructional guides for librarians urge that tutorials be constructed on firm pedagogic ground. Mestre conducted a 2011 survey of “librarians engaged in online learning and/or

creation of learning objects” and concludes that “librarians are generally not aware of best practices or of how to design pedagogically sound projects” (Mestre, 2012, p. 261). She offers ten suggestions for tutorial effectiveness, touching on information chunking, screen design, navigation, user choice, and other considerations (pp. 271-273). Thornes (2012) provides examples of her library’s PowerPoint slides before and after consultation with a learning technologist, calling the advice received “invaluable” for improving slide appearance and clarity (pp. 89-90). Booth (2011) dedicates four chapters to learning theory, instructional theory, teaching technologies, and instructional design (pp. 35-89). She discusses, among other subjects, behavioral, cognitivist, and constructivist theory; intrinsic and extrinsic motivation; direct vs. discovery learning; the affordances of various web 2.0 technologies; and the ADDIE design cycle. Throughout, Booth incorporates what she calls the four factors of learning: memory, prior knowledge, motivation, and environment, while the book’s second half is devoted to her own instructional design framework for libraries. While Smith (2010) briefly discusses theories of learning, different learning styles, and ACRL recommendations for good library instruction (pp. 6-13), her guide emphasizes web-based instruction. She therefore focuses on user-interface design, presenting detailed information on issues such as navigation, screen layout, color theory, and typography (pp. 81-117).

To develop her guidelines, Oud (2009) examines “research in cognitive psychology and education on the effective uses of multimedia in learning” (p. 165), recommending that librarians question multimedia’s effectiveness for their needs. Cognitive load theory suggests that multimedia can overload working memory, so library tutorials should minimize content-related, activity-related, and extraneous loads. This entails focusing on essential points, using chunks of information, combining words with graphics, setting clear goals, providing an introductory

outline for students, ensuring clear graphic design, and aligning activities with student skill levels (pp. 166-168). Analyzing education and librarianship research in online learning, Oud concludes that it calls for interactivity, learner control and engagement, opportunity for feedback, and promotion of critical thinking (pp. 168-173). To overcome the challenge of incorporating interactivity into a screencast, she recommends exploring non-technological solutions, such as "...suggesting practice exercises at the end of a tutorial for students to try on their own, or by posing questions part way through the tutorial for students to think about" (p. 170).

### Tutorial Creation and Technology

In choosing technologies to create tutorials, it's often assumed that screencasting and interactive features are preferable over simple, static webpages. Yang, for example, claims that "Static tutorials are outdated" (2009, p. 692), while Tempelman-Kluit (2006) applies multimedia learning theories to both HTML and streaming video versions of a hypothetical tutorial, concluding that the latter will teach more effectively (p. 368). Libraries do in fact often turn to screencasting software with editing capabilities, such as TechSmith's Camtasia Studio, sometimes paired with Audacity for sound editing (Bowles-Terry, Hensley & Hinchliffe, 2010; Gravett & Gill, 2010; Ergood, Padron & Rebar, 2012). They cite Camtasia's ability to produce tutorials in different video formats, add captions, and integrate editing of audio and video files (Gravett & Gill, 2010, pp. 68-69), along with budget considerations and a judgment that the "technology learning curve is not too steep for most librarians" (Bowles-Terry, Hensley & Hinchliffe, 2010, p. 18). Another option is the incorporation of tutorials into a university's existing course management system, such as Blackboard, to benefit from increased visibility, assessment features, and integration into online classes, as well as a robust set of technology tools (Kelley, 2012).

In practice, however, libraries are often challenged in learning and trying new programs, especially when using multiple technologies. Gustavson, Whitehurst & Hisle (2011), for example, used Camtasia, Audacity, Blender, Powerpoint, Microsoft Photo Story 3, and Windows Movie Maker to create their tutorial. They find that “The planning and creation process took much longer than expected because of the time it took to explore software options and learn to use complex software” (p. 737), while technical issues impeded analysis of assessment results (p. 738). Gravett & Gill (2010) similarly note, “The tutorial project was significantly more time-consuming than expected. Creating the captioning, and editing the final work were lengthy processes...” (p. 70). Their library first used a digital video camera and microphone to record an introduction, then, after trying Macromedia Captivate and Adobe Flash CS4 for screencasting and editing, turned to Camtasia when those programs proved too cumbersome. Additional issues included changes in the online database they were teaching, necessitating tutorial revisions; concerns about e-copyright of commercial databases; and updating campus computers to display the tutorials (Gravett & Gill, 2010, pp. 68-69). Ergood, Padron, & Rebar (2012) likewise express frustration: “Although these websites claimed creating screencast tutorials was easy, the team invested large amounts of time getting accustomed to the Camtasia software (pp. 100-101).

Not all researchers agree that videos are inherently superior to static webpage tutorials. Two usability studies suggest that webpages can be more effective and preferred by their audience. Mestre (2012) tested 21 students to determine their learning styles, then assessed their learning from two versions of a tutorial, one created as a Camtasia screen capture, the other as a static webpage with screenshot images. She also evaluated student reactions to the learning process. 16 of the 21 students preferred the static version, while 19 performed better in post-testing compared with the Camtasia version. Mestre concludes, “... a screencast tutorial with

images can be more effective than a screencast video tutorial. The results also indicated that regardless of learning style, students prefer static tutorials with screenshots over screencast tutorials” (2012, p. 273). The static webpage tutorial made it easier to see the “big picture,” follow along while performing searches, and quickly find a specific section, even though the Camtasia version contained chaptering to enable easy navigation. (Mestre, 2012, pp. 255-256).

In evaluating their 2-3 minute tutorials, librarians at the University of Illinois also find that some students would have preferred text-based instruction: “Depending on learning style preference, Internet connection, and complexity of the task at hand, students may choose to view an instructional video tutorial or they may prefer to read instructions on a static, text-based webpage (Bowles-Terry, Hensley & Hinchliffe, 2010, p. 26). Neither paper suggests that screencasts be abandoned, but rather that static tutorials should not be considered obsolete and that students should be offered multiple format options.

### Tutorial Assessment and Evaluation

Smith (2010) points out that while the terms are often used interchangeably, *assessment* rightly refers to the measurement of student learning, traditionally through testing, while *evaluation* “...is the process of judging the effectiveness and worth of the educational programs and products” (p. 185). In an example of effective assessment, East Carolina University created quizzes in Google Forms, which were embedded within tutorials and required as part of students’ English classes. Quiz results were analyzed prior to live library instruction sessions, which “...made it possible for the librarians to concentrate on areas of weakness, spending more time on helping students build their skills and less on information they learned from the tutorial itself” (Gustavson, Whitehurst & Hisle, 2011, p. 738). At the College of DuPage, tutorials and their

quizzes were integrated into the Blackboard system, allowing automatic tracking in the software's Grade Center (Kelley, 2012, pp. 5-6).

Libraries who successfully gather feedback can identify areas for improvement, and so most incorporate both assessment and evaluation components into their tutorial programs. A usability study at the University of Illinois, for example, used an interview format to both assess student competency at completing tasks and collect feedback on using the tutorial. Discovering that students found introductory material boring and three minute videos too long, they conclude that tutorials are best designed as an “inverted pyramid” in which the most important information (how to complete the task at hand) comes first and is followed by the contextual information” (Bowles-Terry, Hensley & Hinchliffe, 2010, p. 23). Students preferred presentations to be simple rather than entertaining, and material was best presented in multiple formats, with clear language, not jargon, identifying tutorial subjects. Reference librarians could increase student interest by referring to online tutorials during their live interactions, while locating tutorials at point-of-need rather than in a separate section improved findability (Bowles-Terry, Hensley & Hinchliffe, 2010, pp. 26-27).

The literature cites a variety of evaluation techniques, including pilot testing, usability tests, quantitative analysis, anecdotal evidence, and providing opportunities to comment (Blummer & Kritskaya, 2009, pp. 209-211). At Wayne State University, tutorial beta testing included a knowledge test as well as satisfaction and confidence surveys. Disappointing knowledge test results led librarians to re-examine both their content presentation and the wording of test questions (Befus & Byrne, 2011, pp. 9-10). Satisfaction surveys showed a need to improve site navigation and increase interactivity and also uncovered weaknesses in the survey's wording, leading to consultation with an instructional designer (Befus & Byrne, 2011,

p. 12). At the University of Illinois, librarians ran an interview-based usability study on a student test group, gathering feedback on several aspects of their tutorials: length, pace, and content; look and feel; media formats, findability; and clarity of language (Bowles-Terry, Hensley & Hinchliffe, 2010). Librarians at Leeds University were less successful; only one student submitted replies to their optional feedback form, while technical issues interfered with tutorial statistics collection and hit tracking (Thornes, 2012, p. 92).

Researchers have also conducted evaluations on sets of multiple tutorials. Blummer & Kritskaya (2009) perform a literature review to determine best practices, identifying five key factors: "...knowing the tutorial's purpose and potential during preparation, collaborating with other individuals, using standards, engaging students, and conducting evaluations" (p. 200). Most libraries effectively combined "traditional as well as new or constructivist learning theories" (Blummer & Kritskaya, 2009, p. 211) with techniques including active learning, quizzes, relevancy of materials, clear design and navigation, responsiveness to different learning styles, and opportunity for feedback and contact with librarian (pp. 206-209). Su & Kuo (2010) analyze best-practice tutorials in the ACRL's PRIMO (Peer-Reviewed Instructional Materials Online) database, focusing on objectives and teaching strategies, content, browsing time, media applications, and tutorial visibility. They find that the PRIMO samples display both "The good characteristics of traditional library instruction" (p. 325) and adherence to ACRL information literacy instruction standards (pp. 327-328). Effective teaching methods demonstrated include active learning, situation simulation, and question-oriented strategies (pp. 322-323), and tutorials were easily found within two to three clicks from the homepage (p. 325).

Somoza-Fernández & Abadal (2009) conduct a similar survey but are disappointed by the results, concluding that only 7% of the 180 tutorials sampled satisfied most of their educational

indicators. Areas in which most fall short include providing statements of educational objectives, indication of the time needed to complete tutorials, evaluation of students' previous knowledge, opportunity to give feedback, and overall navigation and usability (Somoza-Fernández & Abadal, 2009, p. 130). Similarly, Yang (2009) surveys 372 academic library tutorials to evaluate technologies used, concluding that "Librarians should move on from the long, tedious and stale web pages to more interesting, animated and interactive tutorials" (p. 692).

## Conclusion

This literature review has examined the experiences of multiple academic libraries as they plan, create, and evaluate their online tutorials. The basic requirements for effective instruction, and the steps to achieve it, remain a constant. The process each library undertakes to accomplish its instructional goals, however, is inseparable from the institutional context, resources available, and needs of that specific student body. While theory provides an essential framework, it's only by working through the process that libraries discover what's truly effective for their patrons.

## Cognitive Learning Theory

The PEP tutorials are modeled on principles of cognitive psychology, which emphasizes mental learning processes and "nonobservable constructs, such as memory and motivation" (Alessi & Trollip, 2001, p. 16). This view contrasts with the behaviorist understanding "... that the evidence of learning is outward behavioral change" (Booth, 2011, p. 38) and with the emphasis constructivists place on learner-centered interpretations of knowledge (Alessi & Trollip, 2001, pp. 31-32). In the CMPS/NYGSP environment, grades and testing are avoided,

student work is largely confidential, and the PEP tutorials will be optional, presenting a poor fit with behaviorist strategies of tracking student achievement and using positive or negative reinforcement. Constructivist teaching methods, such as “creative and exploratory assignments, reciprocal teaching, critical dialogue, and collaborative learning” (Booth, 2011, p. 52), are more compatible with the institutional culture, and students will ultimately need to interpret and apply PEP searching concepts to real-world applications. However, the PEP database operates within a set of fixed rules that need to be understood before they can be applied. The tutorials’ goal is to provide effective, efficient instruction of those rules within the time limitations of both students and librarian, making constructivist strategies unrealistic as a means of learning what is, for these students, a secondary skill set. The librarian’s role here has been aptly described by Booth: “For the cognitivist practitioner, educators are the conduit through which information is organized and presented” (2011, p. 50).

That organization of information contributes to improving memory, one of the primary cognitive approaches to enhancing learning. Structured information becomes easier to remember, whether that organization is inherent or imposed on the content (Alessi & Trollip, 2001, pp. 22-23). Working memory is optimized by encouraging formation of mental models, accomplished in a multimedia tutorial by incorporating conceptual models such as diagrams and animations (Alessi & Trollip, 2001, p. 28). Another technique is to apply principles of cognitive load management. Booth (2011) warns that the “Curse of Knowledge ... often tempts library educators to cram excessive detail into our brief learning interactions and objects” (p. 56). By concentrating on only essential content, activities, and sensory elements, the PEP tutorials can make the most effective use of students’ working memory (Oud, 2009, pp. 166-168). Tutorial content excludes non-essential points and is chaptered into “chunks,” or short segments that

concentrate on one concept and are arranged in “logical sequences,” from simpler and easier material to that which is more difficult and complex (Oud, 2009, p. 167). Activity-related load, or technical barriers, is minimal as a result of Camtasia’s clear interface. Finally, the tutorials’ appearance reduces unnecessary audio and visual elements that can become “extraneous load.” Video captures display large areas of the screen, with important elements highlighted through text, graphic, and audio cues such as zooming, symbols, title screens, captions, and verbal repetition. The tutorials thereby show “processes and tasks in context” (Oud, 2009, p. 168).

Those design considerations also determine how well the tutorials capture and maintain student attention, which facilitates perception. Attention, another principle of cognitive psychology, is heightened by the effective use of design factors including “size and fonts used for text, the use of color, the size and level of detail used in pictures, and the volume and clarity of audio” (Alessi & Trollip, 2001, p. 21). Tutorial presentations should be short, with clear transitions between topics and thought given to the presentation of different information types (Alessi & Trollip, 2001, pp. 135-136). The PEP tutorials, for example, present rules and principles, such as search syntax, and skills, including the construction of search requests. Rules should be “...directly stated and then demonstrated, after which the learner is guided in their application,” while video screen captures teach skills “...using step-by-step descriptions, demonstrations, and modeling of the activity to be learned” (Alessi & Trollip, 2001, p. 123). Visual and audio design decisions influence two additional cognitive considerations: encoding and individual differences. Dual coding, where information is presented both visually and through narration, can enhance encoding of the lesson into a form easily understood by the brain (Alessi & Trollip, 2001, pp. 21-22). The multimedia options achievable with online tutorials

also accommodate different learning and cognitive styles, although some studies question how much this actually improves learning (Alessi & Trollip, 2001, pp. 30-31; Mestre, 2012).

Learner options also contribute to learner control, a primary concept in cognitive theory. The tutorials have a menu of chapters and allow pausing, skipping forward, and review, giving students command over sequence and pace, “the most important learner controls” (Alessi & Trollip, 2001, p. 52). Because students can make sequencing choices, the tutorial structure is described as branching, “...more likely to be effective than simple linear programs” (Alessi & Trollip, 2001, p. 126). Tutorial sequencing also contributes to learner motivation, another important cognitive principle. Title pages and statements of objectives can motivate students by “demonstrating relevance to their needs” (Alessi & Trollip, 2001, p. 92), appealing to intrinsic motivation rather than extrinsic motivators such as grades or rewards. Booth (2011) calls this the WIIFM (“What’s in it for me”) principle, advising librarians to make sure that “the concepts we teach ... connect directly to authentic information-needs and technology-use scenarios” (pp. 57-58) and warning against the use of library-speak. Examples presented in the PEP tutorials explicitly demonstrate how to improve search results and, consequently, facilitate research.

By following principles of enhancing working memory, maintaining attention, providing learner control, and appealing to students’ intrinsic motivation, the PEP tutorials reflect Booth’s definition of cognitivist learning as “... the interpretation of sensory information into mental structures that facilitate transfer and recall” (2011, p. 50).

## Methodology

The project incorporates lessons from the literature into an approach suitable for an intimate environment with limited staff, technological, and financial resources. The tutorials will

be stand-alone, at least initially, rather than part of an existing research class or information literacy program, and their use will be voluntary. These factors drove project design choices and evaluation approach. Project planning, in addition to the literature review, included three elements: a pre-project survey, software choice and training, and creation of tutorial content, organized into scripts to use while screencasting.

### Pre-Project Survey

Pilot studies, interviews, usability studies, or skill assessment testing are not practical in the CMPS/NYGSP environment. They are too time-intensive, and it would be difficult to ensure a representative sampling of students with a range of PEP searching skills. Assessment testing for these skills could be off-putting at this educational level. Consequently, I created an online survey (Appendix A) using a basic, free account on fluidsurveys.com. Intended to gather feedback from the tutorial's prospective users, it was sent on March 7<sup>th</sup> to everyone who receives PEP access through CMPS/NYGSP. This can be considered saturation sampling, where "All members of the population are sent an e-mail invitation to participate..." (Sue & Ritter, 2007, p. 27). Unlike a true saturation sample, however, individuals are not prevented from submitting the survey multiple times; the ability to track individual responses was considered less important than maintaining participant anonymity, as recommended by Peterson (2000, p. 7). In an environment where everyone knows one another, anonymity can foster honest feedback. I also decided not to make answers required for any of the questions (Sue & Ritter, 2007, p. 74).

The survey began with an introduction, which, in the interest of informed consent, discloses that the survey and tutorial will be used both at CMPS/NYGSP and as part of a SUNYIT project. The first question was originally about frequency of PEP use. However,

following the advice of Sue & Ritter (2007) that “Every question you ask should be related to the survey’s objectives” (p. 38), I decided that while interesting, this information was unrelated to the goal of the survey and the tutorial. The objective here is not to increase PEP use, but to provide the tools needed to use the database well, whatever the frequency of use. The first question, then, asked if participants have the information needed to access their account, which is a precondition for benefitting from the tutorial. As students and faculty sometimes confide that they have lost their account information, it was important to address this issue, even though the tutorial itself will not cover account information.

The second, ranked question was designed to discover interest in introductory topics, such as PEP content and searching for specific documents, in comparison with the more advanced subjects of subject searching and search modification. Based on Sue & Ritter’s discussion of social desirability bias (2007, p. 40), I decided not to use the phrase “how interested would you be...” because indicating that one is “not very interested” in a subject can be felt as a negative judgment. The phrase “how useful would you find...” was deemed more neutral and accurate. Finally, an open-ended question was included so participants could express their thoughts. Originally the survey contained one open-ended question on “topics not mentioned above”; at the suggestion of the library’s faculty liaison, a second open-ended question text box was inserted, asking for comments specifically on topics discussed in question two. This addition proved redundant, as participants entered all comments in the first text box.

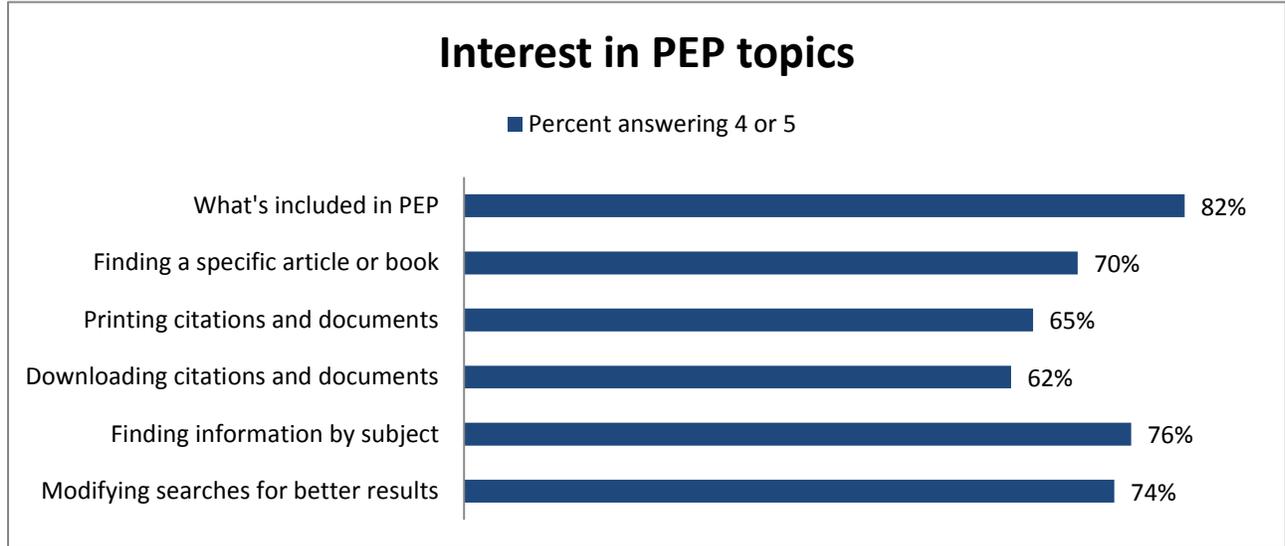
Links to the survey were embedded to emails sent to three groups: faculty; CMPS students, fellows, research associates, and advisors; and NYGSP students. Each group’s link led to one of three identical copies of the survey. This structure was both an adaptation to the limitations of the free fluidsurveys.com account, which allows a maximum of 100 responses per

survey, and a means of sorting results by group without relying on user self-identification. The email sent to faculty (Appendix B) differed from that sent to the other two groups (Appendix C). Its primary goal was to elicit their thoughts on what kind of PEP training would most benefit students, and responses to this question were not anonymous. The second part of the faculty email welcomed feedback on their own PEP use by responding to the same anonymous survey sent to students. The emails were written in consultation with the library's faculty liaison, and, once approved by the Director, sent using the institutes' web-based e-list manager. As suggested by Sue & Ritter (2007, p. 94), a follow-up reminder was sent a week after the original email.

### Survey Results

The student survey response rate at each institute was nearly identical: 46% at NYGSP and 45% at CMPS. At 23%, the faculty response rate was half that of students. This is not surprising, as faculty is not expected to be the primary tutorial audience. Because tutorials will be optional and any chapters can be skipped, I consider the most valuable survey results to be those showing positive interest, because they identify likely needs and tutorial use. Table 1 shows levels of positive interest in six PEP topics, where the question asked how useful information on those topics would be. The table displays the percent of total survey respondents who marked 4 or 5 on this question, with 5 labeled "very useful," on a scale of 1-5.

*Table 1.* Percent of survey respondents identifying topics as useful (4 or 5 on scale of 1-5)



Because survey respondents are already demonstrating interest in PEP, the high percentages are not extraordinary. However, it is striking how many expressed interest in basic topics such as “What’s included in PEP” and “Finding a specific article or book.” The high ratings across all subjects suggest the importance of offering both introductory and advanced tutorials (a weighted analysis, in which “no opinion” responses were subtracted, produced an even smaller range of difference across topics, with average interest level ranging from 4.03 to 4.39). For question one, nearly 8% of those responding to this question did not know their PEP login information, causing some concern but not suggesting a major issue. 36% of respondents wrote additional comments. The issue mentioned most often was difficulty in searching keywords and achieving specificity. For example, this quote from an NYGSP student accurately describes the challenge of subject searching in PEP:

“I have tried to search for articles and found the process not user friendly. I did not like that if you typed in a subject or word it would refer you to articles with that particular word in it, not necessarily an article on that subject.”

Although printing and downloading scored the lowest among survey topics, four respondents mentioned those subjects in their comments. Feedback was also given on database content, access method, and the wish that all class readings be available online.

Email feedback from faculty was disappointing. Two faculty members responded positively to the idea of PEP tutorials, but none discussed whether they would like class-specific training or what PEP skills they thought would most benefit students. The survey email sent to faculty was evidently unclear, as two wrote survey comments concerning student needs rather than their own. One suggested that all topics were important for student literature reviews, while the other emphasized refining keyword searches. A more effective approach might be to develop an informal dialogue with faculty, especially the Research Committee.

### Software Choice and Training

Camtasia Studio by TechSmith, the screen capture software used by several libraries in the literature review, became the clear choice for project software. Available to me at a reduced student price, the software is rich in features but has a user-friendly interface, making it a practical choice for someone not experienced in video editing. Importantly, Camtasia has features that allow incorporation of cognitive learning principles. The literature review emphasizes the importance of engaging students with clear design, relevancy of materials, quizzes, and active learning. Camtasia Studio version 8.0, released in 2012, offers several new features that enable student interaction and make possible a more compelling tutorial design. These include quizzing, playback on multiple devices, enhanced editing capabilities, “interactive hotspots” that can link to external URLs or within sections of the tutorial, and visual effects that focus the user’s attention on important actions or elements. While these capabilities do not

guarantee a tutorial's effectiveness, they permit a non-expert designer to incorporate elements of good instructional software design. Camtasia enables tutorial chaptering, allowing users to view short segments in their areas of interest, as well as video captioning, providing access without audio. Captioning a tutorial also makes all content searchable.

A final advantage of Camtasia is the ability to export videos in multiple formats, although only some have full interactive functionality. One fully-featured option is to have tutorials externally hosted on TechSmith's screencast.com website. Because the CMPS/NYGSP websites are currently being redesigned, this flexibility is important to ensure tutorial access. For training, I watched the Camtasia videos available through Lynda.com, which includes over six hours of instruction, as well as Camtasia's own, shorter tutorials. Camtasia also provides an online PDF help guide, whose pages are linked to through the software.

## Tutorial Content

The final preparation step was writing tutorial scripts, which involved determining content, developing examples to use, and figuring out roughly which graphics and animations to add in editing. Following the survey findings, I made plans for two tutorials, writing scripts that included both narration and actions to be taken during recording. *Introduction to PEP* teaches students what the database contains, its relationship to class readings, website navigation, how to retrieve specific citations, and how to print and download. The second level tutorial, *PEP for Research*, teaches skills needed to perform and refine subject searches and sort search results. *PEP for Research* presents concepts progressively, beginning with an overview of keyword searching, moving to one-word search techniques, and finally demonstrating multiple-word searches.

As evaluation and assessment components, I planned to use Camtasia's built-in quizzing and survey feature, which reports results to the account administrator. Brief, voluntary evaluation surveys were to be presented at the end of tutorial chapters, asking if questions about the topic have been answered and providing a text box for additional comments. To be appropriate for a graduate-level group, assessment quizzes were to be optional and presented as review questions.

### Project Results

As planned, I created two tutorials using Camtasia, each running about eighteen minutes. Camtasia's interface was fairly intuitive, and I was able to incorporate most of the features that support cognitive learning principles. While recording and editing was time-consuming, work on the second tutorial progressed more quickly as my software proficiency developed.

The videos are organized into six short chapters, ranging from one to six minutes. Video structure and the chunking of information enhance learner control, and promote memory by reducing cognitive overload. Both tutorials are introduced with a welcome chapter, composed of a table of contents and video navigation instructions, and end with a segment linking to further information through interactive hotspots. The intervening chapters each focus on an important concept and begin with a title screen to orient viewers. In *Introduction to PEP*, these chapters consist of: What PEP Includes; PEP and Class Readings; Finding Specific Articles and Books; and Printing and Downloading. *PEP for Research* includes: Searching for Concepts: Overview; Searching for Single Words; Searching for Multiple Words; and Refining and Sorting Results. The most substantial chapters end with a clickable feedback screen, promoting interactivity. Viewers can jump to specific chapters, pause, or replay, providing learner control over sequence

and pace. The frequent use of search examples, including some taken from class reading lists, reinforces student motivation by demonstrating relevance.

Visual effects contribute to learning in several ways. The multimedia combination of narration with graphics accommodates individual differences, while providing dual coding. Closed captioning allows students to avoid audio entirely. Because database searching is largely text-based and not visually dynamic, features such as zooming and panning, highlighting, callouts, and circle animations are important to improve perception and attention. The same visual effects, by focusing viewers on important points, reduce extraneous load on working memory.

Two aspects of the project, however, did not go as planned. First, Camtasia's built-in quizzing and survey feature emerged as unusable. I created and inserted quizzes into the first tutorial, although there was little flexibility in structuring them. Once the videos were rendered and uploaded, I discovered that the quizzes could not be made optional. Users could either take the quiz or replay the section, but were not able to bypass the quiz and continue. I decided to remove the quizzes, which required re-taping portions of my audio recording. This eliminated the project's assessment component. Unfortunately, surveys were based on the quiz feature, so were also presented as mandatory. After stripping out the built-in surveys, I created new ones on FluidSurveys.com and used Camtasia's hotspot feature to provide direct links.

The second issue involves hosting the videos on Screencast.com. While the free Screencast account has generous storage space, I did not anticipate the monthly limit on bandwidth. Each time the videos are viewed, it counts against that ceiling. Because these are

large files, the bandwidth limit was nearly reached just through the creation and testing process. As a temporary, emergency solution, extra bandwidth was purchased for the month.

### Conclusions and Future Work

Because the tutorials have not yet been released, I can only draw conclusions on the first research question, which concerns the creation process. Having invested time in learning Camtasia, I feel it does enable implementation of cognitive learning principles, and that creating and maintaining future online tutorials is an achievable goal. However, designing and creating full-length, multi-chapter videos required considerable time and effort. Shorter, independent tutorials, five minutes or less in length, is a more practical path. This can potentially be expanded to other subjects, creating an online information literacy program.

I hope to gain answers to my second, evaluative research question once the tutorials are released. The tutorials will be announced via email, signs in the library, and referrals, and new students will receive tutorial links together with their login information. I'll monitor responses to the embedded surveys and follow up informally in person when appropriate. Assessment of student learning remains a challenge. While formal quizzing may not be suitable, a measurable review activity can perhaps be designed which is directly relevant to classwork, such as finding a specific class reading. Another possible avenue is the collection of use data, either through PEP or through the website which ultimately houses the tutorials. I would also like to start a dialogue with faculty about student research needs. Better communication with faculty may lead to informal assessments of how students are progressing with research skills.

An immediate issue is finding a permanent site on which to host the videos. I have received permission to try embedding them on the institutes' websites, which would be ideal.

This would also allow splitting the tutorials into individual segments with their own links, if user feedback suggests this would be a more effective format. A less desirable option would be to split the videos into chapters and create a YouTube channel; this format would lose interactive elements such as feedback and hotspots.

A final observation is that while it is simple to enhance sensory elements in editing, it is not easy to change the content of something once recorded. In this sense, written materials are more flexible. In fact, while working in Camtasia, I found the written help guide more convenient than reviewing the Camtasia and Lynda.com tutorials, a finding echoed in the literature review (Bowles-Terry, Hensley & Hinchliffe, 2010, p. 26; Mestre, 2012, pp. 255-256). Offering students additional training options, such as PDF materials with text and video screenshots, is an attractive potential solution.

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Appendix A (Survey)

## PEP Tutorial Survey 0%

This survey collects feedback that will help me create a useful online PEP tutorial for the CMPS/NYGSP community, part of my final project in the SUNYIT Information Design & Technology program.

The survey will take approximately 2-5 minutes to complete. Your participation is anonymous, completely voluntary, and much appreciated.

PEP database access is through an account with your own, unique username and password. Do you know your PEP account information?

Yes  
 No  
 Not sure (please explain)

How useful would you find information on the following PEP topics?

	1 (not at all useful)	2	3	4	5 (very useful)	No opinion
What's included in PEP	<input type="radio"/>					
Finding a specific article or book	<input type="radio"/>					
Printing citations and documents	<input type="radio"/>					
Downloading citations and documents	<input type="radio"/>					
Finding information by subject	<input type="radio"/>					
Modifying searches for better results	<input type="radio"/>					

If you have comments or questions on these topics, please write them here:

If you have any questions on PEP topics not mentioned above, please describe them here:

## Appendix B (Survey email sent to faculty)

Title: Feedback on PEP training needs

Dear faculty member,

I'm planning to create an online PEP tutorial for the use of the CMPS/NYGSP community, which will also become part of my final project in the SUNYIT Information Design & Technology program. As I design the tutorial, I would very much appreciate your feedback as a faculty member. Are there aspects of PEP research that are especially important for your students to learn? Is there a need for class-specific tutorial content? If you have any thoughts on PEP training, please drop me an email, call, or stop by to let me know.

If you'd also like to provide feedback on your own use of PEP, you're welcome to respond to this brief, anonymous survey, which will take about 2-5 minutes to fill out. This survey has been sent to all CMPS/NYGSP students:

<http://fluidsurveys.com/surveys/laura-covino/pep-tutorial/>

Thank you!

Laura Covino, CMPS/NYGSP Library

Appendix C (Survey email sent to CMPS students and other affiliates)

Note: The email sent to NYGSP students differs only in the survey link.

Title: Survey on PEP database

Dear CMPS/NYGSP community,

I'm planning to create an online PEP tutorial for the use of the CMPS/NYGSP community, and would very much appreciate your feedback. The following link will take you to a brief survey, which will take about 2-5 minutes to fill out:

<http://fluidsurveys.com/surveys/laura-covino/pep-tutorial-cmps/>

The survey and tutorial will also become part of my final project in the SUNYIT Information Design & Technology program. Your participation is anonymous and completely voluntary, and much appreciated, whether or not you're currently using the PEP database.

As always, if you have any questions about accessing or using PEP, please don't hesitate to contact me.

Thank you!

Laura Covino, CMPS/NYGSP Library