Learning Object Design Project
Rationale

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One of the problems experienced by students who are new to academic and professional writing is that of citing sources. To the uninitiated, the rules of bibliographic styles are often incomprehensible and archaic, and therefore difficult to learn. This learning object was developed to address both the procedural or mechanical elements of citation (how to cite), as well as the conceptual or motivational aspects of the practice (why we cite). The audience for the learning object is primarily undergraduate students, but several peers in this cohort – all having graduated from at least one postsecondary program – expressed strong interest in such a tutorial. This paper discusses the development of the tutorial prototype (development is ongoing) and the cognitive theories that drove its development.

The first part of the tutorial is an introduction to the practice of citation – why we cite and the consequences of not citing. One of the first issues faced in the development of this tutorial was the dissonance between Mayer's (2005) multimedia principle – that we learn best from both pictures and text – and the text-dominant nature of citation practices. Added to this is Mayer's (2005) dual-coding theory – that we learn better from pictures and narration (using both visual and auditory channels) than from pictures and printed text (visual channel only) or pictures, printed text and narration – and the problem is amplified.

The use of narration to describe why we cite was one solution to this problem, but it didn't solve the issue of pictorial content to accompany the narration. Originally I had included definitions of various concepts (citation style, citation, bibliography, etc.), as well as textual bullet points, to accompany the narration but realized that these did not follow either of Mayer's (2005) principles cited above. The images used are intended to convey concepts such as "giving credit where credit is due" and quality of evidence, which are concepts I found difficult to convey pictorially, and I continue to seek alternatives to the images used in the prototype.

In the first draft of the introduction, I did not include information on key concepts – what Mayer (2005) refers to as pretraining – but later added this information to the first part of the introduction, after realizing that if the practice of citation was unfamiliar, it was likely that the vocabulary would be unfamiliar as well.

This tutorial provides a great deal of learner control. The main menu, from which the learner can select a bibliographic style to explore, review the introduction, and explore different tools for assisting in citation, is readily available from every screen. When appropriate, learners can move ahead at their own pace, as well as review material. The introduction is provided as a series of segments of about 1-1.5 minutes each. A site map provides the learner with information on where they are in the introductory segments. The learner may skip the introduction entirely by going directly to the main menu (presumably after they've gone through the introduction at least once), and during the introduction can skip to the next segment or review the previous one. A useful enhancement to this may be to provide the learner with playback controls, so that he or she may have finer control over the narrated segments.

One of the principles demonstrated throughout the tutorial is that of segmenting – breaking the content down into manageable chunks, and allowing the learner to control the pace and direction of the tutorial. In the second part of the tutorial, which focuses on the mechanics of citation, each citation style is broken down into several segments: general style formatting, such as authors, titles, and bibliographies, as well as examples of commonly cited source types (authored book, edited book, book chapter, journal article, magazine article, web document). The learner may navigate forward and backward through the different source types.

The learner is not provided with a choice about the order of the source types – this was a conscious decision, as there is a pattern to the sequence of source types, which are intended to progress from least complex to more complex (the latter including source types for which the pattern changes depending on the context).

This led to another difficult decision. Citation styles can be very complex, with a number of different rules based on minor variations. If one were to truly follow APA citation style, for example, one would have to distinguish between journals which are paginated by issue or by volume. How fine a point should the tutorial place on the rules of each citation style? Is there a way to give the learner a sense of the patterns inherent within the citation rules without it being so overwhelming that they give up? I decided to include only a few of the more common source types, and to focus on the citation patterns, or templates as I refer to them in the tutorial.

Each source type refers to a pattern, provides a list of the common elements necessary to cite the source type, and provides a citation for an example source. In most cases, I've also included an image of the source itself, so that the learner can make the connection between the item and its citation. In this section of the tutorial, I haven't really taken advantage of the affordances of Flash; in the revised version, animation will be used to show how the elements of the citation (author, title, etc.) come together to form the citation itself. This may improve spatial contiguity of the examples, and link the citation more clearly to the template.

One element that is often lacking in citation tutorials, at least the ones I have explored, is an opportunity for the learner to test herself. Most tutorials will provide examples for each source type, leaving the learner to discern the pattern, or template, and to try formatting a citation without feedback.

In this tutorial, the learner is invited to try forming a citation for each source type. The tutorial provides the necessary information about the source (author, title, etc.), as well as the template for citing that particular source type, and provides an input box for the learner to type in a citation. The tutorial provides a properly formatted citation for the item and encourages the learner to compare her citation with this one. I had hoped originally that the feedback would provide the learner with visual cues about where the differences were between the two citations, but inviting the learner to do the comparison encourages active cognition. However, I do plan to provide the learner with the option to ask for the visual cues (now that I have figured out the technical solution to this problem). This is consistent with Koedinger and Aleven's (2007) research on the assistance dilemma, which showed that any feedback, especially immediate feedback on the correctness of the response, is more effective than no feedback, but that

feedback that included an explanation about the error was even more effective, and that students receiving explanatory feedback were more likely to correct the errors on subsequent attempts. At this point, the learner can choose to review information about the source type and try formatting the citation again, thereby correcting any errors, or move on to the next source type.

One of the things that I realized too late in the game is that the learner might benefit from a more gradual progression toward forming her own citation, and one thing I will probably add to the source type instruction is an opportunity to first spot the errors in an already formatted citation, much as I did when providing information about general formatting rules, such as for authors and titles. Following information about general guidelines for forming citations, such as formatting authors and titles, the learner is invited to test her knowledge by either typing correctly formatted authors, or selecting correctly formatted titles from a list.

The tools section of the tutorial is intended to highlight a number of tools that will help the learner created formatted citations, and there are many now available. The idea here is to provide an animated tutorial, consisting of screen captures, annotations, and narration to demonstrate to the learner how the tool can help them. The use of image, text annotation and narration is consistent with the spatial contiguity principle, and eliminates the split-attention effect of visually separating pictures and text.

As mentioned earlier, this tutorial is only a prototype, and there are a number of improvements to be made, many of which are already in development. But it does have many strong elements to it, and these elements reflect a number of the cognitive principles of multimedia learning explored in the course.

References

Koedinger, K. R. & Aleven, V. (2007). Exploring the assistance dilemma in experiments with cognitive tutors. *Educational Psychology Review, 19*, 239-264.

Mayer, R. E. (2005). *The Cambridge handbook of multimedia learning*. Cambridge, U.K.: Cambridge University Press.