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James L. Morrison

Trevor Owens

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Next-Generation Bibliographic Manager :
An Interview with Trevor Owens
by James L. Morrison and Trevor Owens

One of the most exciting sessions at the 2007 Educause meeting this past October was a session describing Zotero, an open-source bibliographic database that can be used by individual faculty members, students, and independent scholars. The next version, scheduled for release in early 2008, will allow any defined group to use and contribute to the database. It is indeed the next generation of bibliographic management software packages pioneered by such companies as Endnote, Refworks, and Procite. In essence, Zotero takes advantage of what has gone before and makes gigantic leaps forward in flexibility, ease of use, and certainly in cost to the educational community.

Zotero is a project of George Mason University's Center for History and New Media; Trevor Owens, who made the presentation, is the Center's technology evangelist. He has been involved in development and outreach on the Zotero project for the last year, and, as an active historian, he uses Zotero to manage his research projects on a daily basis.

James Morrison (JM): Perhaps we should begin with some discussion of the origins of the Zotero project. How did this project get off the ground?

Trevor Owens (TO): The idea for Zotero was born from a mixture of our frustration with existing tools, the very real needs of campus libraries in Virginia, and the exciting new prospects of Firefox extensions for innovative software development. While current versions of tools such as Endnote, Refworks, and Procite had their advantages, their ability to function with online databases, catalogs, and repositories was limited; they did not provide an integrated, user-friendly environment for storing a full range of bibliographic materials for online and offline retrieval. As an alternative solution at the time, several campus libraries around the state had started to offer a "My Backpack" function in their online spaces, which allowed students to create their own digital collections of resources they were interested in. However, because each institution had developed a small piece of code for this function, each institution's system ran into trouble when they upgraded or migrated to a new system. Meanwhile, new versions of Firefox were providing an open-source architecture that allowed for the design of new, customized software extensions that could be embedded directly within the browser interface.

To our team at the Center for History and New Media, then, the answer seemed simple. Instead of building a wide variety of these small "backpacks," we could build a ubiquitous tool that could store all items and information in a single, comprehensive working space. As we went further with the project, the possibilities and horizons grew. Fortunately, we were able to secure generous funding from the Alfred P. Sloan Foundation, the Andrew W. Mellon Foundation, and the Institute of Museum and Library Services to further expand and refine and promote the current tool, which now is compatible with thousands of online information repositories.

JM: Could you speak further on the advantages of Zotero in comparison with other applications and tools? What does it provide as an alternative?

TO: Aside from the general benefit of a free and open-source solution to something that generally costs a lot of money, Zotero revolutionizes bibliographic software in three ways: It is easy to use, it leverages the common entry point to the Web (the browser), and it integrates bibliographic materials into the research process in a much more authentic way.

While the existing reference management tools and systems have made inroads into the academic environment, they have failed to have the same kind of transformative effect that corollary innovations in research databases and word processing software have had. Why? They are not easy to use and they are not intuitive. Consequently, many scholars, particularly in the humanities, are still using three by five cards to organize their research (Rosenzweig 2007). Zotero departs from its predecessors in that its drag-and-drop, iTunes-like interface (Figure 1) takes little or no explanation for users to get up and running. Our brief tour and quick start guide are generally enough to get people making fully formatted bibliographies in less than five minutes.

Second, because Zotero is a Firefox extension, it has the unique ability to leverage the power of a browser. In effect, wherever you go on the Web, Zotero is right there with you, enabling you to capture research materials and bibliographic information through the portal you already use to view that information. Where previous tools exist offline (like Endnote) or online (like Refworks), Zotero's position in the browser gives users the advantages of both. Online, Zotero can easily interact with Web resources like library catalogs; Google tools, including Google docs, Google scholar, and Google books; forums; and wikis. At the same time, all the information is stored locally, so users are able to work offline as well.

Finally, and most significantly, Zotero extends and redefines the whole process of bibliographic research. Where previous tools have been content to manage references, Zotero integrates bibliographic materials with the sources themselves and with users' annotations and notes about those sources. Users store the bibliographic record in the same place that they store the full text, images, spreadsheets, and PDFs and simultaneously take notes that then become part of the searchable text of a database. In short, where previous tools have tried to isolate bibliographic materials, Zotero works to integrate them into the research process.

JM: How does it work?

TO: Let me strongly encourage your readers to watch the screencast tour; this multimedia presentation gives direct illustration of the range of functions in the Zotero interface, and it really provides the best way to understand how the applicaton works. In fact, I am certain that for many of your readers, the tour will provide a whole new perspective on how their research activities can be structured and streamlined within a holistic, integrated working environment.

As readers will notice in the tour, one of the distinctive features of the system is its ability to detect and extract bibliographic information for a range of sources during research. When Zotero senses information on a page you are viewing—a book, a journal article, a filmstrip, a newspaper, or whatever kind of item the system senses—it places a small icon in the location bar of your Firefox browser. When you click the icon in your location bar, Zotero captures the bibliographic information on the page and saves it in your Zotero database. You can then organize the items you capture through the Zotero pane, which you open by clicking on the Zotero logo in the bottom right corner of your browser window (Figure 2). From the Zotero pane, you can organize these items into collections, you can tag them, search them, sort them, annotate and highlight them, take notes, and drag and drop attachments like images and audio and video files onto them. From there, it is easy to right click on any collection and generate bibliographies in an ever-growing list of bibliographic styles, in rich text or as html files. You can also simply drag and drop items into text fields to generate bibliographies on the fly, and for longer projects you can use our Microsoft Word and Open Office plugins to seamlessly integrate Zotero into your writing process.

JM: I do research on three different computers. Is there a way to synchronize the reference database across computers?

TO: You can conveniently transport your Zotero library from one machine to another on a portable storage device. Installing PortableFirefox and Zotero to an external storage device (such as a removable/USB drive, portable hard drive, or iPod) will let you access your collection from any machine that accepts that device. Zotero 2.0 will make this process even easier, allowing users to sync multiple collections through Zotero

without the use of a portable storage device.

JM: A lot of people are leery of open-source products because they require third parties to interpret them. How is Zotero different?

TO: Zotero is so easy to use that it does not demand the kind of support that other open-source tools and systems require. To illustrate the point, in the last few months we have seen a proliferation of Zotero documentation on campus library Web sites across the country and around the world. Librarians at various institutions took time to use the tool and some felt sufficiently confident to develop their own documentation, often without even feeling the need to contact us. While I understand why some may feel hesitant about open-source solutions, our solution is a much better bet for the long haul. Our commitment to open standards means that it is easy to move your information to whatever else comes along; you can import and export information in just about every bibliographic metadata format. Consequently, users can rest assured that even if Zotero is not the final answer, the underlying standards will be the foundation of that solution. Because Zotero's open-source license encourages collaboration with other institutions and developers, we can have confidence that their investments of time and energy will grow exponentially as each acquires a vested interest in the project's success. For example, Zotero is now localized in over a dozen languages, all user contributed. What a proprietary company would have to make a massive investment to complete was easily accomplished by bringing our users into the development process and involving them as a resource.

JM: Trevor, in your presentation, you said that the next edition, Zotero 2.0, will plug the current client-side tool into a server-side Web 2.0-style application. Could you briefly describe what the 2.0 release will offer? And when will we see it?

TO: The 1.0 release of Zotero is a groundbreaking tool on its way to becoming the new standard for bibliographic research, but as you mention, we are already working on the 2.0 release, a server-side component for aggregating Zotero metadata and connecting Zotero users. Zotero 2.0 will allow users to share collections in both ad hoc and official, micro and macro groups. For example, the American Historical Association will have its own group where members can share their bibliographic and research materials. Small research groups will get the same kind of added benefit. In fact, all people working on papers and books together can share research materials in a much simpler and easer format. Anyone will be able to form ad hoc groups around their particular interests, giving scholars an easy way to interact with other researchers in their micro-fields. Among other features, Zotero 2.0 will introduce recommendation models like Amazon's book recommendations (but with a whole lot more than just books) and the ability to take bibliographic RSS feeds of other scholars' most recent public research activity. All of these 2.0 features will naturally allow users to opt in or out. Beta versions of the 2.0 functionality should become publicly available by early January 2008. Over the course of the semester, we will refine the version into a final release.

JM: In your presentation, you also mentioned that the technologies Zotero is built on have the potential to enhance the way people do research. Could you elaborate on this idea?

TO: Scholars and researchers have already started to take advantage of Zotero to change the way they interact with reference material online. By embedding information in bibliographic references it becomes possible for publishers to allow users to instantly capture all the sources referenced in an individual article, a syllabus, or a vita. We like to refer to this as the fluidity of bibliography; reference material is already moving in a much more fluid way between producers and consumers of information.

Zotero 2.0 will further extend these possibilities. Zotero's recommendation model will allow everyday research activities to refine searches for future users, of course, but that is only the beginning. Consider the scholarly monograph. Thousands of hours of research go into every project, and resulting publications really only represent about 10 percent of that work. There is a wide assortment of notes, assessments, and organizational structures that never make their way out to the public. This hidden layer of knowledge has been lost or has traditionally been passed on informally, as a kind of "professional folk wisdom" (Cohen 2007,

¶4). When Zotero users can share their collections, they will have the ability to share much of this work and effort. Once-ephemeral products of research—insightful but peripheral commentary, helpful abstracts, even bibliographies themselves—will become part of the wider scholarly effort, contributing to the collective pool of notes about items and to the collection of knowledge in a particular area.

JM: Most of our conversation thus far has focused on what Zotero can do for researchers, but you mentioned students as one of your core audiences. What advantages does Zotero offer to students and teachers? Does Zotero engage those learning to research in different ways than it does those who are already consummate researchers?

Students are indeed one of Zotero's core audiences. One of the big advantages of using Zotero in conjunction with student research is that it makes explicit much of the implicit prewriting process. Students organize, take notes, tag, and categorize various source materials before ever starting to write. Responsible research practice is on some level encouraged by the structure of the tool. We have augmented this tacit capability with an additional power tool for teachers to make their students' bibliographies completely transparent. Any user can generate comprehensive reports including every item in a collection, the tags and notes associated with those items, the dates those items were added to the collection, and where the resource was acquired. Students can print these reports and hand them in as documentation of their research process; teachers have found these comprehensive reports to be a useful way to peer into and encourage the prewriting process.

Zotero 2.0 will further extend the power of Zotero in the classroom. Students and teachers will be able to create collaborative bibliographic collections that reflect and extend the work in the classroom or collaborate with researchers and students at other institutions to build a shared resource around a particular topic. RSS feeds from the collections of other students in the class and of the instructor will allow a new way for teachers to be in touch with their students' research activities and give students a portal into the research practices of their teachers.

JM: Thank you very much, Trevor, for introducing our readers to this new tool, which should indeed transform the research process for a new generation of scholars. We look forward to following your progress in developing Zotero 2.0 and beyond.

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