

## **Zotero: Open Source Citation Management Tool for Researchers**

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***Abstract** - Citations are always treated as the backbone of any manuscript. A reference to an article plays a very vital role at the time of acceptance and also very helpful to find out the origin of a study. Incomplete references, outdated references and missing volume number, issue number and year are always identified by the reviewers of journals. An accurate reference of a manuscript always considered as a principal issue and identifies the quality of article. Some commercial software packages are now available in the market for managing citations, but most of them are unaffordable by a research scholar. In this context, open source software can solve the problem of researcher without giving financial burden. This paper describes about the functions of Zotero, open source software for managing citations and also explores the capacities of Zotero to represent citations. An attempt has been made in this paper to integrate Zotero, the open source citation management software by the researchers at Siksha 'O' Anusandhan University, Bhubaneswar to collect, organize, cite and share their resources more efficiently.*

**Keywords:** Open Source Software, Citation Management Software, Citation, Zotero

### **Introduction**

Citations are an important component of any research article or thesis. During the acceptance of research articles, citations play a major role and contribute to the quality of literature. Sometimes, common mistakes are occurring during the bibliography composition such as references not in prescribed format or incomplete and outdated references. These silly errors can be completely avoided by using bibliography management tool<sup>9</sup>. The use of this citation tool is well established among researchers and students. The basic function of any citation management software is to store, organize, format reference within the manuscript. With help of this software researchers can easily track of their records and facilitate to edit for scientific papers they write. This tool helps researchers to save their time in writing their scholarly papers. There are several software packages are available for compiling citations like Reference Manager, Endnote and Ref Works. But, these are proprietary versions and expensive for researchers scholars, scientists, etc.<sup>8</sup>.

### **Purpose and Importance of a Citation**

Today in the age of information technology, writing is also treated as a skill. Especially scientific writing always regarded as most vital. It is mandatory in scientific writings that, to cite the references as an acknowledgement to original producer of idea and knowledge. Hence, there is a need to have proper authenticated references so as to citations. Citations are

always important because it is essential for research, education, social activities and publications to present the knowledge. References and bibliography lists are available in articles, theses, books, etc. It contains all the necessary information like – author name(s), titles of articles, books and journals name, date of publication, volume and issue numbers of articles and page numbers for identification and tracking of publications<sup>5</sup>. There are various styles of citation formats such as American Chemical Society (ACS) style, Modern Language Association (MLA) style, American Psychological Association (APA) style, Chicago Manual of Style (CMS), etc. Failing to cite is a part of violation of copyright act i.e. violation of person's ownership /stealing idea of others. The importance of citations in any manuscript is as follows:

- To acknowledge and give credit to the work of others as well as to avoid the risk of plagiarism.
- To enable readers to track the used sources to avoid the overlapping.

## **Objectives**

The main objectives of this paper are as follows:

- To explain about the citation management software and its application for scientific communication.
- Discuss about the features and working techniques of Zotero, an open source citation management software.
- To motivate research scholars of Siksha 'O' Anusandhan University to use Zotero and create their own databases to disseminate information.

## **Literature Review**

Relevant papers related to the study have been reviewed and presented. Trinoskey, J., Brahma, F.A. and Gall, C. (2009) have stated that, Zotero allows to collect, organize, store and cite resources in a single location and also provides more options for note taking as compared to the most popular citation tool EndNote<sup>10</sup>. Duong, K. (2010) describes that, Zotero a fascinating alternatives to commercial citation tools as it is free of cost, user friendly and easily integrated with websites, repositories, online databases and catalogs. Here author, who is a science librarian, attempts to encourage Zotero to faculty members and students of the college of Natural Sciences and Mathematics, California<sup>4</sup>. Butros, A. and Taylor, S. (2010) gave a comparison study between four popular citation management software namely EndNote, RefWorks, Mendeley and Zotero. In this paper they have taken two commercial softwares and two open source software for their study. Here author also provide the advantages and disadvantages of above said software<sup>2</sup>. Ahmed, K.M. and Al Dhubaib, B.E. (2011) have stated in a correspondence that Zotero is most powerful, because it is formatted with different citation export options as well as many citation styles. They also stated that Zotero an extension of the Firefox browser and acts as a personal research assistant<sup>9</sup>. Fernandez, P. (2011) explores Zotero and also finds stated that it reduces many barriers of information access by the research scholars around the world<sup>12</sup>. Murimboh, J.D. and Hollingdale, C.R. (2011) have reviewed Zotero and discuss its features such as collecting, annotating, backing up and synchronizing, and sharing references with scholars and collaborators<sup>11</sup>. Ramesh, A. and Rajasekaran, M.R. (2014) explains about the Zotero along with other bibliography management software. They also discuss about the installation, program features and advantages of Zotero in their short review<sup>8</sup>. Jasimudeen, S. and Vimal Kumar, V. (2014) have explains about the expertise in citation management software by LIS professionals in India. They also stated that Zotero is more popular among library

professionals<sup>1</sup>. Idri, N. (2015) presents the working features of Zotero and planning to introduce the Zotero software at Bejaia University, Algeria in the syllabus of the subject 'Bibliographic Research' for master students. Here, author suggests the implementation of Zotero software in the syllabus to help the students in collect, organize, cite and share resources easily<sup>13</sup>. Kuglitsch, R.Z. (2015) describes Zotero as a new application of citation management system for embedded librarianship and assessment. Also suggest that Zotero is a new technique for assessing student information literacy in a context that supports information literacy<sup>3</sup>.

### **Zotero – an Open source Citation Management Software**

Citation management software also called bibliographic software or reference software. This software has the ability to import citations from any websites and favorite databases, build and organize bibliographies, and entering many bibliographic references in to manuscripts. Citation management software also saves time of the research scholars in collecting, organizing and formatting their references for publication<sup>21</sup>. To capture bibliographic information about research topics, create bibliographies, add footnotes, and manage research collections for the research scholars is the primary features of the software. It is also used to save and organize references in a personal database. By using this personal database one can create citations or list of references according to different styles of citations. Citation management software generally categorized in to four models according to distribution such as web based, desktop based, browser based and hybrid. Each distribution model is also divided in to two more categories like commercial and open source version. In the case of citation management software most of the free tools are not open source in character. Main reason for selecting open source software includes cost effectiveness, availability of source code, and freedom from vendor, facility for modification, customization and redistribution. There are a good number of citation management softwares available to perform these tasks on computers<sup>15</sup>, but the popular tools in academic libraries currently are Zotero, RefWorks, Mendeley and EndNote<sup>16</sup>. We have chosen Zotero, open source software in this paper to collect, organize, cite and share information by the researchers at Siksha 'O' Anusandhan University.

In 2006 Zotero was launched as a project of the Roy Rosenzweig center for History and New Media at George Mason University of United States with an extension of the Mozilla Firefox web browser<sup>18</sup>. In 2011, Zotero came in a standalone version which is compatible to Safari and Google Chrome<sup>17</sup>.

### **Working Description of Zotero**

**Collect:** Zotero has the ability that enable users to record the relevant citation information from online and keep them in a personal database, which can be used to generate internal citations. If ISBN or DOI (Digital Object Identifier) number is available, then one can select the add item by identifier button<sup>6</sup>. Then Zotero will attempt to locate the items and automatically keep them in the personal library. Some times Zotero does not detect the bibliographic information automatically. Hence, in this case one can add an item manually by selecting the new item button. In many cases Zotero collects metadata (such as title, authors and date) automatically. When Zotero detects available metadata from a website, an icon will appear in the address bar. In case of single item availability, an icon corresponding to the type of item will appear where item may be journal articles, books, news articles, webpages, or any other digital objects. Sometimes a folder icon may appear, it means multiple items are

available. By clicking on the above said icon in the address bar, the item(s) are automatically saved to the personal library, which is created earlier by the user<sup>21</sup>.

**Organize and Annotate:** The personal database, which is created earlier by the user, may be edited and organized according to the preferences. The database can also store a copy of the original item, which may be a PDF file or a snapshot of a webpage. Then stored items can be annotated and analyzed by using different methods according to the user's requirement. The database of Zotero has a robust folder system. Where each folder can store many sub folders and items can be dragged between folders. The folder system is optional for the user. User can connect their items through a related item system. User can also create standalone notes that can be related to items. These notes can contain information as kept by the user. After creation of all the items by the user, these are searchable and have the potential to be integrated fully in to the research process.

**Cite and Share:** The most typical use of the stored bibliographic data in the Zotero database is to be generating citations for the research manuscripts. Generally Zotero can be used to download bibliographic data according to required style guides. Zotero supports Microsoft Word, OpenOffice, LibreOffice, NeoOffice and HTML. User can easily insert citations when writing a document by clicking on Zotero button<sup>7</sup>. In Zotero, citations can be highlighted and dragged and dropped from the database in to various text fields including chat windows, blogging software, or E-mails. In a same group of libraries references can be shared between different users. Where, users (who have Zotero account) are invited by the group owner to join. A group is very useful, when the authors of a group contribute to writing a common document. Otherwise, each author can edit citations come from a group library by using Zotero.

### **Strengths of Zotero**

- Zotero, which is free and open source
- Zotero can also be run as an offline database and it does not require constant internet access to function<sup>14</sup>
- In Zotero references can be shared easily with colleagues or other researchers
- It is also capable to capture citations from other websites such as Google Scholar, PubMed, Amazon.com and other webpages of journals, where DOI, PMID and ISBN are displayed<sup>21</sup>
- It also have the ability to extract metadata from a PDF file
- Zotero users are also able to annotate webpages
- Zotero creates a bibliography easily, when the user selects references and drag them in to a word processor
- Zotero supports Microsoft Word and other open office
- Zotero can import Bibtex, RDF, RIS and MODS data formats<sup>19</sup>
- A web translator facility is also available in Zotero to scan a website to determine the desired resource type
- Zotero is constantly improving its functions by the help of largest community network
- Finally, it synchronizes and backup saved research library in to its website i.e. [www.zotero.org](http://www.zotero.org)

### **Weakness of Zotero**

- Zotero provides only 300 MB as free space
- Zotero cannot prevent and remove duplicate items automatically, but one can do it manually

- Zotero does not have many styles in comparison to EndNotes
- In Zotero, editing and creating of styles can be difficult

### **Installation of Zotero**

Zotero which is works on Windows, Linux and Mac operating systems. It offers two options for downloading Zotero i.e. Zotero for Firefox or Zotero standalone. Another easy option for using Zotero is that to register and create an online account on Zotero home page.

- Zotero for Firefox or Zotero standalone: Both of the versions will depend largely on the web browser. However, one can download both versions on the computer. In Zotero for Firefox, Zotero library is embedded in to the Firefox web browser that allows for easy navigation from webpages to the Zotero library. If one always uses Firefox as web browser, then this option may be chosen. Zotero standalone option is same in functionality as Zotero for Firefox, but this version has the ability to work with other web browser such as Google Chrome and Safari in addition to Firefox. To get full functionality of Zotero standalone, one needs to download the relevant browser extension for Google Chrome or Safari.
- Zotero online account: To use this version one have to register and create an account with Zotero, which provides cloud-based server backup facility to the personal research library of Zotero. One can share references with other Zotero groups. Through this online account users can communicate with other users, participate in the forums and also in group discussions.
- If one has installed Zotero for Firefox and wants to install the Standalone version of the Zotero to the computer, then there is an option to import settings from Zotero for Firefox to Zotero Standalone at the end of the installation. To save items in both Zotero for Firefox and Zotero Standalone simultaneously, the user have to click on Yes.

### **Creating Bibliographies using Zotero**

**Drag and Drop Quick Copy:** This option of Zotero is the best example for quick addition of references to a paper, blog post, or e mail. To get this technique, simply select references in the center column and drag them in to any text field. Then, a numbered and alphabetized bibliography will automatically create by the Zotero. By selecting preferences through the Actions menu (the gear icon) one can configure quick copy preferences.

**Right Click to Create Bibliography:** In this technique, users should highlight one or more references first and then right click to select Create Bibliography from selected items. After the selection of a citation style as desired and choose one of the following methods for the creation of bibliography:

- Bibliography can be saved as a rich text file (RTF)
- For viewing in a web browser, bibliography can be saved as an HTML file and this format also allowing other Zotero users to view and capture the documents as bibliographic information.
- Bibliography in clipboard helps users to paste into any text file.
- Bibliography can also be send straight to the printer for printing

**Integration of Word Processor:** Microsoft Word and OpenOffice plug-in of Zotero give more control for creating bibliographies. The above plug-ins are very useful in adding text citations and footnotes to bibliographies. After successful installation of the plug-in, one should see a row of icons in the toolbar of Microsoft Word<sup>13</sup> (Fig. 1).

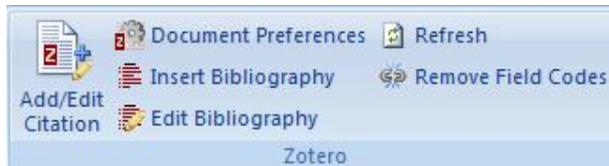


Fig. 1: Icons in the toolbar of Microsoft Word

- Add Citation: After selection of the citation style by using Add/Edit Citation button, the user can select the item or items to cite. After clicking on “OK” the user can find a properly formatted citation in the document.
- Insert Bibliography: By using this button, the user can generate a bibliography from all the referenced items created by him.
- Edit Citation and Edit Bibliography: These buttons allows editing citations and bibliographies respectively, which have already inserted in to the documents.
- Zotero Refresh: This button updates the references with any changes in the Zotero collection of the user.
- Document Preferences: It is useful in changing of bibliographic style for the entire document (Fig. 2).

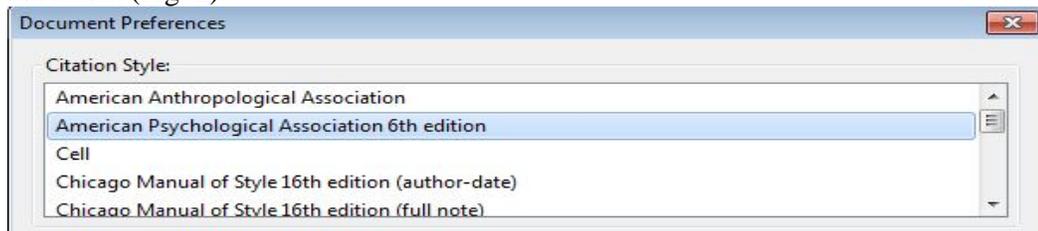


Fig. 2: Document Preferences

### Backup of a Personal Zotero Library

Although one can take back up of the personal Zotero library with Zotero online, but sometimes it goes wrong with cloud base storage. Like Zotero online, error may occur to the Zotero library stored on the personal computer. So, it is most important to take back up of the personal Zotero library in regular interval. Following steps are for taking backup of a personal Zotero library on an external drive.

- After opening Zotero for Firefox or Zotero Standalone, click on the Preferences and then advanced tab.
- Click on the Files and Folders, then click Show Data Directory bar (Fig. 3).

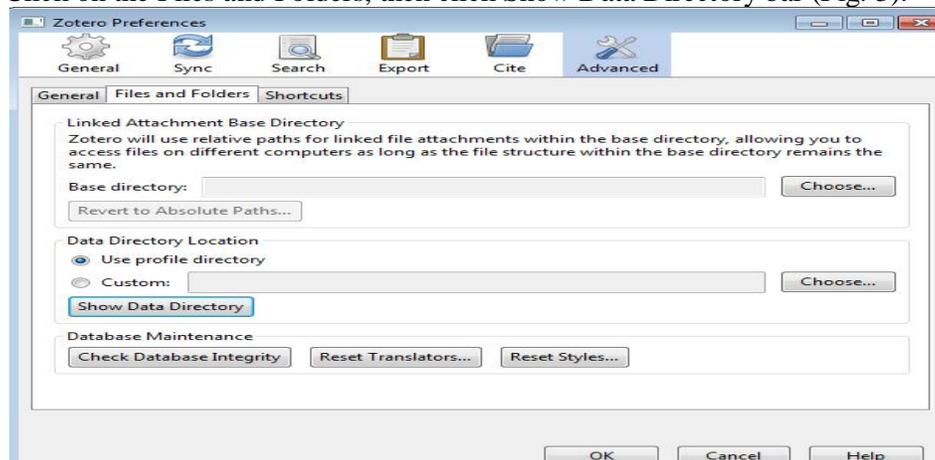


Fig. 3: Show Data Directory bar

- ✓ Now close the Zotero for Firefox or Standalone and copy the Zotero data directory to a backup location, e.g. a USB drive by creating a new folder with name and date.

### **Zotero at Siksha 'O' Anusandhan University**

Recognizing its contribution to technical and professional education the University Grants Commission (UGC), in 2007, declared Siksha 'O' Anusandhan as a Deemed University U/S 3 of the UGC Act, 1956. Ever since its inception Siksha 'O' Anusandhan University, along with all its constituent institutes, has shown impressive progress in terms of knowledge & skills development, human resource and material resources. Siksha 'O' Anusandhan University was reaccredited by NAAC with an 'A' grade in 2015 for a period of 5 years. Ranked 16th by the Ministry of Human Resource Development through its NIRF India Rankings 2016. The University has also research programs offering Ph.D. degree. Full-time research scholars with fellowships are taken to carry out research in different institutes. Currently more than one thousand research scholars are pursuing their Ph.D. degree. In order to get our library on front and promote Zotero among Ph.D. research scholars of Siksha 'O' Anusandhan University, we have initiated awareness programmes on the use of Zotero by offering small training programs. We are also planning to propagate the Zotero by organizing internal workshops on Zotero at our library to encourage all researchers of Siksha 'O' Anusandhan University.

### **Conclusion**

The citation management software is most essential for scientific writings and its communications. In low budget and dwindling funding to the libraries, library professionals always look for the creative ways to provide information services to their users<sup>20</sup>. Without having EndNote, understanding and working on Zotero could also be of interest to the academic library professionals as they learn about Zotero and encourage their research scholars, faculties and students to use the same. The ability to integrate with MS Word and OpenOffice make Zotero as ideal software. By using this facility the users can simply insert in their personal library at the time of article composition. Although Zotero has a few limitations, ultimately it is free and it has all the features to be a good citation management tool. In addition, Zotero has large community of developers. Overall, Zotero is excellent citation management software that is very easy to use. Now Zotero become a strong competitor among other citation management tool.

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