A journey to access free open source referencing management systems (FOSRMS): Zotero

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Abstract

Investigations into increased cost effective service provisions at the Western Institute of Technology at Taranaki (WITT) Learning Resource Centre (LRC) resulted in a request for the LRC to find ways to reduce one-to-one support. One suggestion was to put in place a cost-effective, user-friendly and pedagogically appropriate referencing management system (RMS) which would enable students to engage constructively, effectively and independently with the conventions of scholarly citation, namely referencing. This journey involved exploring programme options, carrying out a viability pilot study and following up with a review of student usage or 'uptake' project.

As a result of this, WITT seemingly became the first New Zealand tertiary educational institute to install an equitable option, namely a free, open sourced referencing management system (FOSRMS) (Zotero) across campus. Student involvement and support for the project resulted in a higher than anticipated uptake with approximately 85% of students using either Zotero or other electronic options. The flow-on effect of this is greater student independence as fewer students appear to be seeking referencing support at the LRC.

Introduction

Institutional budgetary cuts tend to have a ripple-down effect, which is felt throughout all departments, including Learning Resource Centres (LRCs). Budgetary cuts at WITT instigated a search to improve cost efficiencies in the LRC tutor's time. Reduction in student individualised appointment times was the main target and it was evident, from LRC statistics that working with students on referencing took a considerable amount of that time. A two-pronged approach was decided upon. Firstly, a concerted effort was pursued to shift the main topics being requested in one-toone sessions into the classroom workshops. Secondly, student access to RMS across campus was introduced. Introducing RMS availability to students, such as Endnote, is not a new innovation for tertiary education, but proprietary software incurs considerable annual charges to the institutions and/or its students, and consequently their provision implies inequity, in that only those who can afford them can have them.

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The introduction of a RMS into our institution involved a three-year journey. This included a suitability quest and comparative review of free open source RMS (FOSRMS); a pilot project involving working with students to determine suitability for polytechnic students; and after a presentation at the 2011 ATLAANZ conference, a request from conference session attendees to do a student usage project twelve months after Zotero was installed across campus.

Background

WITT's financial restraints, during the last five to ten years, resulted in an across campus search for more cost effective institutional options that would simultaneously maintain and/or improve services. During 2011 the WITT LRC service reviewed its provisions as part of this process with the goal of improving staff time usage. Identified commonalities across individualised appointment times and discipline (departmental subjects) support revealed that the requests for American Psychological Association (APA) referencing and writing assignments utilised the most significant amounts of LRC tutor's time. A two-pronged approach was recommended:

- i. increased in-class, integrated, course related, activity based, study skills (academic literacy) programmes
- ii. the introduction of FOSRMS.

The first was implemented via an integrated academic literacy package which involved LRC staff teaching the programme but working closely with academic staff to design, implement and evaluate a study skills programme based on student and course related study needs. The second resulted in this exploratory project to identify a suitable FOSRMS package, to complete a pilot project to determine viability of across campus implementation and to monitor student uptake. This project had the potential to provide multiple benefits at different institutional levels:

- i. institutionally: a cost saving with improved service provision;
- ii. for Faculty staff: a reduction in marking time;
- iii. for the Learning Centre: a reduction of individualised tuition time;
- iv. for students: increased efficiency, independence and choice.

WITT had previously had a RMS (Endnote) available on campus, but it was discontinued due to a low cost/benefit ratio; essentially, it was under-utilised and was costing approximately \$40 per user per year. It had only been available to staff, but due to the complexity of the package, few used it. Discussion with 2011 ATLAANZ conference participants also suggested that the student uptake of Endnote, in some of the institutions, was also limited for similar reasons.

During 2011, WITT students were taught to reference manually and introduced to free online tools such as 'Style Wizard' (EB Communications, 2009) and/or 'Son of Citation' (Warlick & The Landmark Project, 2010). Unfortunately, both packages

could only compile one reference at a time and they did not save the entries. This meant the reference list still had to be generated manually and even then, the error rating in many of the entries was high, thus contributing to the high usage of LRC individualised appointments.

Why use a referencing manager (RMS)?

Part of this exploration process involved being able to justify the introduction of RMS for student usage as WITT students had never been offered this option before. The exploration revealed that the academic rigour involved in accurate referencing/citation when writing articles or assignments had always presented challenges to all writers (Angelo, 2010). To meet this challenge, referencing managers were designed – 1983, Bookends for Apple, followed in 1988 by Endnote (Wikipedia Foundation Inc., 2012). As RMS have been in existence for the past three decades and are still being used today, this indicates that writers find these tools useful.

The accuracy and consistency that RMS offers in comparison to manually completing the process, is succinctly summarised by Nagel (2011) (Figure 1 & 2). Manually, all articles have to be filed, sorted and entered individually both in text and then compiled alphabetically into a reference list; a process often seen as an arduous and extremely time consuming (Nagel, 2011). Utilising a RMS involves inserting all readings into a library and then checking for accuracy. For in-text referencing, the appropriate source is selected and inserted in the text, then, with the 'click of button', all items used are automatically organised, sorted and inserted into the reference list; a major saving of time.

With APA comprising of over 90 different formats for a reference list (American Psychological Association [APA], 2010), referencing presents a challenging complexity, especially for new and returning students. The process involves considerable typing with the potential for errors in formatting and missed sources, for example. Disadvantages include the time to learn RMS and the potential for 'computer glitches'.

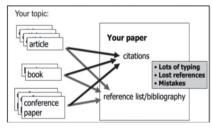


Figure 1. *Referencing manually* (*Nagel, 2011, slide 4*)

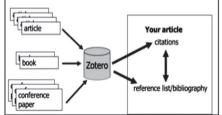


Figure 2. *Referencing with a management tool (RMS) (Nagel, 2011, slide 5)*

The automaticity of the process is what Gilmour and Cobus-Kuo (2011) refer to as "a boon to scholars who find themselves spending far too much time navigating the intricacies of multiple citation styles" ("Citing references", para. 1). They further noted that any manual alteration that may be necessary is quicker than generating a reference list manually. James (2012) and Owens (2010) go so far as to suggest that all students from secondary to PhD should all utilise the timesaving tools that this technology presents to them, especially if they are free.

Overall, making RMS available to all students would provide them with a tool that would save time, result in greater accuracy and consistency, meet the demands of academic rigour and free up time to allow them to focus more intently on what they enrolled for – course content.

Choosing the appropriate RMS tool for WITT students

In 2011, an exploratory project was initiated to explore available packages. The criteria for selection included the need to:

- · compile and format in-text APA referencing;
- · automatically generate a reference list/bibliography,
- · to be free/open sourced, and
- be user friendly for polytechnic undergraduate students.

The focus on APA was predetermined due to a previous institutional decision that had standardised referencing across campus to make student transitioning between programmes more seamless.

Both the University of Auckland (UoA) and Auckland University of Technology (AUT), during the time of the study, mentioned software on their LRC websites (the original sources of 'Style Wizard' and 'Son of Citation') (AUT, 2012; UoA, 2012). Of the RMS mentioned on these two sites only Endnote seemingly had institutional support.

A literature search of RMS studies identified a comprehensive comparative study of 30 different programs (Wikipedia Foundation Inc., 2012). With this greater awareness, the essential criteria expanded to include:

- · work within a Windows or Mac environment,
- · be able to function within Word and Open Office,
- · be password protectable, and
- work on the existing WITT system.

A desirables list included:

- exportable/importable between packages enabling libraries to be moved to and from other systems to facilitate student needs if they moved between institutions ,and
- · have an rss feed.

The first criteria (free and open sourced) reduced the choice available to 17 RMS. Focussing on WITT student based criteria (Word or Open Office either on a PC or Mac), twelve others were eliminated reducing the list to five (Table 1).

Zotero was the only one that met both the necessary and desirable criteria. It was not only open source, but was updated regularly, from user feedback, by educational professionals. Their latest development, making Zotero mobile, increased its desirability. Although Mendeley offered a free 'Earth' account, the full version had a monthly charge. A private company owned it which Barsky (2010) suggested could be a considerable disadvantage as it could disappear at any time.

Packages left	Free	Open Source	Windows, & Mac	Word/open office	APA style	Password protected	Export to Endnote	Rss feed	Pub med links
Aigaion	1	1	1	х	1	1	Х	X	х
Docear	1	1	1	1	1	X	1	X	х
JabRef	1	1	1	Х	1	Х	1	X	1
Mendeley	?	?	1	1	1	1	1	1	1
Zotero	1	1	1	1	1	1	1	1	1

Table 1. The highest rating referencing managers according to student need.

An important consideration, missed in the initial analysis, was the accuracy of the programs; a problem that had caused concern with previously used tools. Gilmour and Cobus-Kuo (2011) provided a comparative accuracy analysis of four tools (CitULike; Mendeley, RefWorks and Zotero) of which only Zotero and Mendeley were free. This study reviewed the four tools against five referencing styles, including APA, measuring number of errors, errors per citation and error-free citation. Overall, for APA, Zotero had the best results for a free package - a little above Mendeley.

Other comparative studies (Barsky, 2010; Fenner, 2010; Gilmour & Cobus-Kuo, 2011; University of California, 2012) positively evaluated Zotero and Mendeley but Zotero was described as simpler. Angelo's (2010) research also reported support for Zotero's because it was "simply easier to use than the alternatives and provided the same level of functionality [such as Endnote]" (p. 72-73).

Zotero's use of cloud-based technology is a major bonus despite it only working from a Firefox platform. Because it is cloud based, it works directly with the internet in a similar way to Facebook thus the information is stored externally, is accessible from any computer in the world and automatically facilitates direct entries from websites or library databases. The package can be installed on home computers and at WITT and synchronised from wherever it is used. Unless an institution already accesses the Firefox platform this is a potential obstacle, one which WITT did not have to address as the WITT library computer system already utilised it. A standalone version was also available for those without internet access at home.

Finally, a further reason for the LRC's choice of Zotero was because according George Mason University (2012) over 180 tertiary institutions from around the world, including Yale, Harvard (United States of America) and the University of Cambridge (England) recommended using Zotero (George Mason University, 2012).

Learning Centre pilot project

Once Zotero was chosen as the preferred package, a group of students enrolled in one of WITT's degree programmes were offered the opportunity to trial the tool. A volunteer was chosen to independently explore the package, which he then shared with other class members. All the students who learned the program endorsed the project and the LRC presented the results to WITT management and the research committees. The volunteer's summation of the project: "I've found Zotero to be an excellent tool in the writing of my first few essays. EASY and FREE – two of my favourite things. [It was] so beneficial to my learning ...initially [I] really struggled with APA ... perfect result in referencing now. I think I was the only one in my class" (M. Fabri, WITT Bachelor of Social Science student, personal communication, March 29, 2011). He first thought using Zotero might be considered a 'bit of a cheat', but concluded that his focus was course material, not referencing. The management and research committees subsequently approved the installation across campus for 2012.

After presenting the first stage at the 2011 ATLAANZ conference (ATLAANZ, 2011) participants expressed an interest in student uptake of the package and this resulted in a follow up project and a further presentation at the 2012 conference. The initial volunteer, with the LRC staff, produced three follow up teaching videos (Morris & Fabris, 2012) that were installed on the WITT Library site as teaching tools

2012 Project: Student uptake

Method

During 2012, a project was set up to determine student uptake and ease of usage of Zotero. Questionnaires were distributed through the library website and hard copies were available in the library for any interested students to complete. A level four university preparation class (L4), who had classroom instruction on APA, Zotero and Son of Citation, also had the questionnaires given to them to determine whether learning to use the package in class was more effective than self-instruction.

Data collected included age, gender and ethnicity of participants, followed by their process preference and their reasons for usage/non-usage of Zotero. The data for the two groups (the generic responses and the L4 group) was collated using Excel and colour coded based on their referencing preference selection. The project was given low risk ethics approval.

All courses who utilised the academic literacy in-class programme across campus were taught to do APA manually; level four and above had both Zotero and Son of Citation demonstrated, but not necessarily taught to them at a 'hands on' level; and level one to three were only introduced to Son of Citation. At that time, although Zotero was freely available across campus, very few faculty staff knew it existed which resulted in some expressing a little resistance to student use. Those who had experience with it, encouraged students to use it. Those academic staff who were less enthusiastic about the use of Zotero argued that it was important that students first understood the referencing process before being shown how to use a referencing tool. As a result, teaching of APA and the RMS were graduated according to levels of study. Handouts on installing and using Zotero were freely available on the LRC handout stand and teaching videos utilising WITT students were put the WITT Library website.

Results

Forty student responses were received back from the questionnaires: 18 from the generic student population and 22 from a level 4 class. All respondents were required to use APA for assignments. Those who responded from the generic student population were from levels two to six (Figure 3) although there was a higher interest from level four and above. The class sample was all level four.

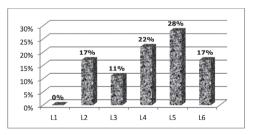


Figure 3. Percentage of generic population participants and their levels of study

Both groups were mainly female (78%, generic; 68%, L4), aged under 30 (67%, generic; 77%, L4) with 20% more Pākeha than Māori (Table 2).

Table 2: Demographics: Gender, ethnicity and age of participants

Sample	Male	Female	Mãori	Pākeha	International	Other (International with NZ Citizenship)	Under 20	20-29	30-39	40-49	Over 50
Generic	22%	78%	33%	55%	6%	6%	16.5%	50%	11%	6%	16.5%
L4 Class	32%	68%	27%	59%	0%	14%	45%	32%	5%	18%	0%
Total	28%	72%	30%	57%	3%	10%	33%	40%	7%	13%	7%

The generic group reported that 39% were self-taught to use Zotero from LRC handouts, 22% were taught by other students and 39% requested teaching from the LRC. Overall, 72% either were taught in class or visited the LRC for follow up support.

The overall response from the 40 questionnaires completed to referencing methods used, revealed that after 12 month institutional accessibility to electronic referencing (Son of Citation and/or Zotero), 85% of the survey participants had utilised the tools (52.5% Zotero only; 17.5% Son of Citation only; 12.5% mixed methods; 2.5% other) whereas only 15% chose to reference manually. Those who chose to solely reference manually explained that their choice related to a lack of home access to computers or lack of computer skills, they had not had time to trial it thoroughly, wanted to understand referencing properly before using it and found that it did not work in the free version of Word.

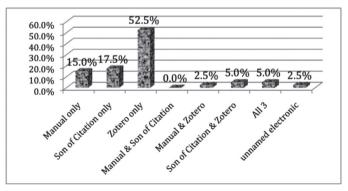


Figure 4: Whole sample referencing method preferences

One student from the generic group reported used electronic referencing which was neither Zotero nor Son of Citation. Twelve and a half per cent indicated that they used varying methods depending on the amount of referencing required in an assignment. If there were only one or two references, they frequently did them manually (Figure 4).

When comparing the 'Zotero only' uptake between the two groups, the difference was minimal with only 4.5% more using it from L4 group. The main difference between groups related to the apparent L4 lesser usage of Son of Citation (8.6%) but greater (7.1%) manual only uptake (Table 3). Reasons for this were not given.

	Manual only	Son of Citation only	Zotero only	Manual & Son of Citation	Manual & Zotero	Son of Citation & Zotero	All 3	unnamed electronic
All	15.0%	17.5%	52.5%	0.0%	2.5%	5.0%	5.0%	2.5%
L4 Class	18.2%	13.6%	54.5%	0.0%	0.0%	4.5%	9.1%	0.0%
Generic Group	11.1%	22.2%	50.0%	0.0%	5.6%	5.6%	0.0%	5.6%

Table 3: Comparison of generic group and L4 class referencing method preferences

Students across both groups reported the main reasons for Zotero usage related to ease of use, the time saved, ease of modification, how it helped with keeping track of references and that it was free (Table 4).

Table 4. Students main reasons for using Zotero.

Ease of Use	Time saved	Easy to modify	Not used		
23 (57.5%)	9 (22.5%)	2 (5%)	6 (15%)		

The reasons for not using Zotero as identified by the generic group:

- "quicker manually and I can then fully understand referencing" (10)
- "using Son of Citation, I don't have my own computer yet (2)
- "had difficulty loading/syncing on different computers, "had difficulty citing my references"
- "Zotero needs to accept all identifying doi numbers. Not accepting some NZ books. I need to put more info into the library" (11)
- "learnt about it too late for my project" (14).

There were fewer identified challenges for the L4 class although one identified that it did not work on MS Word free edition. Most of the issues raised were taken to the LRC and support was given to get the programme working, although some issues were beyond LRC expertise, such as it not working on the free edition of Word.

Because much of the literature reviewed discussed the ease of installation and use as an advantage, students were asked to share their experience with putting Zotero onto their computers. It was a three-step process, namely downloading Firefox, Zotero and plugin applications that linked Zotero to Word. The students' responses unanimously supported the ease of installation suggested although generally those who attended classes seemed to find it easiest (Figure 5 & Figure 6).

One of the findings of this project was how easy it was for most students to take over the installation and learning process themselves, especially if they had attended classes. Only five of the 40 (12.5%) students experienced any difficulties with installing or using Zotero. There did not seem to be demographic factors affecting the difficulty. All five were from the generic group; all were female, one of the six was Maori (16%); there was the only international and three of the ten Pākeha (30%). Age wise, three (60%) were between 20 and 29, one was under 20 and one was over 50 years of age. No problems were experienced if classes were attended. Students verbally expressed that it took about 15 - 30 minutes to load the three packages and register. It took 15 minutes to learn the package and approximately one-hour practice, while working on an assignment, for it to become part of the learner's tool kit.

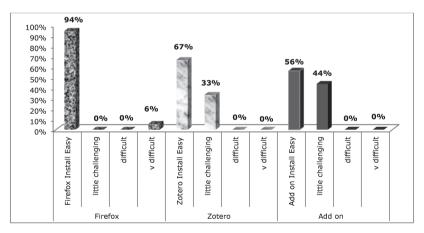


Figure 5: L4 installation levels of difficulty

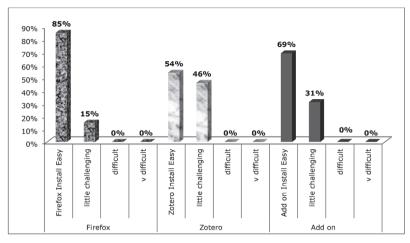


Figure 6: Generic group installation levels of difficulty

Reflections

Initially, this project was explored to find potential benefits at multiple levels. Firstly, institutionally, it provided a service previously unavailable to WITT students and with minimal cost, namely installation and maintenance by IT and LRC staff time, but this would have occurred with any such software. The presentation of OSFRMS, whether it is Zotero or others such as Mendeley, does demonstrate a potential saving to both students and the institution (when supplied to staff). According to the University of Auckland, the current cost of Endnote (the equivalent proprietary software) to students is \$60.00 (The University of Auckland Library, 2013). Secondly, anecdotal discussion with academic staff has indicated a considerable time saving in marking, but this needs further investigation. Thirdly, interim LRC statistics, pertaining to service usage, indicate less time by LRC staff being spent on the mechanics of referencing, but more is spent assisting students load and learn to use Zotero, especially for the generic group. This is seen as an interim change until a full in-class teaching programme is developed across campus. Conclusive information will not be available until the end of 2013.

Four findings of particular interest to LRC staff were:

- The student uptake of Zotero (65%) was much higher than anticipated.
- With the introduction of RMS, an important benefit emerging is that it now takes less time to teach the mechanics (the 'hows') of referencing thus providing more time to work on the pragmatics and ethics underlying when and where referencing should be used, to lessen the chance for plagiarism.
- Although students can install and learn Zotero independently, fewer difficulties were experienced if they had in-class tuition.

• At the 2011 ATLAANZ conference a member raised concerns relating to students already having made a commitment to Endnote. Zotero is just another option, although, if a full change-over was anticipated or desired, transitioning could occur quite simply as libraries (data collection) between each are transferable.

Final thought to ponder

If an institution is only providing/recommending proprietary software is this a discriminatory practice that provides unfair economic advantage to those who can afford RMS? The provision of OSFRMS, irrespective of which package, provides greater equity to all students.

Conclusion

What began as an exploration for improving WITT LRC staff time utilisation within a challenging fiscal tertiary environment provided the platform for identifying a tool that is providing multiple benefits across the institution. Referencing Management Systems, such as Endnote, are widely used across New Zealand and other worldwide institutions but the associated costs eliminated them as an option for WITT. What is relatively new in New Zealand is the use of a free, open source option (FOSRMS), namely Zotero. This alternative has provided WITT staff and students access to an economic and pedagogically appropriate academic, time saving tool. Zotero has withstood close scrutiny from the academic and cyber communities and met all the criteria considered essential to meet WITT student needs. This project explored options and listened to the student voice. This voice has given a fairly powerful message that FOSRMS have provided students with a more equitable option that has made referencing less challenging, however; it is not the answer for all. Although 85% of students are using RMS (65% Zotero), 15% still choose to reference manually. Our responsibility, as LRC educators, is to provide our institutions, academic staff and learners with enough information for them to make informed choices about processes that will enhance the student learning experience. After twelve months exposure to the FOSRMS, WITT students have substantiated Puckett's (2011) thoughts when he stated if "the 20th century tool for writers was the typewriter; its 21st century counterpart is the word processor. In the same way, if a 20th century tool for researchers was the index card scribbled with citation notes, its 21st century equivalent is Zotero" (p. 2). Referencing managers are not the answer for all, but do provide an option for writers, irrespective of whether they are secondary, first year tertiary or more advanced students.

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