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Reference Management Software Preferences Among Liberal Arts Faculty

Nicholas Lonergan
Dickinson College

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Purpose: A survey was conducted to determine faculty preferences and attitudes regarding Reference Management Software (RMS), in order to improve the library's support and training programs.

Design/methodology/approach: A short, online survey was emailed to approximately 272 faculty.

Findings: Survey results indicated that multiple RMS were in use, with faculty preferring Zotero over the library supported Refworks. More than 40% did not use any RMS.

Research limitations/implications: The relatively short length of the survey precluded a more detailed investigation of faculty attitudes. The 20% response rate, while typical of surveys of this type, may over-represent those faculty who have strong attitudes toward Reference Management Software. These findings support the necessity of doing more research to establish the parameters of the RMS environment among faculty, with implications for support, instruction and outreach at the institutional level.

Practical implications: Surveys should be conducted to establish local faculty RMS usage and preferences, as they may differ from both published findings and local expectations. As it is unlikely that faculty will overwhelmingly use one RMS, libraries should plan to support multiple RMS.

Originality/value: This study is among the first to investigate the issue of RMS faculty preferences in a liberal arts setting.

Reference Management Software Preferences Among Liberal Arts Faculty

Introduction

Reference management or citation management software (hereafter abbreviated RMS), such as EndNote, RefWorks and Zotero, is software that stores citations in a digital form, either on a local computer or via an online interface, to make organizing research and formatting bibliographies and in-text citations more efficient. Many programs also offer sharing and collaboration features. RMS has become popular with both students and faculty in higher education, with many students entering college already familiar with free citation generators such as Citation Machine. Academic libraries are increasingly supporting RMS and recommending them to their constituents (Hensley, 2011).

To gain background information for decisions regarding upgrading an institutional RefWorks subscription to the new version and subsequent training and marketing, Dickinson College librarians surveyed Dickinson faculty in May 2016 to assess their preferences and use of reference management software. This information was predicted to be useful for determining whether the new version of RefWorks could meet the needs of Dickinson faculty, and more broadly for deciding which RMS to support and how best to support them.

The questions librarians wanted to answer were: 1) what percent of faculty use RMS, 2) which tools are they using, 3) what features are important to them, 4) what features are missing from their primary tool, and 5) how do they recommend or teach these tools to students?

Literature Review

The library literature has extensively investigated the topic of RMS from the perspective of documenting its benefits for researchers and students, comparing the features of available software, investigating the accuracy of citations generated by RMS, and suggesting best practices for instruction and support. Childress (2011), Rempel and Mellinger (2015), and Melles and Unsworth (2015) provide recent reviews of the literature. RefWorks, which uses a web-based interface, and EndNote and Zotero, both of which can be installed on the user's computer (as well as offering online storage) are among the most popular RMS available today (Hensley, 2011) .

While the literature on the benefits and features of RMS is extensive, there are limited studies investigating faculty awareness, usage, and preferences for RMS, and the author was unable to identify any papers that specifically investigated this topic in a liberal arts college setting. The following literature review describes the findings from several previous studies that investigated faculty preferences and use of RMS in a variety of college and university settings using a survey methodology.

Francese (2012; 2013) separately investigated faculty awareness and preferences for RMS at Tallinn University in Estonia and the University of Torino in Italy. Researchers were mostly aware of the existence of RMS, but were only familiar with the more common packages such as EndNote and Zotero. Actual usage was somewhat lower (66% at Tallinn University and 76% at University of Torino). Both populations mainly used the basic features of the tools, avoiding the social bookmarking features, and generally claimed a lack of knowledge, time, and training as reasons for not using the tools more comprehensively.

Sarrafzadeh and Hazeri (2014) surveyed Iranian Library and Information Science professionals to determine their preparation for teaching the use of RMS to LIS students. The authors found wide awareness of RMS (approximately 90%), with 60% use. EndNote (95%), followed by Zotero (22.8%), were by far the most popular RMS. While organizing citations was the most important feature, this study found a higher rating for the use of RMS to share citations with colleagues than other studies, perhaps due to the focus on LIS professionals. Ease of use and cost were the primary features behind the choice of RMS.

Similarly, Ram and Anbu (2014) surveyed Library and Information Science professionals in India to assess their awareness and use of RMS. 50% of respondents were aware of RMS, while 45% had used RMS. Reference Manager was the most popular tool (42%), followed by EndNote (15%). Lack of knowledge and lack of time were the most frequently cited reasons for not using RMS.

Melles and Unsworth (2015) surveyed post-graduate students, and interviewed students and faculty in the Arts at Monash University. While they found that 71.4% of students made use of an RMS, with the majority preferring EndNote, they were particularly interested in the practices of non-users. Their results challenge the notion that RMS is a comprehensive solution for all researchers. Instead, some students and faculty used highly personal systems incorporating a variety of software and paper-based solutions. The authors argue that reference management, including the use of RMS, can be seen as a solution to competing demands on a researcher's workflow, and as such there is no right answer.

Hristova (2012) examined RefWorks usage statistics to compare student and faculty usage patterns. Her findings challenged the assumption that faculty are heavier users of RMS than students; instead the majority had relatively low frequency and intensity of use. She speculates that faculty may have preferred EndNote as part of their research workflow, and used RefWorks to share reference lists with their students. In agreement with Melles and Unsworth (2015), these findings point to the personalized and highly variable nature of faculty reference management practices that can be obscured in a quantitative analysis of use statistics and preferences.

Emanuel (2013) is most similar in scope to the present study. She surveyed graduate students and faculty at the University of Illinois to determine if RefWorks was the primary RMS used by researchers, and what other tools were used, with the

goal of better supporting and teaching RMS. She found that researchers at UIUC prefer EndNote (38%), followed by RefWorks (19%) and Mendeley (13%). Zotero was used by only 7% of respondents. Regarding the most important features of an RMS, Emanuel found that ease of use was the top feature, with 69% of respondents. Use (34%) or recommendation by colleagues (32%) played a role in choice of an RMS for some respondents. Only 13% of respondents thought RMS was important in a classroom setting. Participants primarily use RMS for basic features like formatting citations (84%), collecting and organizing references (82%), and organizing PDF files (55%).

Separately, Rempel and Mellinger (2015) investigated faculty use of RMS through a combination of journaling, interviews, and observation. The authors identified a group of researchers who had attended an instructional workshop on RMS, with 14 respondents completing the study. They identified two primary factors: ease of use was the most important factor for the selection of an RMS, while the expectation of performance/efficiency improvements to scholarly workflow was the most likely factor leading researchers to stick with a particularly RMS.

Finally, Nilashi et al. (2016b) develop an interpretive structural model explaining why researchers choose RMS through focus groups of researchers expert in RMS use. They identify eight factors important in selection and use of RMS among expert users. Their findings confirm those of Rempel and Mellinger (2015) that ease of use is the single most important factor explaining why researchers choose specific RMS.

These studies suggest that researchers/faculty from different areas of scholarship and different regions of the world share similar tendencies in their awareness and use of RMS. Specifically, they tend to be broadly aware of the existence of RMS, but actual usage of the products is somewhat lower, and usually limited to a few popular platforms. Those who do use them tend to rely most on the basic features (organizing references and formatting citations in a specific style), and awareness of or interest in more advanced features (particularly the Web 2.0 social bookmarking and collaboration features) tends to be low. Finally, faculty tend to choose an RMS based on the personal recommendation of advisers, colleagues, or due to its widespread use in their discipline, and prefer to stick with it due to the hassles of learning a new system, potential software compatibility issues, the need to migrate stored references, or other concerns regarding time and workflow.

Methods
The survey questions were developed by the author with extensive input from Dickinson librarians, and implemented as an online survey in Qualtrics. The intent of the survey was to gain a broad sense of faculty use and preferences for RMS in a relatively short survey. Additionally, the survey needed to provide data for subsequent decisions regarding upgrading to the new version of RefWorks and corresponding marketing and training efforts. The full text of the survey is provided in Appendix B.

Questions concerned demographics, use of RMS, the most important features of the primary RMS used by the respondents, the prominent features missing from that tool, and whether the respondents teach or recommend the use of RMS in their classes. A textbox was provided for open responses at the end of the survey. No monetary reward was given for participation, but faculty were informed that the survey would help the library to better support RMS on campus. The survey was approved for IRB exemption by the Dickinson College Institutional Review Board.

An initial invitation with a link to the survey and a description of the purpose, and two subsequent reminders, were emailed to the approximately 272 faculty by their primary liaison librarians. The survey was sent to faculty in all departments, thereby providing the opportunity to investigate whether faculty in the sciences, social sciences, and humanities have different preferences regarding the use of RMS.

Limitations of the survey include the short length, which prevented acquiring additional data that might have been useful (such as faculty's views on the role of the library in providing instruction and support for RMS), and the response rate of approximately 18.8%. Several previous surveys of RMS faculty preferences mentioned in the literature had a similar or lower response rate, so these results seem normal for the topic and method chosen (Francese, 2013; Emanuel, 2013; Sarrafzadeh and Hazeri, 2014). It is not possible to determine whether the respondents had a pre-existing interest in RMS not shared by the non-responders, thereby biasing the sample, but this is a possibility that must be considered. The fact that a significant proportion of the respondents (43%) indicated they do not use RMS suggests that the sample may be at least somewhat representative of the broader faculty population. Finally, some respondents did not answer every question, so the following analyses do not always add up to the total number of respondents.

Results

51 faculty responded to the survey, representing the humanities, social sciences, and sciences, for a total response rate of approximately 18.8% of Dickinson faculty. Of the respondents, 29 (57%) used RMS, while 22 (43%) did not.

Of those faculty who used reference management tools, the percentage using the six popular tools mentioned in the survey is given in Figure 1. Zotero was used by 12 faculty (40%), followed by EndNote and RefWorks with 6 users each (20%). BibTeX, a RMS compatible with LaTeX, the math typesetting tool commonly used in mathematics, computer science, and physics, had 4 users (13%). Only two faculty (7%) mentioned using a tool not specified in the survey (one respondent listed Bookends, and the other did not provide the name).

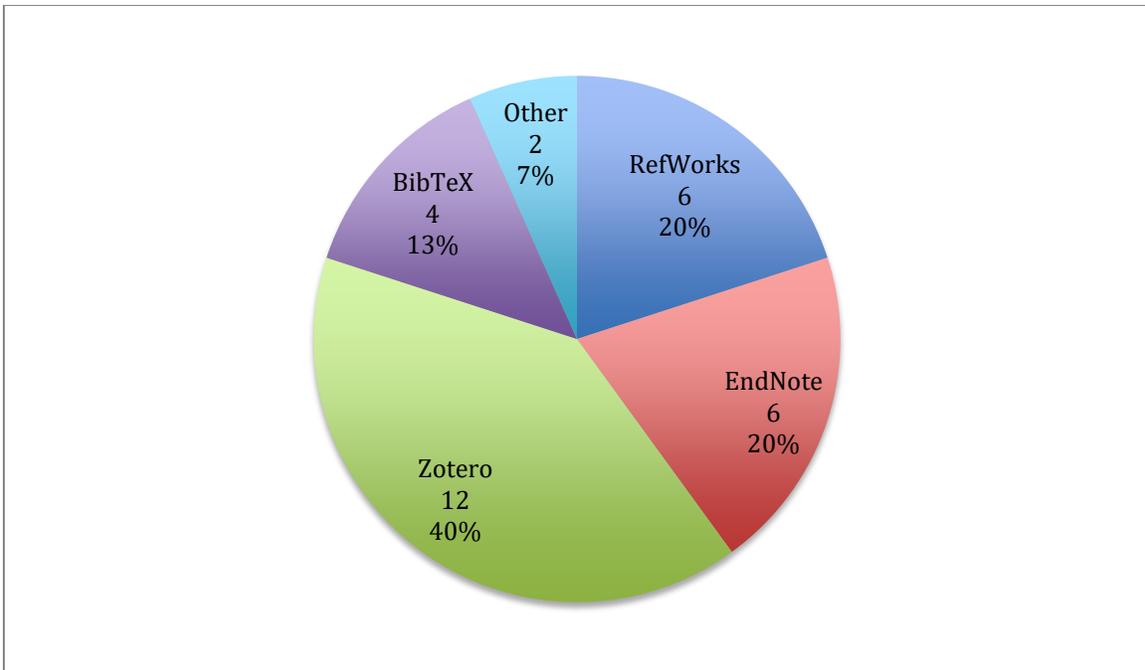Figure 1: Percent of faculty using popular reference management platforms.

Figure 2 shows the features faculty rated as most important in the tools they use, along with the features they mentioned were missing. As expected, the "core features" of any RMS were listed as being important, and no one listed them as missing: importing references from library databases, organizing references, and creating a formatted bibliography.

Features listed as missing in at least some RMS included a plugin for common word processors to cite while writing, the ability to generate a reference entry automatically by uploading a PDF, and features for annotating and sharing documents or reference lists.

Figure 2: Software features that are most important to faculty, and features that are missing from the tools they use.
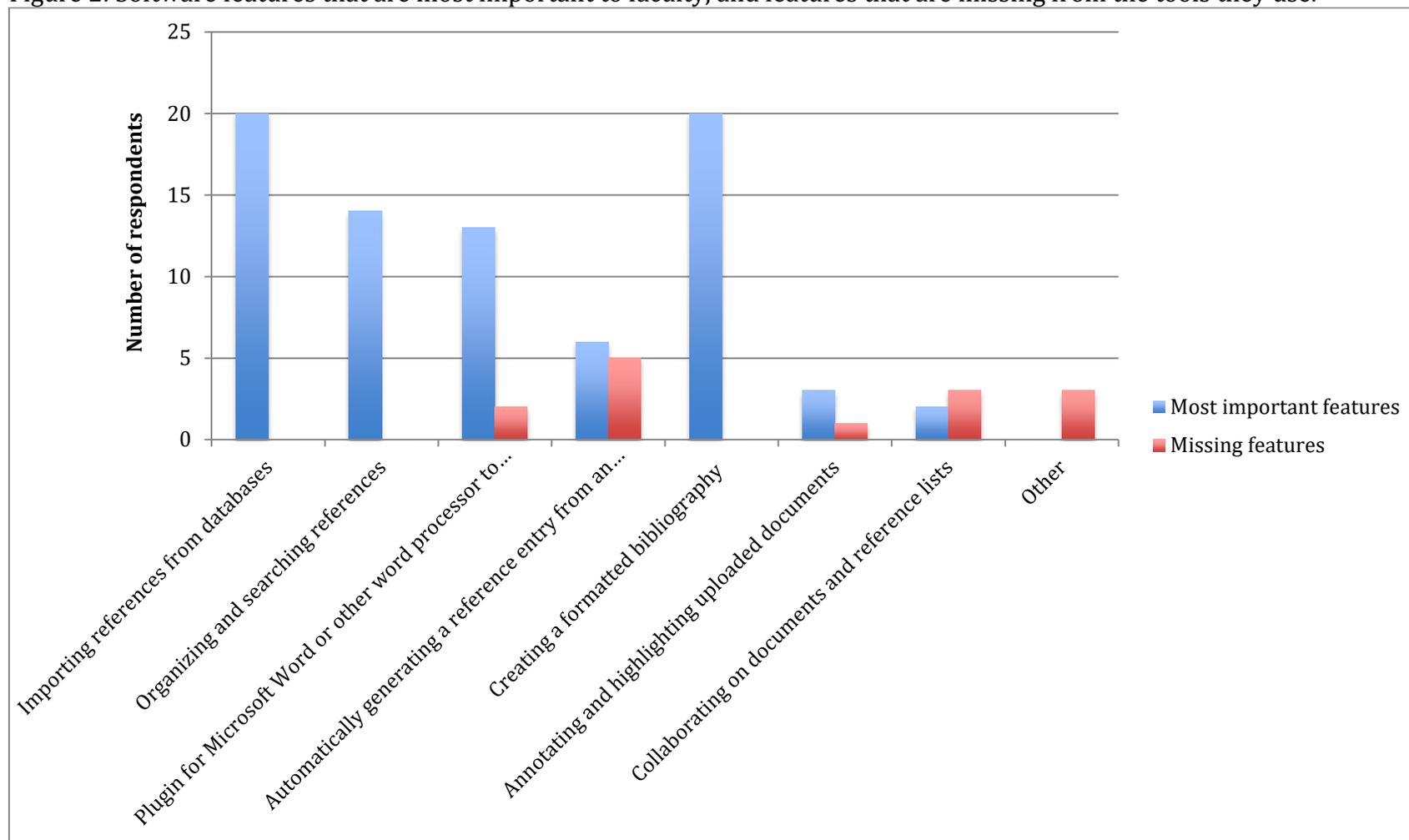
Figure 3 shows how faculty recommend RMS to their students, both in class and out of class. This question allowed multiple answers, so some faculty may have selected multiple options. Thirteen responses (50% of unique responses) were for the "do not use" option, with the remainder mostly encouraging use. Only a few respondents indicated that they actively require or teach RMS to students. To some extent, this may be because librarians often teach or recommend the use of RefWorks in library sessions with First Year Seminars or other classes, but this is not always consistent due to specific class needs, so may indicate a need for additional library marketing to students to ensure they are aware of the available options for RMS.

Figure 3: How faculty recommend reference management tools to students.
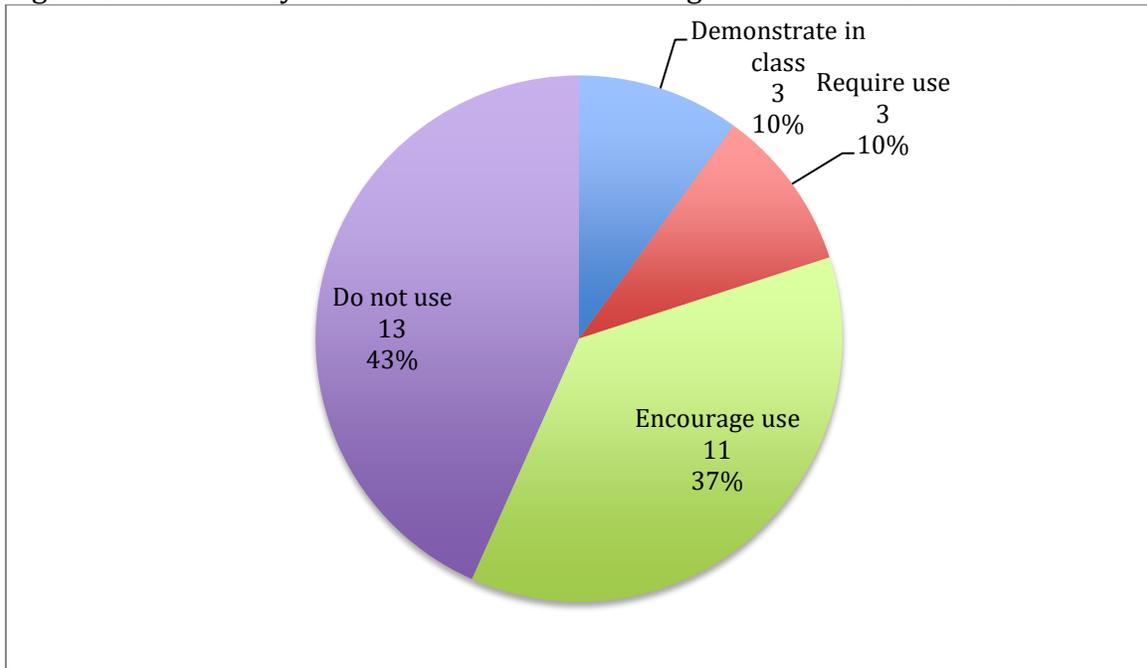
Faculty from the humanities, social sciences, and sciences responded to the survey. Academic departments from which faculty responded were grouped together by major academic division. Science was somewhat underrepresented, but this may reflect the fact that science departments at Dickinson have fewer faculty than the other two divisions on average. Notably, while 50% of respondents from the social sciences and humanities used RMS and 50% did not, 80% of respondents from the sciences used RMS.

Figure 5 presents the differences in choice of RMS by faculty in the humanities, social sciences, and sciences. Although the academic divisions were not equally represented by survey respondents, so should not be taken as conclusive, their answers present some intriguing hints as to possible differences in the choice of RMS. Notably, Zotero is primarily used by humanities and social science faculty. Due to Zotero's ability to save and organize multimedia files, such as artwork, sound

recordings, or other primary sources, along with citations, it may be preferred over competing products in some disciplines. Similarly, LaTeX's typesetting capabilities for mathematics make its use necessary in some science fields, leading to the natural choice of BibTeX as the RMS for many science researchers. Unfortunately, two of the four respondents who selected BibTeX did not identify their departmental affiliation, so those responses are not included in Figure 5. The responses for Zotero associated with a department came from Computer Science and Economics.

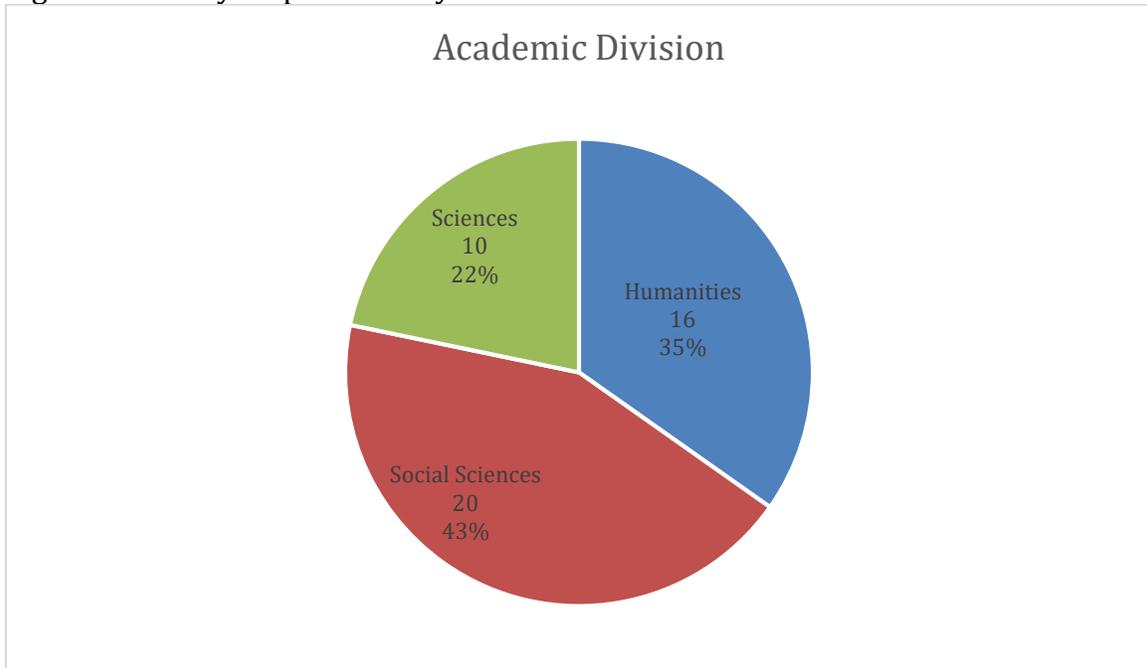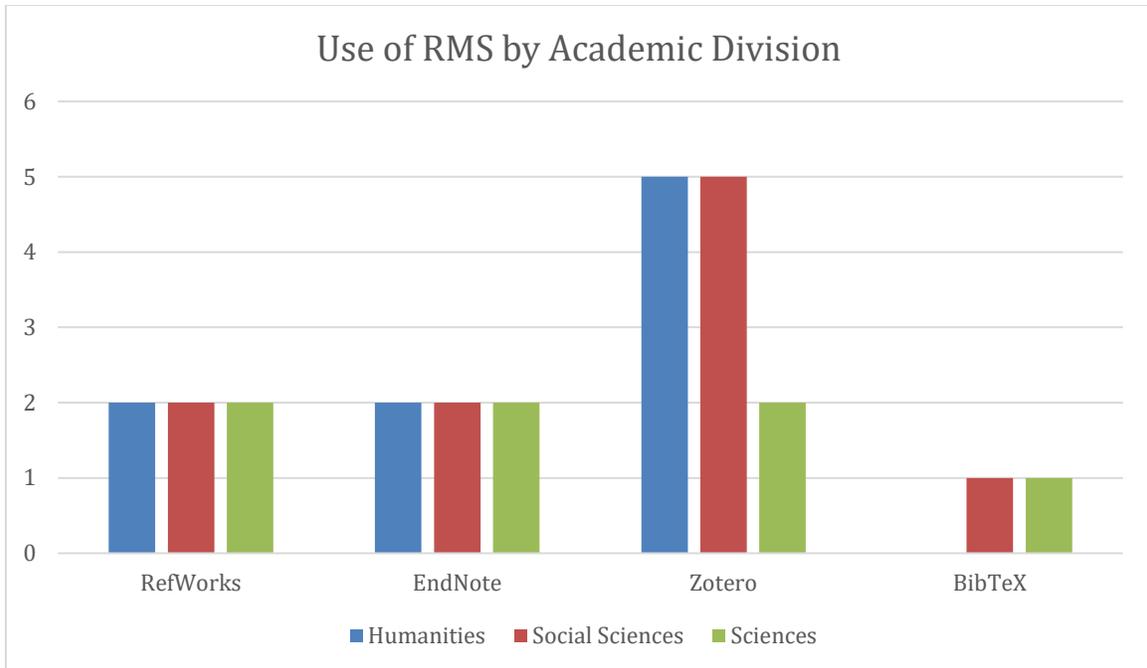Figure 4: Faculty respondents by academic division.

Figure 5: Faculty use of RMS by academic division.

Use of RMS by Academic Division

A bar chart titled "Use of RMS by Academic Division" showing values for RefWorks, EndNote, Zotero, and BibTeX across three academic divisions (Humanities, Social Sciences, Sciences). RefWorks: Humanities 2, Social Sciences 2, Sciences 2. EndNote: Humanities 2, Social Sciences 2, Sciences 2. Zotero: Humanities 5, Social Sciences 5, Sciences 2. BibTeX: Social Sciences 1, Sciences 1.

Discussion

Dickinson librarians were unaware of the breadth of RMS used by faculty, and identified several issues needing improved support. Specifically, three findings from the survey were surprising:

1. 22 (43%) faculty respondents did not use RMS.
2. Only 6 (22%) faculty respondents using RMS used RefWorks, the only RMS officially supported by the library and the one usually recommended to faculty and students.
3. Of the remaining 21 (75%) faculty respondents who used RMS other than RefWorks, use is divided between at least three tools (EndNote, Zotero, and BibTeX), two of which were not supported by the library (EndNote and Zotero). Over half used Zotero.

Foremost among the results was the discovery that RefWorks is not the most used RMS at Dickinson College. This was surprising, because the college provides an institutional subscription to RefWorks and the library supports it via online guides, reference consultations, and class instruction. Emanuel similarly found that although the University of Illinois provided a subscription to RefWorks, many researchers continued to use EndNote or other more familiar tools (Emanuel, 2013).

The high faculty use of Zotero was perhaps most surprising; as software that requires a fair degree of computer literacy to install and use, Zotero is arguably less user friendly than more streamlined, web-based options such as RefWorks and EndNote Web. As one faculty member commented, "Zotero is an excellent reference manager; it is also managed by a non-profit, which is important to me." Another

factor leading to the high use of Zotero may be its facility with storing multimedia files like digital images. As noted by Childress (2011) and Rempel and Mellinger (2015), different disciplines may have differing patterns for the use of sources and need for storing different types of citations and supporting documents, a factor that deserves more investigation. Cost may also be a relevant factor for some researchers.

Several additional findings were not as surprising. There are some misunderstandings about which RMS are available to faculty. One respondent commented: "I feel like I cannot teach using reference managment[sic] software that is not universally available for students. I would love if endnote was available to all students. I use it all the time," suggesting a lack of awareness of alternatives such as RefWorks, Zotero, and EndNote Web, which are universally available to Dickinson students.

Additionally, some faculty report not knowing how to take advantage of some features of the tools they use, or feeling that they don't have the support to properly teach these tools to students: "I would have used WriteNCite, but it was very difficult to install the plugin. I didn't have time to bring in help for what should have been a simple installation that any student should have been able to do on their own computer." While librarians and library IT staff are available to help with these issues, faculty awareness of support for RMS is clearly lacking. This has previously been reported in the literature: Francese (2013) found that many faculty are unsure what support the library should provide for RMS, or even lack knowledge that the library can provide support at all.

In comparison to faculty surveys published in the library literature, Dickinson College faculty are similar in their reliance on basic features of the RMS and low use of more advanced features, in low responses to teaching the use of RMS to students (though many faculty may encourage students to use them), and in having concerns about time, difficulty, and support for learning new RMS or RMS features. However, they differ from the published results in generally preferring Zotero over commercial programs like RefWorks or EndNote. This result reinforces the importance of conducting surveys or other investigations at the local level to identify patterns of RMS awareness and use to better support instruction and marketing efforts. More broadly, the literature suggests that the use of RMS, both in awareness and choice of specific tools, differs substantially between institutions and even between academic departments.

Finally, this appears to be one of the first studies investigating what features are missing from researchers' primary RMS. The answers to this question can be interpreted in two ways: features that the RMS does not offer, or features that it does offer but the respondent was unaware of. In either case, these answers can assist libraries in RMS marketing and training efforts. While several features noted as missing were also ranked as fairly unimportant, particularly the Web 2.0 social sharing and annotation features, there were two features ranked important by

researchers that at least some noted as missing in their primary RMS: a cite while you write plugin and the ability to automatically generate a reference entry from a PDF. Although this survey did not ask researchers for their motivations in choosing an RMS, these responses can be interpreted as confirming previous work in this area, which found that researchers rate the ease of use and productivity of a tool as most important (Emanuel, 2013; Nilashi et al., 2016a).

Conclusions

As a result of surveying Dickinson faculty, the librarians decided to support Zotero by developing support materials on the library website, joining those for RefWorks and BibTeX. They also developed a new webpage on the library's citing sources guide linking to the most popular RMS, including those not supported by the library, in an effort to aid researchers in selecting an appropriate tool.

Librarians will develop marketing and training programs for the new version of RefWorks to coincide with the planned migration in the hopes that more faculty will take advantage of this tool, both in their own work and with students. These marketing and training efforts will make use of the faculty preferences identified in the survey to emphasize how the new RefWorks can accomplish more of the features identified as missing in faculty's primary RMS while remaining simple and efficient to use. Of note, the new RefWorks currently being developed by ProQuest adds many of the features noted as missing by at least some faculty. This offers a good opportunity for marketing to faculty who might have been reluctant to switch from a tool that does offer those features, or to existing RefWorks users who were concerned about the lack of those features.

Training programs will also be offered for reference librarians and library staff who work with faculty to assist them in recommending and supporting the use of RefWorks. Librarians also plan to collaborate with other departments on campus that may recommend the use of RMS to faculty, such as the department of Academic Technology.

Finally, it is hoped that the approach documented in this paper, along with the specific survey instrument used, will be useful to librarians at other colleges and universities who want to learn what RMS their faculty are using, where knowledge gaps exist, and how best to market these tools and services to faculty. Emanuel (2013) calls for additional investigations of researcher preferences at a range of academic institutions, and the present study adds to this small but growing body of knowledge.

Appendix A: Reference management software mentioned in the article.

BibDesk http://bibdesk.sourceforge.net

BibTeX http://www.bibtex.org

EndNote http://endnote.com

EndNote Web www.myendnoteweb.com/

Mendeley https://www.mendeley.com

RefWorks www.refworks.com (legacy), http://www.proquest.com/products-services/refworks.html (new)

Zotero https://www.zotero.org

Appendix B: Full text of the survey.

Reference Management Software Survey

Q1 This survey asks about which reference or citation management tools/software you use, how you use them, and what you like and don't like about them. Reference management software stores and organizes citations and helps you create a bibliography formatted in the correct style (e.g., RefWorks, Zotero).

This information will help us to better support the use of reference management software on campus. Your participation is greatly appreciated.

For questions or comments, please contact Nick Lonergan at lonergan@dickinson.edu.

Q2 What is your department?

Q3 Do you use reference management software? (Reference management software stores and organizes citations and helps you create a bibliography formatted in the correct style.) [**If the participant selected "No" for this question, the survey jumped to Q10. All participants were shown Q11.]
○ Yes
○ No

Q4 Which of the following reference management software do you use? Select all that apply.
❑ RefWorks
❑ EndNote
❑ EndNote Web
❑ Zotero
❑ Mendeley
❑ BibDesk/BibTeX
❑ Other _____

Q5 Which features are most important in the reference management software you use? Select all that apply.
- ❑ Importing references from databases
- ❑ Organizing and searching references/PDFs
- ❑ Plugin for Microsoft Word or other word processor to format citations and bibliographies while you write
- ❑ Automatically generating a reference entry from an uploaded PDF
- ❑ Creating a formatted bibliography
- ❑ Annotating and highlighting uploaded documents
- ❑ Collaborating on documents and reference lists with others
- ❑ Other _____

Q6 Which features are missing in the reference management software you use? Select all that apply.
- ❑ Importing references from databases
- ❑ Organizing and searching references/PDFs
- ❑ Plugin for Microsoft Word or other word processor to format citations and bibliographies while you write
- ❑ Automatically generating a reference entry from an uploaded PDF
- ❑ Creating a formatted bibliography
- ❑ Annotating and highlighting uploaded documents
- ❑ Collaborating on documents and reference lists with others
- ❑ Other _____

Q7 Please indicate how you use reference management software in class or with students. Select all that apply.
- ❑ Demonstrate/teach reference management software in class
- ❑ Require students to use reference management software
- ❑ Encourage students to use reference management software
- ❑ I do not use reference management software in classes or with students

Q8 Why not? Please select all that apply.
- ❑ Wasn't aware of reference management software
- ❑ Was aware of reference management software, but haven't tried it because I don't see a need
- ❑ Tried it, but it didn't fit my needs
- ❑ Other _____

Q9 Please provide any other feedback you wish to share about reference management software here.

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