

## Pre-Service Teachers' Use of Library Databases: Some Insights

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The aim of this study is to investigate if providing mathematics education pre-service teachers with animated library tutorials on library and database searches changes their searching practices. This study involved the completion of a survey by 138 students and seven individual interviews before and after library search demonstration videos were released to them. Results indicate that although students' confidence in conducting database searches increased, ongoing support will be needed before their searching practices could be considered sufficiently sophisticated to access the depth of literature necessary for teaching and learning primary mathematics.

For the last couple of years, students studying their second of four mathematics education units in the Bachelor of Education (Primary second year students) and Bachelor of Education (Early Childhood and Primary third year students) at the Australian Catholic University (ACU), have engaged in tutorial discussions and completed assessment that has required them to access research and professional literature. Their assessment required them to search the research literature to identify an aspect of conceptual difficulty in *Number* experienced by primary school age students. They then followed this with a search of the professional literature for an intervention or recommended approach to support student conceptual understanding of that *Number* concept.

Each year the discussion around assessment at the commencement of the unit, and periodically throughout the semester, stressed to students that they must use both the research and professional literature when completing this assessment as both types of literature add depth to their understanding and add to tutorial discussions. Nonetheless, most students relied on Google searches to support their understanding of the *Number* concept they had decided to target in their assessment. As a result, a depth of understanding of the difficulty that primary age students can have with the concept under study was not evident, leading to superficial or inappropriate suggestions for intervention. Frustrated by students' use of Google as their main search tool, the first and third authors enlisted the help of the Liaison Librarian, the second author, to provide some structured advice on how to get students to use the ACU library databases more effectively. Following a search of the literature for effective approaches to support students' engagement with library database searches, it was decided that the second author would develop animated library database search demonstration videos to assist students to conduct library database searches.

This paper outlines the study that ensued. It provides a tailored review of the literature on the use of library databases by undergraduate students and approaches adopted by academics and librarians in an effort to promote more sophisticated library searching techniques. This paper then reports results on this mixed methods study and concludes with

a discussion of a way forward for encouraging students to engage with the wealth of resources provided by the ACU Library.

## Literature Review

Rapid advances in technology have meant that access to information has also grown at a similar rate and as a result, using appropriate tools in skilful ways has never been more important (Holton, 2005). Searching for specific information using open access online search engines such as Google is a basic way to find information. In an effort to confront this problem university students are provided with access to a vast array of sophisticated research tools by their university library. They are also offered a variety of instructional materials and sessions by the library staff to keep them up to date with advances in searching the library databases. These approaches are designed to develop good information literacy skills that are supported by liaison librarian services as this is accepted as imperative (Yang 2009). Yet the provision of, and training to use these resources, is met with student ineptitude as they cite the level of complexity as a deterrent for use and lack of time to invest in the acquisition of the necessary skills. Trying to circumvent the identified difficulties, researchers have been investigating the use of different interactive tools to engage university students (Armstrong & Georgas, 2006).

The research is clear that students struggle to navigate online resources (Imler & Eichelberger, 2011) and as a result require the guidance from both library and academic staff to enhance their skills. An abundance of literature on the planning and structure of information literacy programs (Barefoot, 2006; Boyd-Byrnes & McDermott, 2006; Bruce, Edwards, & Lupton, 2006; Orr, Appleton, & Wallin, 2001; Poirier, 2005; Selematsela & du Toit, 2007; Selwyn, 2008), particularly in the areas of face-to-face (Hsieh & Holden, 2010; Stec, 2006; Stowe 2011) and online instruction (Bobish, 2010; Bowles-Terry, Hensley, & Hinchliffe, 2010; Hsieh & Holden, 2010) is available with most university libraries providing these resources to their students.

The provision of face-to-face and online instruction is designed to meet the needs of the current generation of technology savvy students who respond well to tutorials that provide “clear verbal explanation and animated, interactive instruction” (Yang, 2009, p. 692). Multimedia tools are recommended to enhance visual learning styles (Nelson, 2004). Consistent with these ideas librarians are now using online resources such as YouTube (Lo, 2011). Information literacy instruction in the format of online videos offers undergraduate students a variety of desirable options (Thornton & Kaya, 2013) by generally providing them with an information literacy program that is convenient (Dewald 2009), flexible and self-paced (Gunn, Hearne and Sibthopre, 2011) which appeals to undergraduate students (Armstrong and Georgas, 2006). This approach permits the option to review the instruction on multiple occasions (Gunn, Hearne and Sibthopre, 2011) and at times and in places convenient to the student (Lo, 2011). Dewald (2009), nonetheless, points out that online tutorials should function in conjunction with face-to-face instruction and connection to student assessment, as limited progress is made if provided in isolation. In support of these ideas it is also recommended that videos be short (Armstrong & Georgas, 2006; TubeMogul, 2008) and to the point. Thornton and Kaya (2013) state that the use of videos for library instruction is important, however it is important that they not form the entire information literacy program.

To recapitulate, scholarly work identifies the benefits of using a combination of blended learning techniques such as face-to-face and online tools to enrich the

development of a students' learning (Roberts & Levy, 2005). In addition to these findings the research also indicates that library instruction is best received when it is course related, and specifically assignment related (Dewald, 2009, p.26).

How this research relates specifically to mathematics education students use of ACU Library databases is largely unknown. In response, the current study aims to understand the actions taken by undergraduate mathematics education students when searching for research and professional literature to support their study. The education students at ACU are provided with face-to-face library instruction during their first semester in their first year. A direct and formal information literacy program has not been formally provided to the students for ongoing self-paced learning since these initial sessions. Providing ongoing information literacy support throughout a Bachelor degree would build upon the knowledge given in the first year program and scaffold learning (Biggs & Tang 2007). Therefore this project sought to answer the research question:

To what extent does providing students with animated library tutorials on library and database searches in mathematics education change their searching practices?

## Method

This study focused on student responses to two short videos that demonstrated library searches and library database searches on mathematics education topics developed by the second author. Participants were 138 of the 182 students enrolled in the second of four mathematics units in the Bachelor of Education program. A subgroup of the participating students included seven students who were willing to be interviewed before and after access to the animated library database search demonstration videos.

This study involved two stages of data collection with each of the two stages collecting quantitative and qualitative data that included completion of a survey by all participants and a subgroup of seven students being interviewed. The first stage occurred prior to students gaining access to the demonstration videos. This stage of data collection was designed to ascertain their current practices when conducting library database searches and their perceptions of possible future use of the demonstration videos. All participating students completed the survey that was divided into three sections, including demographic details, database questions and video questions. These questions included closed, categorical, and Likert style items. In addition, seven students participated in a semi-structured, open-ended interview with the second author while demonstrating a database search related to the statement, "common misconceptions with the learning of subtraction". This interview was conducted in a private room, and recorded using an iPad and the application, Notability. The students used a desktop computer to demonstrate their searching practices.

After this first stage of data collection all students in the unit were provided with the animated library database search demonstration videos to support their study. At the end of the semester, the participants were again invited to complete a survey designed to ascertain the usefulness of the animated library database search demonstration videos in assisting them to change their searching practices leading to better preparation of the final assessment item in the unit under study. The original group of seven students was again interviewed in the same manner as at the commencement of the project and they completed the same database search as the initial interview.

Interviews were transcribed and analysed alongside screenshots of the search undertaken by the students. This allowed the researchers to consider the steps taken by the

students and to make judgments about the usefulness and efficiency of the search undertaken. The survey data underwent descriptive analysis by analysing response proportions for all items asked. The Likert style items were on a ‘forced choice’ five point scale with anchors ranging from ‘1 strongly disagree’ to ‘5 strongly agree’ (Clark & Watson, 1995). All quantitative data were coded and entered into SPSS for processing to support subsequent interpretation of results.

## Results

### *Stage 1: Before student access to demonstration videos*

*Quantitative results.* Survey results indicated that 100 of the participating 135 students preferred to use the internet, such as Google, when searching for research and professional journal articles. In comparison, 46 conducted library database searches while only 10 used the library subject guides when searching for literature. The survey results also indicated that the students did not typically ask a librarian for assistance with only 40 taking this approach. Ninety-three of the students preferred to ask a family member or friend for assistance while 69 relied on references provided by their lecturer.

As the majority of students relied on search engines such as Google it is not surprising that very few students indicated that they were confident in the use of the library search box (11) or the library databases (10) as indicated in Table 1. Also worthy of note in Table 1 is that there were a large number of students who did not respond to these items indicated in the zero column, even though they answered other items on the survey. When comparisons were made using the demographic data, course type, year level, gender and age range only gender had statistically significant different levels of confidence with males more confident ( $M = 2.68$ ) when using database searches than females ( $M = 2.18$ ),  $t(131) = -1.36$ ,  $p = 0.011$ .

Table 1

#### *Frequency Distribution for Confidence using the Library Search Box and Databases*

Items	0	1	2	3	4	5
I feel confident when using the library search box	19	7	18	47	33	11
I feel confident when using the library databases	27	4	21	40	33	10

Student responses to the items regarding their potential use of the demonstration videos were somewhat encouraging. One hundred students said they would use the videos with 88 of these saying they would watch it more than once. One hundred and four students indicated that they would prefer to watch a demonstration video than attend a face-to-face library class.

*Qualitative results.* When demonstrating their searching techniques for the second author, each of the seven students used different approaches. The first student produced productive results when searching for articles on “common misconceptions with the learning of subtraction” by selecting the advanced library search option that resulted in the desired articles. The second student selected the database link on the homepage and the third used the library guides, both with limited success. The remaining four students were unsuccessful when demonstrating their searching techniques. They entered the entire statement “common misconceptions with the learning of subtraction” into the basic library

search window, indicating the approach they would use when searching using Google. This approach indicated that these students did not know how to start a search through the library search box or by using the library databases. These results indicate that an understanding of how to use the search tools was lacking for all but one student.

These results would indicate that these students studying their second mathematics education unit are limited to a Google or similar style search with the result being that their academic reading would be limited to what could be found on these sites. The outcome of this searching approach is that the recourses of the library are left underutilised. Moreover, the resources provided in professional journals produced by the Australian Association of Mathematics Teachers (AAMT) and for example the National Council of Teachers of Mathematics (NCTM) and the wide range of research journals are simply not being accessed.

### *Stage 2: After student access to videos*

*Quantitative results.* Table 2 displays the number of downloads of the videos by the students from 12 March 2013, the date the videos were released to students, to 27 May 2013, the date the assignment was due. Worthy of note in this table is that the students were downloading the videos up to the date the assignment was due. The results indicate that by the date their assignment was due the library search video had only been downloaded 51 times and the library database search video downloaded 59 times. This result is only half that expected after student responses on the first survey indicated that 100 of the 135 surveyed would watch the video.

Table 2

*Video Download Cumulative Data during Semester of Study*

	11/4/13	9/5/13	13/5/13	22/5/13	24/5/13	27/5/13
Library Search	6	22	29	40	44	51
Library Databases	19	27	36	50	55	59

As the download count continued to grow it was anticipated that students would begin to use the library searching facilities. Results on the second survey did indicate an improvement in results from the first survey. Seventy students indicated that they primarily used the library database search with a further 42 indicating they did use library database search but not very often. A further 26 students indicated that they did not conduct a library database search at all. The students were asked on the survey if they believed they had spent too much time searching the databases whilst searching for information. Fifty-two students agreed with this statement.

In an effort to ascertain if the demonstration videos had improved the students' level of confidence, the questions asked on the first survey were again asked on the second survey. These results are displayed in Table 3. As student surveys could not be matched, an independent samples *t* test was conducted that compared student confidence perceptions from Stage 1 to Stage 2. These results indicated statistically significant different levels of confidence in the use of library database searches with Stage 1 representing less student confidence ( $M = 2.78$ ) while Stage 2 represented more student confidence ( $M = 3.21$ ).  $t(271) = -2.346$ ,  $p = 0.05$ .

Table 3  
*Frequency Distribution for Confidence using the Library Search Box and Databases*

Items	0	1	2	3	4	5
I feel confident when using the library search box	20	3	7	35	46	27
I feel confident when using the library databases	13	4	9	45	39	28

*Qualitative results.* Although some of the interviewed students referred to aspects of the online instructional videos, there was a tendency to use the same strategy demonstrated to the second author in their first interview. Overall the majority of the students did not follow the instructional video recommendations and instead maintained their own research style demonstrated in stage one of the study. Having said that, some students did modify their search technique, and they had learnt to limit their search results as demonstrated in the videos but these techniques were not sophisticated and did not provide the intended results.

During these interviews some of the students also indicated that they had relied on the reading list included in the Unit Outline provided by the lecturer with a typical comment being, “*We should be just told what to read*”. Moreover they expressed frustration with this list, as it only contained the actual references to recommended journal articles and did not include hyperlinks to the papers as is the practice in other units in their course. This forced the students to use the library to locate the references. These students reported that a Facebook site used by the students studying the mathematics education unit provided a platform for them to share the readings once someone had downloaded them. The interviewed students presented the argument that this saved a lot of time as they felt they were wasting time by putting effort into learning how to search when they knew that someone would post the articles to the Facebook site for them. Typical of the comments was the following by one student, “*We’re too busy to learn how to search...We look out for one another and Facebook is good for that*”.

## Discussion and Conclusion

The large volume of literature available to mathematics education students means they need to be discerning about what they read in order to develop a deep and well informed understanding of mathematics teaching and learning. One way to achieve this is for them to read high quality literature in refereed research and professional journals. However, being able to precisely access appropriate papers easily requires sophisticated library searching techniques. Previous research has shown that university students do not take advantage of the search tools provided by their libraries (Armstrong & Georgas, 2006). Consistent with this prior research, two online demonstration videos, developed for the cohort of 181 students studying their second mathematics unit of four in their course, were only downloaded 51 times for the library search video and 59 times for the library databases search. Moreover, when this download information is considered in conjunction with the enrolment of 181 students it would be fair to say that even when provided with access to demonstrate videos that could be downloaded at any time, students still do not take full advantage of this opportunity to improve their searching techniques. This finding supports the work of Armstrong and Georgas (2006). However, results also indicate a statistically significant increase in student perceptions of their confidence when conducting searches. This confidence can also be evidenced by the increase in student self-reported library

searches from 46 students on the first survey to 70 on the second survey with a further 42 using the databases some of the time suggesting that students are trying to make sense of the database searching practices demonstrated on the videos. However these figures are very low and when students are completing assessment items on a large range of topics they highlight that most students are not accessing appropriate literature for the topic they have chosen. The fruits of mathematics education research are therefore being lost on this group of students.

It is also worthy of note that 52 students believed that they had wasted time trying to use the library database search tools indicating that they had tried to engage with the search tools. If these students are not given support they may well return to their previous practices that relied on Google style searches. If however, they are given appropriate ongoing support, their skill level and success rate may well increase. The students in this study continue to have access to the videos and are provided with ongoing collaboration with the Liaison Librarian and academic staff. A recommendation from this study is for time for the Liaison Librarian to be incorporated into the lectures at strategic points in the semester to address student searching issues and to demonstrate library search approaches that grow in sophistication. This approach may also support a growing relationship with the Liaison Librarian as students indicated that they did not contact the librarians when they needed assistance.

The students who were interviewed did not demonstrate any substantial improvement in their search techniques with the only change being modifying their search and limiting search result parameters. Student sharing of journal articles via Facebook, although seemingly helpful, may be working against enhanced learning for all and may even perpetuate learned helplessness by those who sit and wait for others with sophisticated searching skills to provide what they are willing to share. This may be contributing towards the separation of students' results from high distinction to pass in this mathematics education unit. Ongoing research in this space is warranted.

## Acknowledgements

This study was supported by an Australian Catholic University grant funded through the Mathematics Teaching and Learning Research Centre.

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