Something Old, Something New, Something Borrowed, Something Blue: A Marriage of Innovation in Nursing EBP and Digital Literacy Education

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Abstract

Background: Evidence-based practice (EBP) is the foundation of modern health services. It improves patient outcomes and quality of care by combining clinical expertise, patient values, and the best research evidence to guide health care decisions. The ability to find, evaluate and apply evidence is essential for EBP. However, preparing the future nursing workforce with the required knowledge and skills to do so can be a challenge.

Objectives: At Murdoch University, we have integrated various digital tools with our personal learning platform to develop an interactive tutorial for final-year nursing students. The tutorial aims to improve skills in the areas of research, critical appraisal and digital literacy.

Methods: Using the analogy of a marriage, this paper will present the case study of a collaborative project between the University Library and the College of Science, Health, Engineering & Education (the 'wedding party') to develop a self-paced, interactive online tutorial on database searching and systematic reviews, as applied in nursing practice.

Four key elements went into planning this marriage:

- Something old: Camtasia (familiar to both Library and College)
- Something new: LibWizard (a new Library software acquisition)
- Something borrowed: PebblePad (managed by the College)
- Something blue: Digital badging (micro-credentialing)

These elements were integrated into a single digital learning object, which was launched in late January 2019 (the 'wedding').

Results: This innovative online tutorial was successful in engaging students and developing their digital and information literacy skills for evidence-based practice, and future improvements were also identified.

Keywords:

Evidence based nursing practice, Information literacy, Learning innovation, Online learning, Micro credentialing

Conference Theme

- Best Practice Information and Digital Literacy

Introduction

Evidence-based practice (EBP) is the foundation of modern health services. It improves patient outcomes and quality of care by combining clinical expertise, patient values, and the best evidence available to guide healthcare decisions. Aspiring health practitioners must develop skills in EBP, including the ability to find, evaluate and apply evidence. But educational institutions preparing the future workforce with EBP skills and knowledge face many challenges, and must often rely on innovative solutions.

At Murdoch University, final-year nursing students complete a three-week intensive research unit before going off for semester-long clinical placements, which includes an assignment that applies EBP skills to a case study. During the first week, students are given instruction in the use of library databases for systematic reviews.

This paper describes the marriage between the University Library and the College of Science, Health, Engineering & Education to develop a self-paced, interactive online tutorial on database searching and systematic reviews, aimed at improving skills in the areas of research, critical appraisal and digital/information literacy.

The wedding party

College of Science, Health, Engineering & Education
The College of Science, Health, Engineering & Education was formed in late 2018 as part of a restructure at Murdoch University, consolidating a number of schools into a single administrative unit. Nursing is one of the larger programs within the College and forms its own disciplinary group. Investigations into e-portfolio learning began in 2014, and eventually PebblePad was selected for implementation across in the Bachelor of Nursing curriculum. This initiative was recognised for innovation in curriculum design and pedagogy practice at the 2018 Australian Awards for University Teaching.

University Library
The Murdoch University Library created a Digital Literacy Strategy in 2017, and one of the outcomes was to produce digital learning objects that would assist students with developing their information literacy skills. This led to greater use of established technologies such as Camtasia, as well as the acquisition of new tools such as LibWizard.

Coming together: Learning design
The project began when a nursing lecturer from the College approached a librarian to conduct workshops on database skills for systematic reviews and EBP. A problem-based approach was used, where students were given a case study and asked to present evidence-based solutions. The goal was to consolidate what was taught in previous years, develop student capabilities in searching health databases for systematic reviews, and improve information and digital literacy skills for evidence-based practice.

The databases selected were:

- Cochrane Library, a major publisher of health evidence, for locating previously published systematic reviews
- CINAHL, the key nursing database, for teaching both keyword and thesaurus searching
- Scopus, a multidisciplinary citation database, for revising keyword searching and introducing citation searching.

With more than 280 students on two campuses, face-to-face workshops were impractical and unsustainable, so a student-led, interactive and appropriately scaffolded online tutorial was determined to be the best way to achieve the learning outcomes.

Literature review

Information literacy (IL) is the foundation of evidence-based practice (Skiba, 2005), and there are many similarities between the two processes (Søvik, 2016, p. 31). Thus, academics and

librarians are natural partners in developing programs to improve these skills in nursing students. There are many benefits of embedding librarians to teach IL skills in both clinical and educational settings (Wink & Todd, 2018), as they have been shown to improve students' self-efficacy in EBP (Watwood, Bormann, & Bennett, 2018).

But there are many barriers to evidence-based practice that nurses face (Ryan, 2016), including lack of confidence in using databases and appraising the quality of the evidence (Sadoughi, Azadi, & Azadi, 2017, pp. 190-195). This highlights the need for better digital and information literacy programs to support EBP (Wadson & Phillips, 2018).

Melender, Mattila, and Häggman-Laitila (2016) conducted a systematic review of programs for teaching EBP to nurses, and concluded that the best approaches combined self-directed learning with teacher guidance (pp. 10-11). A later meta-analysis (Kang & Seomun, 2018), also found that web-based interventions had a significant effect on knowledge and clinical performance in nursing students, especially when delivered over a short period of time and combined with "traditional methods for teaching skills" (p. 1693).

The programs highlighted in the above studies all adopt a blended learning approach. But these are not as scalable as online-only programs, and are more labour-intensive (Matlin & Lantzy, 2017, pp. 97-98). Can fully-online programs be equally effective? Matlin and Lantzy (2017) found that students in online-only cohorts developed slightly better higher-order skills than their contemporaries in face-to-face programs (p. 104). They conclude that web-based programs can replace face-to-face instruction "without any significant detriment to student learning", if high-quality materials are used (p. 105).

Russell, Rawson, Freestone, Currie, and Kelly (2018) built online interactive modules with a variety of quiz-like activities, and found a weak but positive relationship between completion of online modules and higher marks in assessments (p. 963). Students also reported a generally positive experience with the online library modules, which were seamlessly integrated with the other learning materials (p. 965).

Methods: Planning the wedding
Four different digital tools came together to create the wedding of our dreams.

Something old: Camtasia
Camtasia is a screen capture and video editing application that has been around for 20 years (TechSmith, 2019, "Our History"). It has since been gaining momentum in various sectors including higher education. At Murdoch University, there are a couple dedicated capture suites on our Perth campus. The Library has been using Camtasia to build a suite of digital learning objects, which include a mix of screencasts, presentations and animations. The Nursing program also uses it to create demonstration and other instructional videos.

Video tutorials are well-established and popular with students, but a more recent study has shown that there is no positive correlation between viewing video tutorials and assessed learning outcomes (Fontane, 2017). More interactive methods are required to build higher-order skills in EBP.

Something new: LibWizard
LibWizard is one of the newer offerings by SpringShare, well-known in the library sector as the creators of the ubiquitous LibGuides. It is composed of four modules that each focus on a different format: forms, surveys, quizzes and tutorials. The tutorials module uses a split screen "guide at the side" layout (Thomas & Gosling, 2009) that incorporates a variety of media including embedded web content (see Fig. 2). The latter configuration allows students to conduct live database searches while completing the tutorial, without flicking between screens.

An early iteration of this technology was evaluated by the Open University (Thomas & Gosling, 2009) and found to be more effective than screen capture videos in supporting diverse learner needs. However, at that time the technology was rather experimental and required significant in-

house development. A more recent product, still on the market, is the open source Guide on the Side (https://ualibraries.github.io/Guide-on-the-Side/about.html). This requires installation on a local server and in-house technical support (neither of which the Library has access to). In contrast, LibWizard is a software-as-a-service (SaaS) product that was easily added to existing SpringShare subscriptions.

However, LibWizard uses <iframe> HTML elements to embed the web content, and not all databases are compatible with them. One of the first challenges the Library faced was documenting which databases would and would not work.

Something borrowed: PebblePad
PebblePad is a personal learning platform that allows nursing students to access learning activities while at Murdoch as well as on placement, and build up evidence of their learning throughout the program. By the time they graduate, students will have a record of their learning journey and a professional portfolio that demonstrates their learning and competencies, which they will have continual access to as alumni. PebblePad was chosen as the delivery platform for the online module partly because nursing students were familiar with the platform, having used it since the beginning of their studies.

Something blue: Digital badges
Micro-credentialing is strongly associated with e-portfolios (Boyer, 2018; Rizvi, 2016), and the Nursing discipline began introducing digital badges into the program in 2018. The CINAHL Searching badge is the third in the series.

Micro-credentialing has its roots in the gamification movement, but libraries have begun using them as granular evidence of learning for IL (Boyer, 2018; Rizvi, 2016). However, badges may "lack sufficient value as standalone certification of employability skills" (Rizvi, 2016, p. 89), and so should be "linked to improving pedagogy and … student success" (p. 92). They are quite popular with students, particularly undergraduates, and are an effective means of motivating self-paced and self-directed active learning (p. 91-92).

The College is currently running a pilot project to determine the uptake of badges for developing skills and knowledge throughout the Bachelor of Nursing learning journey, using a student-directed approach.

As it turned out, the final badge design had hardly any blue, but the outcome of this implementation (as mentioned below) certainly made us feel rather blue!

Bringing it all together: Implementation
The current project integrated screen capture, split screen tutorials, e-portfolios/learning journeys and micro-credentialing into a single digital learning object.

PebblePad was used as the delivery platform, and content was added in the form of text, links, images, embedded video and basic web forms using a scaffolded learning approach:

- Introduction and case study
- A quiz on systematic reviews (web form)
- Developing the research question
- Creating search strategies
- Finding existing systematic reviews in Cochrane Library
- Searching CINAHL—this page comprises the Camtasia video, LibWizard tutorial, and a field to upload the digital badge as evidence of completion (see Fig. 1)
- Searching Scopus—students repeat and adapt their searches in Scopus, and are introduced to citation searching
- Grey literature (including a video on Google Scholar)
- Using systematic reviews in healthcare.

The centrepiece of the online tutorial was page 5 (Fig. 1), where the Camtasia video, LibWizard module and digital badges are all featured.
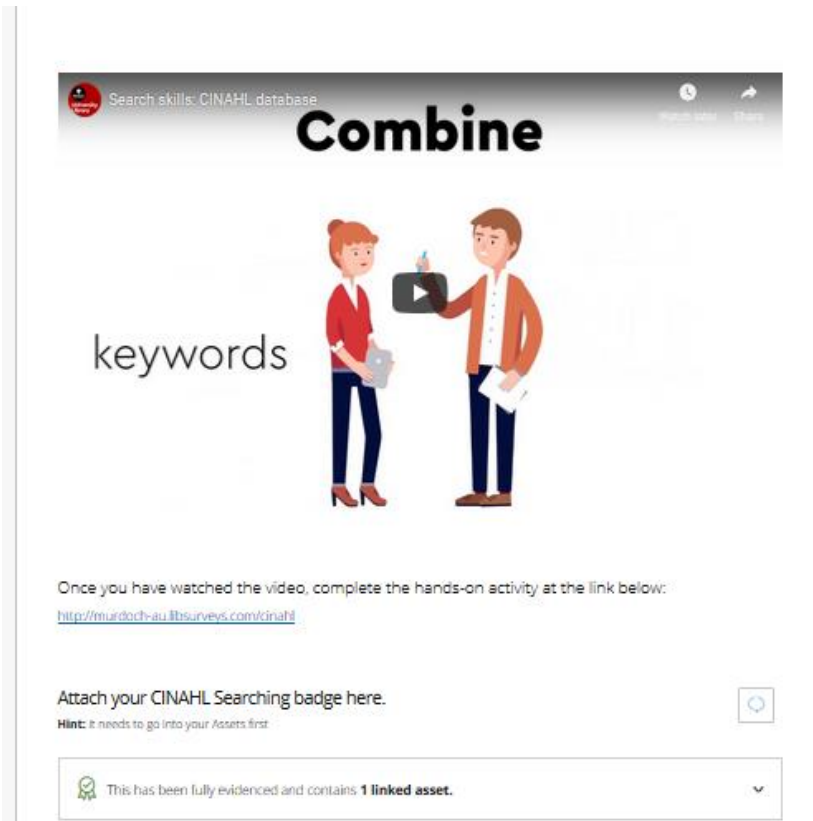
Fig. 1 Page 5 of PebblePad tutorial included the Camtasia video, link to the LibWizard module, and attachment box for digital badge

Fig. 2 shows a typical page of the LibWizard module. On the left is the 'question column' where instructions, questions and answer fields can be added. Most of the screen would be taken up by a 'slide content' window on the right, which in this case contains the embedded CINAHL EBSCOhost database. Students would read the instructions and conduct live searches in the database to answer the questions.
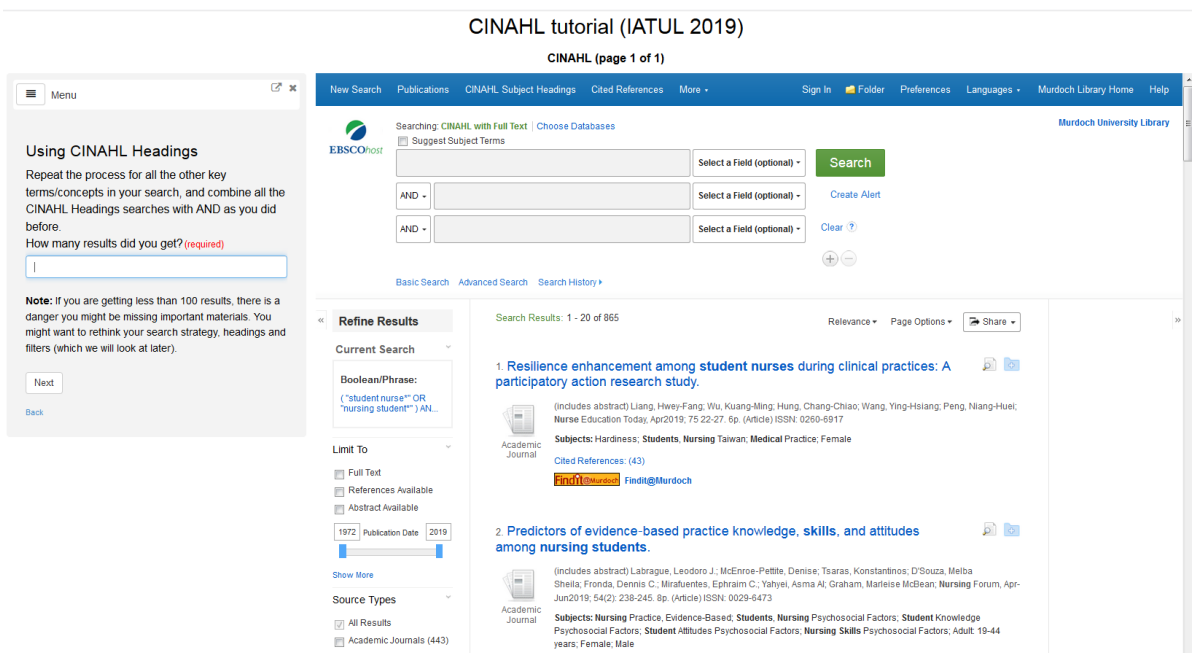

Fig. 2 LibWizard tutorial, with instructional content in left sidebar and embedded live database on the right

To build a tutorial in LibWizard, you would create one or more 'slides' based around what is in the content window. As the name implies, the slide content window can also contain PowerPoint

slides, as well as videos, images, or even entire LibGuides. Then you add content to the question column, using separators to create 'pages' (notice the 'Next' button in Fig. 2). Because of this versatility and simplicity, it was initially planned to build the entire tutorial in LibWizard. However, as Cochrane and Scopus do not work in the iframes, PebblePad had to be 'borrowed' as the delivery platform.

In this implementation, we used just one slide featuring the embedded CINAHL database (Fig. 3). Welcome and Thank You screens are provided as standard, which can be customised as needed.
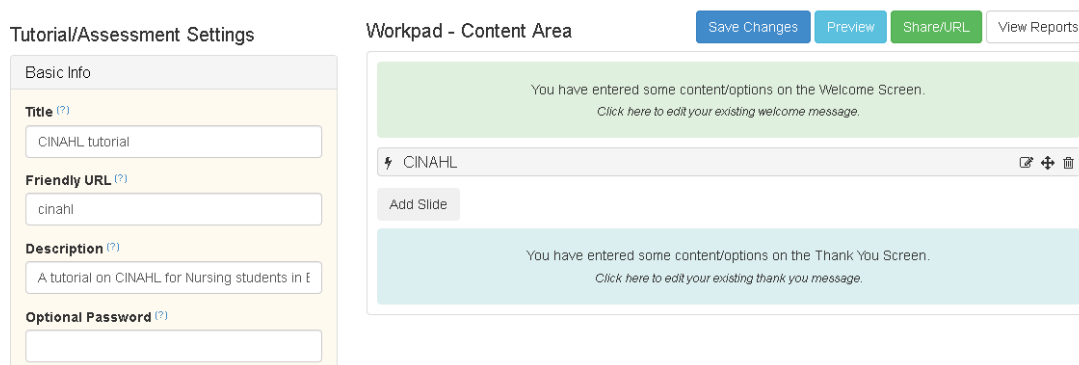

Fig. 3 Backend of LibWizard, showing Welcome screen, slide for CINAHL module, and Thank You screen

It should also be noted that Murdoch's licence for CINAHL has a restricted number of simultaneous users, and the Library made a special arrangement with EBSCO for unlimited access over the required period, so that students would be able to complete the tutorial.

A key feature of e-portfolio learning is collecting evidence of learning (see bottom of Fig. 1). In particular, we wanted to provide a way for students to show they had completed the CINAHL module, while promoting self-directed learning. It was decided that a digital badge was the best way to do this, as it would have the additional benefit of motivating students with a 'tangible' reward for completing this task.

All questions in LibWizard were made compulsory, so that the student would need to complete the entire activity to earn the badge. The module was configured so that when the tutorial is completed, the 'Thank You' screen is bypassed and redirected to the Moodle learning management system (Fig. 4). This will authenticate the student's identity, and he or she will need to complete a declaration of completion to be able to download the badge. The student can then return to PebblePad and attach the badge as evidence of learning.
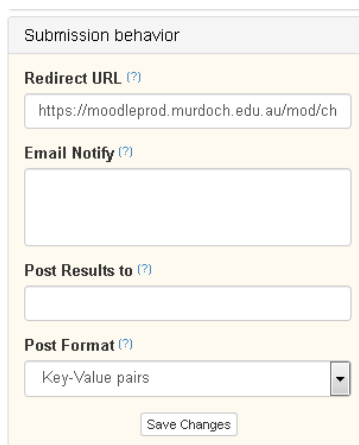

Fig. 4 Configuration of submission behaviour to
redirect to the Moodle learning management system

The badge itself is an image file developed with the assistance of Marketing & Communications, and the Moodle component was set up by the University's Learning Innovations team.

This entire tutorial was designed to be student-directed, without the need for marking or active monitoring by the authors. But with such a large cohort of students, it was expected that a number of them would have difficulty using CINAHL, so a Camtasia video was recorded that walked through the process of searching the database following the same steps as the tutorial (but using a different example), showing where to find various functions and features. This was uploaded to YouTube and embedded in PebblePad.

Both the Camtasia video and the LibWizard module are freely accessible on the web:

- LibWizard tutorial: http://murdoch-au.libsurveys.com/CINAHL-IATUL (this is a clone created for IATUL 2019, so as not to affect the statistics of the original)
- Camtasia video: https://youtu.be/FIYAhtzO8VM.

Collecting feedback
A feedback form was built into the finished product, which consisted of 11 questions altogether. Eight questions covered general teaching evaluation as well as specific technologies, using a 5-scale Likert rating. For example: "Obtaining an electronic badge upon completion of the module, motivated my learning", where 1 was 'Strongly disagree' and 5 was 'Strongly agree'.

Two open-ended questions asked about general attitudes and learning difficulties in the tutorial, and a final Yes/No question asked whether students would recommend that the online tools continue to be used in future.

Results: The wedding
These elements were all combined into a single digital learning object, which was launched in late January 2019.

As expected, despite the instructional scaffolding and Camtasia demonstration video, there were a number of students who made appointments with the librarian for face-to-face assistance with completing the tutorial.

There were also technical problems with the Moodle setup for granting the digital badges, which led to a flood of anxious emails from students. It took a while for these to be resolved, and in the end the badges were sent as attachments in replies to the individual emails.

Basic statistical analysis was performed on the quantitative data from the Likert and Yes/No questions, and the open-ended questions were coded and analysed for qualitative information.

Quantitative data
The median for most of the Likert questions was 4, with the exception of the question about whether the digital badges motivated learning, which had a median of 3.

Modes for each of these questions were mostly 3 or 4, matching or slightly below the medians. The outlier was a 5 for the question of whether the LibWizard tutorial was helpful.

Most of the means reflected the difference between the modes and medians, and generally hovered between 3 and 4. The highest, exceeding 4.0, was that the content met stated objectives. The lowest, at just above 3.1, was about the digital badges motivating learning.

For the question on whether they would recommend continued use of the digital tools, 68.2% responded 'Yes', 18.9% said 'No', and 12.9% did not submit an answer.

Qualitative data
An analysis of the open-ended questions revealed the following themes:

- By far, the dominant theme, with 43 responses, was learning effective database searching skills

- Students also found the interactive nature of the tutorial engaging and helpful
- Attitudes toward EBP were very positive, in line with the findings of Ryan (2016)
- The digital badges were a major motivating factor.

Overall, students found the online tutorial to be a challenging but positive experience.

Discussion: Honeymoon

The quantitative data showed a clearly positive response to the digital learning object, with a mean above 4 that it met the stated learning objectives. Furthermore, the LibWizard module rated the highest mode of 5 for contribution to learning. The qualitative responses also showed that learning to use databases was the most beneficial aspect of the tutorial.

Developing digital literacy skills in students

The primary aim of the tutorial was to develop students' information and digital literacy skills for EBP. Was this successful?

Using Søvik's (2016) model showing the parallels between EBP and IL, students need to be able to:

- Develop a clinical question/identify research needs
- Find/locate evidence
- Appraise/evaluate the literature
- Act on/apply the evidence
- Evaluate and reflect on their practice/acknowledge their IL needs.

The results show that the program was successful in helping students develop these skills and apply them to their case study.

Innovation

The literature shows that web-based instruction is effective. Videos have been used for many years, but more interactive and effective means of delivery are needed. Some attempts at this have been made, but until the release of LibWizard, there has not been any turnkey product for live database searching tutorials.

Digital badging is another rising trend in education, and the combination of this with LibWizard and PebblePad has created a truly unique and innovative product.

Future improvements: After the honeymoon

As with all innovations, there were teething problems, and two major issues became apparent—problems downloading the digital badges, and the need for greater face-to-face instruction.

Digital badges

Technical issues with Moodle resulted in low scores for the digital badges evaluation, and in the feedback this was the No. 1 obstacle to learning by a large margin. It is interesting that the most established of the technologies used was the one that created problems in this implementation. In future, more work needs to be done to ensure that this does not occur again.

Face-to-face instruction

The lack of assistance from a tutor was the third most common difficulty facing students, which is why some of them arranged to meet with the librarian for guidance. This indicates that in any cohort there will be students who would either experience difficulties in the online environment or prefer face-to-face instruction. Options for such guidance in the form of webinars and helpdesk sessions will be considered for next year.

Conclusion: A lasting relationship

The marriage between the University Library and the College of Science, Health, Engineering & Education at Murdoch University was a successful integration of LibWizard, PebblePad,

Camtasia and micro-credentialing, birthing a product that has helped nursing students develop the confidence and skills needed for effective EBP.

While not a perfect implementation, the project has yielded important lessons around technological improvements and support for students, which will help improve future iterations.

Evidence-based practice and digital literacy are useful skills for both professional practice and lifelong learning (Søvik, 2016), and the Library and College will continue to partner together in delivering this online tutorial to develop self-efficacy in students.

Acknowledgements

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