

Experiences of NUS Librarians as Lecturers of a PhD Engineering Module

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Abstract

“No, I came in thinking it was a waste of time, but I learnt useful skills that I would use over the course of my PhD. Thank you!” ... with these encouraging words from a senior student who attended the module a few semesters ago, we press on! In 2014, librarians of National University of Singapore (NUS) started teaching information literacy skills to Faculty of Engineering’s PhD students in the module EG5911 “Research Methodology and Ethics”. Back then, the information literacy component was allocated 25% of the module’s Continuous Assessment (CA). Today, the information literacy component is 40% of CA. Apart from the increase in CA, librarians are also given the liberty to revamp the information literacy syllabus and assessment of the module. This article details the journey the librarians took from teaching information literacy skills in a traditional lecture-cum-tutorial setting to a 4-hour activity-based lesson in a smart classroom.

Review of Literature

A search in databases such as ProQuest, EBSCOHost, Scopus and IEEEExplore, etc. for literature on information literacy or library instruction for Engineering graduate or PhD level students of the five academic libraries in Singapore did not retrieve any relevant materials. Some journal articles on National Institute of Education (NIE), polytechnics, secondary schools or at the national level, did not relate specifically to information literacy instruction for Engineering PhD students. These articles were specifically on information needs and information seeking behaviour (Butterworth, 2000; Chua, 2014; Laxman, 2009; Schubert Foo et al., 2014).

However, through meetings with information literacy librarians of various Singapore institutions, one Singapore university library conducts a 3-hour seminar for postgraduate Engineering research students. This seminar is a compulsory one-shot seminar offered to all postgraduate Engineering students within a semester. The seminar is conducted by a librarian and takes an experiential learning approach. Students learn through group discussions and activity-based content. Students are not assessed.

Literature outside of Singapore are “information literacy studies in the engineering education literature fall primarily into four categories, i.e. information gathering, information evaluation, information application and information documentation” (Wertz, Purzer, Fosmire, & Cardella, 2013). These do not specifically describe the content taught nor the delivery or the details on how instructional programmes in Engineering education has evolved over the years. The closest example is an article on how Engineering librarians at the University of Michigan (Lalwani, Niehof, & Grochowski, 2018) is working with the College of Engineering's Graduate Education Programs Office to offer instructional programs on literature reviews, data management, finding funding and reading retention. Although the programme is not integrated in curriculum, responses from students who attended the programme were positive. Students also sought the help from librarians to understand more about certain topics.

Despite the heavy reliance on Google (Phillips, Fosmire, Turner, Petersheim, & Lu, 2019) in a world grappling with fake news, the librarians play a critical role in generating “the multiplier effects of inculcating positive habits of information literacy” (Chua, 2014). By educating the graduate students in information literacy skills when in their early years, librarians are equipping future researchers and professors to teach their juniors and students. By equipping graduate students who lack information literacy skills, they are enabled to be “more focused, engaged and productive” (Laxman, 2009). Students’ information literacy skills will improve over time from “fair” to “good” with more practices and with guidance from librarians (Kousar & Mahmood, 2015; O’Clair, 2013).

Harris (2011) concluded that the foundation for successful collaboration are (1) faculty support from the doctoral-granting department, and (2) adequate library resources (particularly in terms of staffing); including the 5 models of research skill instruction, i.e. online tutorials, one-shot workshops, course integration, credit-bearing research practicum, and one-on-one individual consultations.

In the case of the module EG5911, successful collaboration with NUS’ Faculty of Engineering is realized with 4 out of the 5 models of research skill instruction. Furthermore, the service and resources provided by the librarians met the ABET accreditation for Engineering Programs (Accreditation Board for Engineering and Technology, Inc., n.d.). NUS Faculty of Engineering programmes are accredited by ABET. One of the criteria for

accreditation states that “the library services and the computing and information infrastructure must be adequate to support the scholarly and professional activities of the students and faculty”.

About EG5911 “Research Methodology and Ethics”

EG5911 is a module which all new NUS Engineering PhD and Masters by Research students have to take. All Engineering PhD are required to complete the module in order to sit for their Qualifying Exams.

When the module was first offered, the module consists of three assessment components, namely, library component, presentation of an ethics case study, and participation. Students are required to pass all three components in order to pass the module. The typical class size was between 70-210 students and this decreased as the student intake dropped in recent years.

The module’s learning outcomes (MLO) are:

- MLO 1: Recognize the need for information;
- MLO 2: Construct effective strategies for locating and accessing information;
- MLO 3: Compare and evaluate information;
- MLO 4: Appreciate the importance of good research;
- MLO 5: Discuss ethics in research with empathy and respect;
- MLO 6: Be aware of and concerned with safety hazards in research; and
- MLO 7: Prepare and deliver a compelling presentation to graduate students from a range of engineering disciplines.

The information literacy component supports MLO 1 to 4. To assess learning, students have to complete the library component assessment, group presentation and participation. The module is offered every semester. The information literacy component is usually taught on Week 3 and 4 of each semester. The module is taught by a team of Engineering academics and six Engineering librarians. The Faculty of Engineering’s Office of Graduate Programme (OGP) provides the necessary administrative and coordination support.

2011-2013: The Preparation

In 2011, the module coordinator of EG5911 approached NUS Libraries to discuss integrating information literacy into the module. The module coordinator had previously attended a Citation Analysis workshop at NUS Libraries. The module coordinator used the analogy of a video recorder when describing the value of knowing information literacy skills. He said everybody knew how to press the “Play” and “Record” buttons but to know how to maximize the use of the video recorder, you would need to read the instruction manual. Instead of his students “reading” the “instruction manual” of information literacy, he wanted the librarians to teach information literacy so that students are equipped with these necessary skills before embarking on their research.

From the initial discussion, meetings and brainstorming, the NUS Board of Graduate Studies finally approved the module in 2013. The first run started in Academic Year (AY) 2013/14 Semester 2.

2014-2016: The Beginning

When EG5911 first started in 2014, the Library Component was taught in one lecture session and one tutorial/lab session. The lecture was when all students gathered in a huge hall to hear

the lecturer speak. Tutorial/lab sessions were held the week after the lecture. The tutorial/lab sessions were when students apply what they learnt in the lectures.

In 2014, the learning outcomes of the Library Component were to identify, search and evaluate relevant information sources, manage references and apply search techniques taught. The librarians focused on demonstrating how to improve search results through the application of various search operators. In line with the ethics component of the module, librarians also taught students how to cite using IEEE citation style.

Of the 25% of CA allocated to Library Component, 5% was for an Online Quiz and 20% was for the Individual Assignment (Search Log). For the quiz, students were assessed on concepts learnt at the lecture. As for the Individual Assignment, students had to show how they searched for information for their research topic and whether they knew how to apply various search operators to retrieve the relevant results.

In AY2016/17 Semester 1, the CA for Library Component increased to 40%. This change is significant, as it showed that the faculty valued the contribution by the library. Also, the change required the students to pass all assessment components (i.e. presentation, participation and library). Failing any of the components will warrant a repeat in the following semester for the whole module.

The challenges during the first few semesters were the administration and management of the quizzes and the assessments which librarians were not familiar with. However, the Office of Graduate Programmes (OGP) was very supportive and a strong collaborative relationship started which continued through the years.

In 2015, NUS librarians and librarians of other institutions of higher learning attended the ACRL Singapore Immersion Programme. By 2016, the team of librarians for EG5911 applied what they had learnt in the Immersion Programme. The librarians created learning activities such as the use of worksheets, conducted peer sharing among students and engaged students during the lectures and lab sessions. The activities during lectures were crucial as students in the back rows were observed to be distracted and uninterested.

The outcomes of the learning activities were evidenced in student feedback such as “we can have a few more interactive sessions, and group discussion activities”, “the interactive portions helped me stay engaged and learn first-hand how to use the tools”, and “the Kahoot was pretty interactive but too little questions”.

In 2017, there was a change in the leadership at the Faculty of Engineering. The graduate programmes were under the charge of a new leader who questioned the need for PhD students to learn information literacy skills. In his opinion, Google Scholar was adequate and learning how to cite could be easily picked up. The new leader attended one of the information literacy lab sessions, asked questions but remained unconvinced. At the end-of-semester briefing in which the module’s lecturers and Engineering librarian attended, the leader again questioned the necessity of information literacy skills in equipping students for research. Even with the support of some of the lecturers, the leader remained fixed in his opinion. The briefing ended dismally with the possibility of information literacy component being removed from EG5911. When they heard about it, the team of Engineering librarians were extremely dejected. However, the team decided to press on and continue planning for

the new semester but yet were mentally prepared for the eventuality of being cut out of the module.

2017: The Leap

As the new Faculty of Engineering leader intended to revamp the structure of EG5911, he organized a focus group discussion with past EG5911 students to get their views of the module. All these senior students who took EG5911 a few semesters ago, gave overwhelmingly positive feedback. All of them indicated that the information literacy component was the most useful as they could apply what they had learnt in their research directly. With this evidence, the leader changed his opinion of the library component.

Subsequently, the leader gave the librarians carte blanche to revamp the library component. This included re-utilizing the classroom time and access to smart classrooms. The team decided to take up this opportunity and maximize the use of resources provided. The name “Library Component” was changed to “Information Literacy Lab”.

The librarians proposed a radical model by consolidating two weeks’ of lessons into one four-hour sectional lesson. This intense hot-house method was purely activity-based lesson and filled with exercises, games, role-play and discussions and interspersed with 15-20 minutes mini-lectures. As the librarians had freedom to obtain resources, we requested for the lessons to be conducted in Active Learning Classrooms (ALC) of the Faculty of Engineering. OGP suggested that lessons could be conducted on a Saturday so that part-time students could easily attend the lesson. The purpose of these extreme changes was to explore how intensive peer learning activities could affect learning. Librarians also decided to help students who had a basic information literacy competency level by allowing them to skip the first hour of the four-hour lesson if they passed a Pre-Class Test. The purpose was to give students the opportunity to use their time better. The proposal for these changes were accepted by the leader who conveyed his appreciation to the team for helping students learn better.

In the Lesson Plan, we incorporated these activities: flipped-classroom approach with pre-readings; group discussion on a specific topic, using sample and blank worksheets; peer sharing via Padlet; demonstration of search progression via H5P; “learn from the past” via IVLE (Integrated Virtual Learning Environment) Poll; elimination of articles using CRAAP via IVLE Assessment and Kahoot quizzes. Students were also offered consultation time with the librarians after the lesson.

More students achieved higher marks in AY2017/18 Semester 1 as compared to AY2016/17 Semester 2. Out of 40 marks, the mean (average) shifted from 24.6 marks (AY2016/17 Semester 1) to 28.9 marks (AY2017/18 Semester 1). This showed that the changes in made to Information Literacy Lab had an effect on the overall marks. Apart from the improvement in marks, librarians also observed that the students were more attentive and participated actively throughout the intensive four-hour lesson.

2018: The Transformation

In 2018, NUS Libraries introduced the Research Skills Framework (NUS Libraries, n.d.) to guide the development of information literacy programmes and student learning. The Engineering librarians of EG5911 unanimously agreed to revamp the syllabus to take an inquiry-based approach in AY2018/19 Semester 1. The librarians added Questioning as the starting point of the iterative inquiry cycle. Therefore, the revamped programme included the first three domains of RSF, i.e. Ideate, Search and Use & Cite. Through questioning,

librarians aimed to enable students to delve deeper into their topic, identify potential research gaps and explore their topic from various angles. In each iteration of the inquiry cycle, librarians introduced either a new product/application/concept, or significant search feature. With each iteration, students learn more and gain a better understanding of the research process as a whole.

Visualization tools available in each information source was also introduced to enable students to learn better from analyzed data presented in diagrams and charts. The application of a citation manager to managing references was also introduced in the early stages of the lesson to reinforce the practice of its use.

The Individual Assignment was changed from a Search Log which requires students to show how they improved their searches to a Research Review. In the Research Review, students have to demonstrate how they questioned their research topic and find answers in the databases Scopus and PatSnap.

In planning for 2019 and the years to come, the team of librarians have to contend with manpower constraints and possibly decreasing the number of sessions. Some considerations could be to revert to the use of a bigger venue such as the Lecture Hall and increasing the interactivity among students during the class.

Lessons Learnt

To get that foothold in integrating information literacy in curriculum requires the invaluable support of a faculty member or academic. The first EG5911 module coordinator recognized and valued the information literacy skills librarians taught. As an academic and researcher, he is known to explore innovative ways of doing things and was effective in gathering support for his endeavors. Librarians, who first met with him, had the opportunity to engage him through discourses on student learning. The conversations were not focused on the relevancy of information literacy skills (the hard sell). Instead, librarians discussed the challenges in getting students to think critically, discover new ideas, solve problems and so on, and by the way, how librarians could help (the soft sell).

Having a champion such as the first EG5911 module coordinator, who pressed on to create a module in which librarians are co-lecturers and members of the module planning committee, sealed the collaboration and buy-in with the Faculty of Engineering. Even after the module coordinator left the Faculty to be the head of a residential college, the collaboration with Faculty of Engineering continued and remained strong.

Apart from engaging the module coordinator and the other co-lecturers of EG5911, the librarians also cultivated a strong working relationship with the administrators of the OGP. The staff of the Office provided invaluable administrative support in ensuring the lessons are conducted effectively and efficiently. Administrative work such as booking rooms and facilities, managing students registering, withdrawing or appealing for changes and uploading of assessment marks to systems, requires tremendous of time. With the support of administrators who are more knowledgeable in student matters and systems, librarians were able to focus on teaching and designing the content.

What about the support and buy-in from the Engineering librarians themselves? The main challenge Engineering librarians face in managing and maintaining the information literacy component of EG5911 is the resources required. Six librarians and a total of at least 20 work

days are required to improve lessons and learning activities, assess learning and administer the class. Every academic year, the team of librarians strives to improve learning activities and provide more relatable and relevant examples. Improvements also include streamlining processes to ensure the administration of the classes and assessment is efficient. Even though they faced various challenges, the team of librarians were like-minded and united in their goals. They were all hungry to explore, were not afraid of failure, and constantly challenged each other to achieve better outcomes. The team focused on creating a harmonious, respectable working culture which they maintained in spite of arguments and grumblings. Having a team leader, who is able to unite the team, face challenges boldly and communicate effectively with the Faculty and the students, is essential.

Despite the huge investment of time and resources, Engineering librarians enjoy the interactions with students and learn tremendously about teaching and learning. Librarians are more cognizant of the challenges students face in learning information literacy skills and are motivated to continuously explore ways to improve learning.

Lastly, the librarians had the support of the Library Senior Management. Librarians were encouraged and given the freedom to explore new approaches and initiatives. This support is critical to continue promoting a culture of innovation in teaching and learning.

Conclusion

Although the information literacy component of EG5911 is resource intensive, the programme is a trail-blazer of many firsts. It is the first programme with Faculty of Engineering which has been continuously delivered since its inception. It is the first programme which is given 40% of the module's CA. It is the first programme which librarians are lecturers and tutors of a PhD module.

The Engineering librarians of EG5911 continue to look forward to closer collaboration with the Faculty and to promote an academic culture in which librarians play a deeply embedded role in teaching. This is the future NUS academic librarians look forward to.

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