Adding value to OERs in an open education practice-based degree

Institution & Institutional Context

The Master of Data Science and Innovation is a degree program that takes a trans-disciplinary approach to studying data science. The design of the course reflects the University of Technology Sydney's objective to 'engage students in creative and inspiring learning that enables them to build strong professional identify, future-focussed graduate capabilities and become global citizens.' The program is based on an ethos of openness, where making use of open resources and open data are a part of a long-view strategy for developing openness to new ideas and new experiences alongside open, transparent practices.. Graduates of the course will have the capacity to know where to go to find information and analyse what they find to develop insights into data that may not be obvious to others.

By learning to engage in a range of creative and analytic practices, combined with opportunities to integrate with industry experiences with real world projects, the course brings together two intersecting domains— data science and innovation. From a data science perspective, students learn to analyse data sets using statistics and data mining techniques. From an innovation perspective, students learn to craft visualisations and construct narratives which communicates insights from the data to inform organisational decisions, and develop a critical mind about the ethics and limits of "big data".

Students may take up to three subjects in a semester. One of the three subjects is a visioning subject in which students explore a speculative problem, such as issues raised by data privacy. In addition, there are two technical subjects in which students develop particular technical expertise. The course coordinator identified the technical skills essential for a graduate of the course to acquire and students are informed of the standard they must attain by the end of each subject.

Subjects are taught in two intensive, on-campus block periods with online activity in-between blocks. The on-campus sessions are used to provide opportunities for students to work together to manage resources, explore different positions on key issues and to ensure that students understand what is important to achieve by the end of the subject. During the out-of-block time, students work individually to integrate knowledge from a diverse range of disciplinary fields with industry experiences, real-world projects and independent study.

Keywords and OEP themes

Degree Design Based on OER; Open Learning; Masters Degrees; Student Participation; Active Learning; Open Educational Resources

What is the case study about?

The curriculum of the Master of Data Science and Innovation is an example of a mix of traditional and non-traditional modes of learning in a formal course offering. The goal of the course is to embody an ethos for openness within its core values rather than an exclusive use of OERs. To this end the design principles of the course embody a transition from proprietary to open systems. OERs are central to the course in two ways. Firstly data science is a fast evolving field in which it is hard to find textbooks that cover all of the topics required. The transdisciplinary nature of the course had the Course Coordinator and Librarian collaborating to search for OERs for a range of purposes as outlined below.

Secondly, the principles of openness are central to the course because the open data movement is central to the field of data science. The design team decided it would be too difficult for a transdisciplinary course to be entirely open or use only OERs and still offer a safe space for student experimentation. A growing proportion of the data the students will be working with as data scientists will be open. A hybridised model of proprietary and open systems allows students to question what data they release in a public environment, when it should be released, and what data should be retained within their organisation. Consequently, students learn that they do not have control once data is out in the public domain.

What is the issue or need you are addressing?

Students come into the course with very different work backgrounds and a variety of work experiences. Many are working in technical roles as computer scientists, mathematicians, or statisticians and are very technically adept. Others come from different industries where there are commercial constraints on certain ways of working. The course equips students with an understanding of the potential for data analytics to transform a variety of practices. Students are expected to develop habits of mind for staying current with their knowledge and skills and use the skills developed in the course to further their own learning. It is the students' responsibility to make up any gaps between assumed knowledge and their understanding of a topic. To develop this understanding the course encourages students to use open education resources for independent study.

How was the initiative implemented?

Subject coordinators collaborated with the library to identify OERs that students were expected to use as part of their self-directed learning in relation to preparatory work for some of the core subjects. It is chiefly in the technical subjects where OERs assist with the variability within the students' prior experiences. Students who do not have formal training in statistics use the first year of their study to build up their statistical knowledge using the OERs until they have understood the critical techniques they will apply in their laboratory work and projects.

The course has deliberately made OERs active components of the self-learning and curriculum support materials. The designers wanted to avoid re-inventing something that already existed and instead partnered with the UTS Library to curate a selection of resources suitable for the course. Library staff selected relevant resources, such as web sites or e-books with tutorials, which were reviewed by the appropriate subject coordinator.

To make better use of these existing materials the course designers decided to provide additional, tailored support resources. These resources were created to help students translate the OER specifically for the subject they were studying. These adaptations are a package of short, 10-15 minute audio commentaries or occasionally short screen casts that review particular OERs. The commentaries were only created for OERs that were intended to be used multiple times throughout the course. They will be created so they can reused and will be available beyond the students in the course.

A key aspect of professional learning built into the course is the students' ability to find resources that can be used as the basis of learning modules. To assist students to identify their own learning opportunities, students complete a small online diagnostic quiz to help them understand which OERs may have the most value for their studies. There is a large pool of resources at the end of the quiz and depending on students' responses to each of the questions in the quiz they are pointed to the resources that can help them to develop the required technical skills. These resources are available prior to studying the subject as preparation before they are formally enrolled. However, students are also expected to craft their own challenges and construct the learning experiences required to meet that challenge. The course provides them with ways of them doing that both individually and collectively through their work in groups.

The course also makes use of social bookmarking and annotation tools (Diigo; Declara) to share and comment on OERs, and indeed any other web resource, within course-specific collections. Students and staff who use the tools receive email alerts when new items are added to the collections. It is hoped that Declara's content and activity-driven recommendation engine, operating within a hybrid public and UTS-only space, will add value beyond a passive repository, but at the time of writing the pilot had only just begun

Outcomes

Students in the course are required to undertake a high level of self-directed learning using OERs. A focus group of four students (aged between 30 and 40 years old, three males and one female) reported that they found a range of resources effective for their learning. As well as the traditional lectures, textbooks and academic papers, the students relied on online tutorials and video lectures from Lynda.com and TED to successfully complete their studies. Reading precise academic texts was deemed essential for a more detailed understanding of the subject.

The students said they used additional resources because they could be accessed at any time on their own. They were looking for resources that were well planned and pulled together the key concepts in the subject whenever they had problems with learning some aspect of the subject matter. They commonly accessed freely available educational resources related to their subjects a couple of times a week. Students were very satisfied with the opportunity to use technologies of their choosing for studying and communicating and they were largely satisfied with their own level of skills in using technology and the time required to learn how to use new technologies.

To address confusion about the topics or shortfalls in the use of educational technology to learn technical skills, most students found their own materials to supplement the material provided in the course. All students had heard of MOOCs, and two started but didn't complete a MOOC, while one started and completed a MOOC related to the course. Reasons given for using freely available educational resources were mainly for help in understanding the subject material or to get an alternative perspective on the topic. Occasionally it was to see the steps necessary to do something successfully (like a technical tutorial) or to see a practical example of a theoretical concept. Some students used OERs to illustrate a point in a class presentation or when their lecturers assigned them as supplemental material. Not all students in the focus group would recommend this as the best approach to learning to a friend or colleague.

Issues & challenges

The engagement with OERs in the course is intended to help students think about the value of the Open Data Movement and to help them plug any gaps between the knowledge level required and the students' own levels of knowledge. The resources gathered for the course are not exclusively open but supplement closed resources. There is a blend of open and online material that starts with a contained set of resources which are increasingly open, like peeling away the layers of an onion. Students however saw the use of OERs as a way of overcoming differences in their lived experience of learning, either due to lack of clarity or relevance of the course materials and they needed to go elsewhere for help in understanding the subject material.

The Library played a significant role in the collection and evaluation of OERs for the course. This had its own challenges in terms of balancing expertise with close collaboration and communication so the Librarian has a good grasp of the desired learning outcomes of the course to ensure relevance of OER format and subject matter. In addition, the Library has purchased a range of resources which it would like to see used more extensively and these were promoted to the course coordinator.

Insights and Recommendations for National and/or Institutional Development

The insights provided by this case study exemplify pedagogical practices for the effective integration of OERs into a course. Students were formally and informally encouraged to search for OERs as part of their assignments to support them in developing self-directed learning skills. The subject coordinators saw this as an essential step in the preparation for lifelong learning that would prepare students for a transition from proprietary systems to more open approaches in managing data and developing students' information literacies to the next level.

Students certainly valued the flexibility offered by the use of OERs but also saw them as disconnected from the 'teaching' provided in one of the subjects. The four students interviewed had difficulty in seeing the importance of independent study which could provide a note of caution that any strong reliance on OERs could be perceived by students as an avoidance of teaching. This is particularly the case where students perceive the use of OERs as supplemental rather than integral to learning in the subject Students respond by undertaking independent searches for resources that could offer alternative perspectives that make up for what they perceive as shortfalls in the course.

To counteract any perception that OERs are supplemental rather than integral to learning, it is essential that OERs constitute a core aspect of learning experiences for students. This case study has highlighted the significant role played by the Library in curating lists of resources at the course level. It also suggests a potential role for libraries in monitoring the integration of the students' experiences of OERs.

A closer relationship with students in a course will also enable libraries to identify what is necessary to succeed in certain subjects based on the topics or assignments students' report they find difficult to master. Over time, consulting with large numbers of students with similar learning challenges will eventually identify patterns of difficulty which can be reported to subject coordinators as areas that can

be addressed in their subjects through a greater integration of OERs. This expansion of the library's role beyond curating lists of resources to a greater focus on student learning by classifying and advising on which resources are good fit in a subject not only helps students make better use of those resources but builds the foundations for an active engagement with the resources the library recommends.

Finally, it should be noted that the Master of Data Science and Innovation is still in its infancy, having enrolled its first cohort in 2015. Thus the whole of 'program-level' implications will take at least another semester to discern. There were encouraging signs at a recent hackathon event, where students worked with OERs and library eBooks and their own shared notes from the previous semester, to suggest that acceptance of openness is beginning to take hold.

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