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'It's Not Their Job to Share Content': a case study of the role of senior students in adapting teaching materials as open educational resources at the University of Cape Town

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ABSTRACT Inspired by the Massachusetts Institute of Technology's landmark decision to make its teaching and learning materials freely available to the public as OpenCourseWare (OCW), many other higher education institutions have followed suit sharing resources now more generally referred to as Open Educational Resources (OER). The University of Cape Town (UCT) in South Africa joined the OER movement with the launch of the UCT OpenContent directory in February 2010. While much of the research has focused on the potential value of OER to institutions and to the community at large, less attention has been paid to the complex processes that need to be undertaken to adapt existing materials as OER and specifically the opportunity to engage senior students in this practice. In this article the authors explore the processes that three senior physics students employed in assisting their lecturers to adapt existing materials as OER, the challenges they encountered and the contribution these students made. The findings reveal that the senior physics students report having sufficient time, knowledge of the field and skill in using a range of technological tools that made the OER adaptation process of their lecturers' materials easier. Based on the participating physics lecturers' acceptance of the students' adaptations of their materials, it would seem that the strategy of using senior students to support busy lecturers to adapt existing teaching materials as OER is worth considering.

Introduction

Inspired by the Massachusetts Institute of Technology's (MIT) landmark decision in 2001 to make a selection of its teaching materials freely available to the public as OpenCourseWare (OCW) (Abelson & Long, 2008), many other higher education institutions have followed suit. These institutions have begun sharing teaching resources online in a form now more generally referred to as Open Educational Resources (OER). Like other leading institutions such as the Open University (Gourley & Lane, 2009), Athabasca University (McGreal, 2010), the Open Universiteit Nederland (Schuwer & Mulder, 2009) and the University of Michigan (Kleymeer et al, 2010), the University of Cape Town (UCT) has joined the OER movement firstly by signing the Cape Town Open Education Declaration and secondly by launching its own OER directory, UCT OpenContent, in February 2010 (Hodgkinson-Williams & Donnelly, 2010).

While a great deal has been written about the potential of OER (Atkins et al, 2007; Centre for Educational Research and Innovation, 2007; Caswell et al, 2008), less attention has been paid to the actual processes of adapting existing teaching and learning materials as OER. One of the leading reasons academics give for not participating in the OER movement is the time required to prepare and/or adapt materials for open consumption (Browne et al, 2010; Sclater, 2010). While other studies have investigated methodologies for designing or reusing OER (Conole & Weller, 2008); providing repositories to optimise sharing (Davis et al, 2010); and using tools to support

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collaborative and cooperative work around OER (Wilson & McAndrew, 2010), few studies have investigated the role of senior students in the OER creation process (Kleymeer et al, 2010).

In this article we explore the processes that senior students at UCT undertook in accessing and working through materials to be adapted as OER, their decision making around embedded copyright issues, their sourcing of alternative images, their decisions on meta-tagging, how they overcame some of the challenges these processes posed and the contribution these students made.

Open Educational Resources and OpenCourseWare – clarification of terms

Institutions such as MIT led the way for increasing access to academic resources with the launch of MIT OpenCourseWare. Since then many institutions have followed suit and various institutional and cross-institutional initiatives are now seen throughout higher education around the world. The OpenCourseWare Consortium (OCWC), the largest association of open education institutions, now represents in excess of 200 universities who participate in OER activities and collectively are sharing more than 14,000 courses (Carson, 2011). The OCWC homepage describes OCW as 'a free and open digital publication of high quality university-level educational materials. These materials are organised as courses, and often include course planning materials and evaluation tools as well as thematic content.'[1]

The term OER was first deliberated and agreed upon at the UNESCO (2002) Forum on the Impact of Open Courseware for Higher Education in Developing Countries to describe the 'open provision of educational resources, enabled by information and communication technologies, for consultation, use and adaptation by a community of users for non-commercial purposes' (p. 24). OER includes 'teaching, learning, and research resources that reside in the public domain or have been released under an intellectual property license that permits their free use or re-purposing by others' (Atkins et al, 2007, p. 4). The various types of OER include 'full courses, course materials, modules, textbooks, streaming videos, tests, software, and any other tools, materials, or techniques used to support access to knowledge' (p. 4). The terms OER and OCW are often used synonymously but, as Terrell and Caudill note: 'The distinction between the two is that OCW resources are organized as courses, while OER resources may take any digitized form. ... So, for the purposes of clarity, OCWs are OERs, but not all OERs are OCWs' (2011, p. 38). This is an important distinction, for while the UCT OpenContent directory does include some complete courses, most of the current resources are best described as OER.

The OER Initiative at UCT

With funding from the Shuttleworth Foundation, UCT's Centre for Educational Technology (CET) developed the Drupal-based UCT OpenContent directory [2] with some assistance from an external development company. The UCT OpenContent directory is designed to showcase OER developed at UCT and was launched on 12 February 2010 with 21 resources contributed by UCT academics. Nearly two years later, the success of the project is manifest in the growth of UCT OpenContent to include 166 resources consisting of over 1000 individually accessible teaching and learning resources. Most of these resources were specifically adapted for UCT OpenContent as most resources at UCT are intended for campus-based students. While a number of these resources are available internally on the local Learning Management System (LMS), Vula, a localised instance of the Open Source Software platform, Sakai, they are not intended for public use.

One exception to this generally lock-down culture at UCT is the Department of Physics, where a number of lecturers established a departmental website with many downloadable teaching resources over 10 years ago.[3] This website was set up prior to the establishment of the institutional LMS and the materials were primarily intended for use by physics students at UCT. There was no process for checking that the materials were potentially useful to a wider audience, if they contained copyrighted materials or that they were appropriately licensed. Meta-tagging was not undertaken at all and thus the materials were difficult to locate via a search on the Web.

When the OER team at UCT were developing the UCT OpenContent directory, lecturers in the Department of Physics were approached about sharing their online materials more formally.

Most of the lecturers said that they were happy to share the materials online, but had no time to ensure they were suitable for a wider audience, appropriately licensed or accurately indexed and then linked to UCT OpenContent. The OER team was able to offer these lecturers a small grant to fund senior students to assist them with the process of reworking their existing teaching materials into shareable OER.

OER Creation and/or Adaptation Processes

In most cases existing teaching materials require some additional work in order to be ready to be shared as OER to the general public. As sharing openly requires an additional set of processes to be applied to the traditional mode of resource creation and distribution, the additional time associated with ensuring that materials are ready to be shared as OER can be seen as a disincentive for busy academics (Browne et al, 2010). Figure 1 illustrates some of the differences between intra-institutional sharing of teaching materials with that of OER.

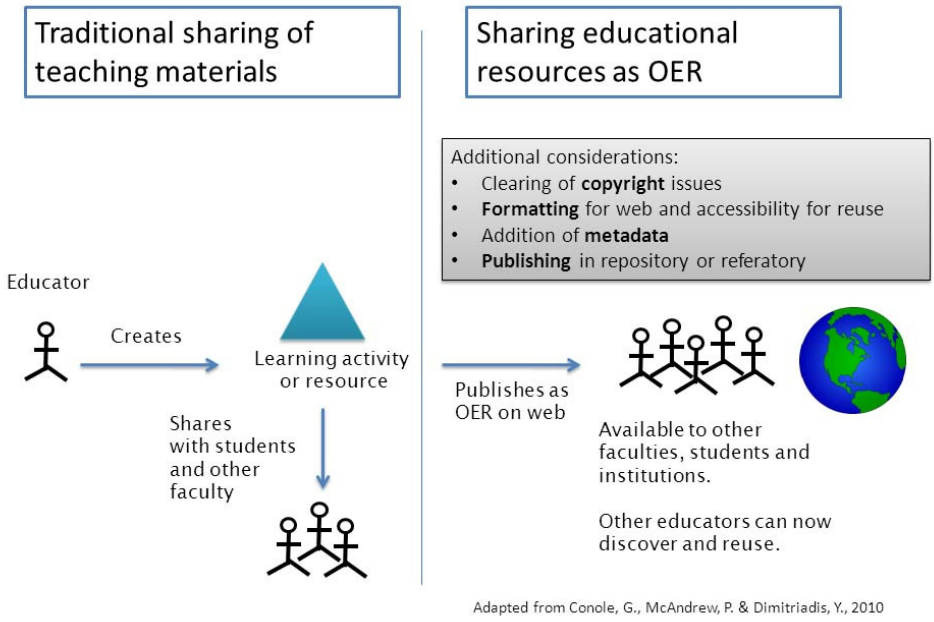

Figure 1. Traditional sharing versus sharing OER (adapted from Conole et al, 2010).

Most OER creation and/or adaptation initiatives focus on the role of the lecturers in using specific methodologies for designing or reusing OER (Conole & Weller, 2008) or using specific tools to support collaborative and cooperative work around OER (Wilson & McAndrew, 2010). Apart from the University of Michigan's initiative (Kleymeer et al, 2010), little publically available information exists on how students are assisting their lecturers in adapting materials to be shared as OER.

As part of the Open.Michigan initiative, the University of Michigan developed an OER development process called dScribe [4], which specifically uses senior students to support academics in adapting existing teaching materials to be shared as OER. The dScribe process, which is 'short for "digital and distributed scribes", is a participatory and collaborative model for creating open content'.[4] The students are responsible for much of the groundwork involved with identifying potential copyright issues, sourcing alternatives or re-creating problematic materials, formatting materials for consumption on the Web and adjusting the materials to suit a broader audience (Figure 2). Furthermore, Open.Michigan has developed a software package called OERca [5] which provides an online system with which students and academics can collaboratively work on clearing copyright issues embedded in digital resources.

The UCT OER team have worked closely with the OER team at the University of Michigan since early 2009 when UCT OpenContent was still being conceptualised. Their dScribe process was used at UCT in the training of the senior students to assist academics to adapt their existing teaching materials as OER. It is important to note that the OERca system was not used as it was not yet supported by the IT department at UCT and due to the intensive training involved to get both students and academics well versed in using the system. This resulted in a number of the processes which could have been mechanised using OERca being done manually by the students. So while the process undertaken by the physics senior students used the dScribe process as a model for student and academic engagement, most of the interactions happened in person or via email rather than in a centralised system. The actual process adopted differed slightly as the senior students developed their own heuristics for creating OER, which are discussed under the findings.

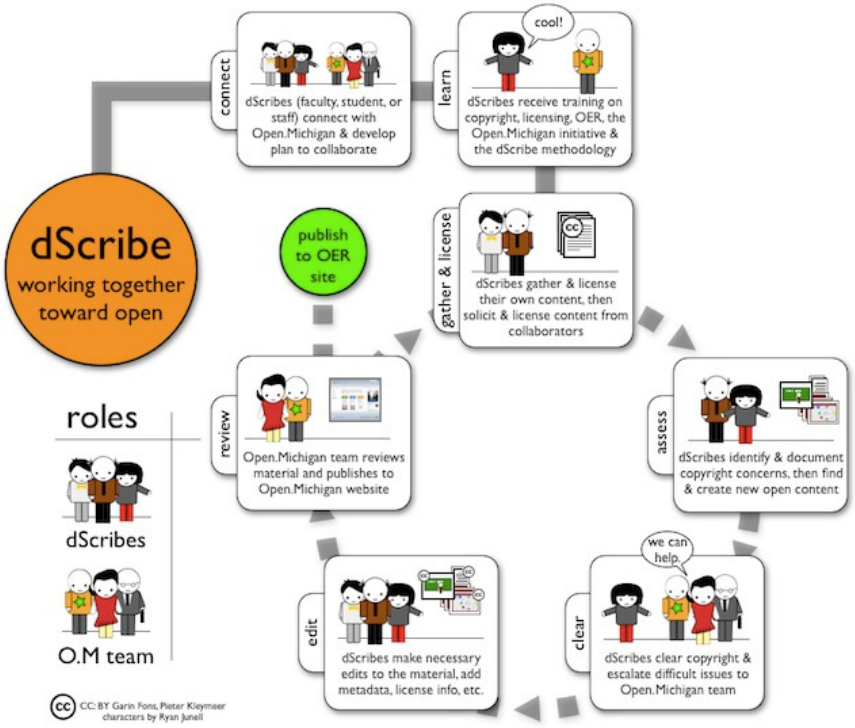

Figure 2. University of Michigan's dScribe process.[4]

Methodology

This case study attempts to interrogate the 'particularity and complexity' (Stake, 2005, p. xi) of OER adaptation by three senior students (Table I) in the Physics Department at UCT. It reports on the OER adaptation process, which took approximately 120 days to complete as the students worked part time between August 2010 and December 2010.

Students	Qualifications	Year	Year as a tutor
1	MSc – current	2nd year	1 year 6 months
2	MSc – current	3rd year	5 years
3	MSc - current		4 years 6 months

Table I. Student tutor demographic details.

Semi-structured interviews were used to elicit responses from the three students and each hour-long interview was transcribed and sent back to the respondents for member checking (Maxwell, 1992). In addition, emails from two of the students were used to supplement the interview data.

Each of the 254 utterances were thematically coded (LeCompte, 2000) to identify the key ideas and categorised according to the emergent themes.

Findings

The analysis of the data focused the three subsidiary questions: 'What processes did the senior students follow in adapting lecturer materials as OER?', 'What challenges did they encounter within the process of adapting lecturer materials as OER?' and 'What contribution did the senior students make?' in order to address the main research question: 'How successfully can senior students engage in adapting lecturer materials as OER?'

Processes Followed by the Senior Students in Adapting Lecturer Materials as OER

Although the senior students had been provided a fairly sound grounding in the process of adapting their lecturers' existing materials into OER by the OER team who drew on the University of Michigan's dScribe process, the interviews revealed that the students had to make this process 'their own' and figure out exactly what worked for them by coming up with their own 'little heuristic plan' (Student 1). As Student 2 observes:

> Our initial discussions with the CET [Centre for Educational Technology] people were fairly helpful in setting us off in the right direction, but it was really the feedback on our first pass through the material that was the most useful.

Locating materials and requesting permission. In terms of the process that the dScribe process terms 'Gather and License', the senior students initially anticipated that the process would be quite straightforward, as the following extract illustrates:

> Interviewer: What would it take to get some of those resources ... converted and shared?
>
> Student 1: Not a lot, I mean we already have the website – it's probably just a question of getting permission and getting the latex source of pdfs and take out some pictures and put it up.

However, the students found that the process of gaining permission was not as unproblematic as they had anticipated. Not all the lecturers were happy to share their materials and 'there were a couple of people in the department who just refused point blank and said no, this is my stuff!' (Student 2). Student 3 comments thoughtfully that a lack of lecturer confidence might be a potential reason for the denial of permission to share these materials:

> There were some lecturers that just wouldn't allow us to, and I am not exactly sure why. I guess, maybe, being sort of not very confident in their actual stuff, something like that. Not wanting the whole world to see, these things you put together the night before. I think a lot of the lecture preparation happens the night before, or morning of. It's not always so thought out, whereas I think more attention is paid to the lecture itself. I think a lot of the lecturers want to emphasise the lecture rather than just the lecture slides.

Fortunately 'key members of the department, in particular [Lecturer 1] and [Lecturer 2], were already open source and open educational resources converts before we undertook this project, and their pre-existing resources formed the backbone of the Physics OpenContent' (Student 2 email). In addition 'most of the academics involved in the Physics major courses were very happy for [the senior students] to use their resources, and even to modify them to comply with copyright etc.' (Student 2 email), so they were able to obtain permission for a number of materials to be adapted as OER.

The senior students also found that the process of gathering 'source' files took longer than they expected. While many of the materials were already hosted on the Physics Department site, these materials were often in PDF format and therefore not immediately editable. The source files were often developed in LaTeX, a free document markup language software package, which is ideally suited to the equation-intensive text in physics. However, this meant that the students needed to locate the original LaTeX files in order to delete or add images and/or text.

Reviewing materials and identifying problematic issues. Once these files were obtained, the students estimated that about a third of the materials were 'just about right to start with – like there were one or two pictures you know taken from Wikipedia, that's about it' (Student 1). Another third of the materials were 'straightforward, a few things here and there, copied equations or things like that' (Student 1); while the last third needed a great deal of reworking due to the 'ridiculous' (Student 1) use of copyrighted material.

The students reported that the process of 'looking for copyright infringements was pretty quick' (Student 1) and straightforward. As Student 1 notes: 'For the most part we did our own thing, in terms of identifying the problems. The scheme I did, was pretty straightforward – notepad, file open, scan through, and reference page numbers where I found issues.'

Initially the students felt that they were 'being over cautious [as they] would say maybe this could be a problem, and anything raised an issue' (Student 3). Later on the students developed a Google Docs spreadsheet to keep track of the identified problems and noted that: 'Google Docs was actually really nice, it really worked well. Also it saved us the administration of finding the latest version, or lost copies' (Student 3).

Editing materials. The editing of the materials took the longest time, but as the dScribing process progressed, the students started to develop a set of rules or 'heuristics' (Student 2 email) to assist them adapt existing material into useable OER. The 10 key 'rules' or heuristics they devised were to:

- Decide whether an unacknowledged image is really necessary and if not, exclude it. In his email Student 2 points out that: 'Not every slide needs a picture – sometimes copyrighted images were included on slides which served no illustrative or educational purpose, particularly when introducing a new topic.' The rule to exclude unnecessary images is captured in the following extract:

  > Many times in the slides, especially the slides that we didn't include, people felt that they had to fill every available bit of space. There was some extraneous stuff and in many cases it was really innocuous like here's a picture of Newton or whatever. And sometimes they would have a diagram just for its own sake, and afterwards you would think how does this actually relate? (Student 2)

- Check potentially necessary unacknowledged images or diagrams on Tineye [6], the 'reverse image search engine that was pretty useful' (Student 1). If the image was licensed for reuse, they included it; if not they deleted and located an alternative Creative Commons licensed image or drew a new one. Student 3 explains: 'In general once we had discovered where it had come from, either we chucked it if it was not essential. Or if we had to replace it, if it was simple we would just redo it, or we would look on Wikipedia and Wikimedia.' The students commented upon the value of readily available share-alike images: 'There are a number of good pictures of scientists in Wikipedia and it's got a little license at the bottom and you can use it' (Student 2). This emerging rule was already quite entrenched in the senior students' own work:

  > Also, I personally have been producing my own diagrams rather than taking diagrams out of textbooks for use on my own slides, which then is maybe an additional diagram in the public domain for other people to use. I know [Lecturer 1] has been doing that for years. (Student 2)

- Use simple rather than over-complicated diagrams. This rule emerged as their way to deal with the 'very very fancy [copyrighted] diagrams' (Student 3) used by lecturers. 'What we ended up doing is leaving the very simple diagrams, since it's difficult to show that we would be infringing on copyright by just drawing an arrow and that sort of thing' (Student 3).
- Exclude gratuitous backgrounds as they 'obscure what you are seeing' (Student 2).
- Check for unreferenced text and include the correct reference as having the details is important for learning, as Student 2 suggests:

  > But as well as copyright being the law, in some ways it, it makes for a richer experience if I am using resources from a textbook or a website or whatever. Not only do I get those resources which I have included, but that website or that book might be useful to you, so crediting it is a good thing.

- Exclude all references to local events in materials to be released as OER (e.g. class times, test dates) to make it less contextually specific, as Student 2 notes: 'The resources should be aimed at a general audience – slides containing test dates and housekeeping announcements date the slides and distract from the material.'
- Include information referred to but not explicitly given in the slides, e.g. derivation of equations, which might have been undertaken on a blackboard. Student 2 reflects that this was why he 'started including the derivations in those hidden slides. Cause it will often say – in those resources, it will say – obviously from whatever, from X equation ... cause they have then derived it on the blackboard.'
- Include an introduction to the slides to help the readers make sense of the progression of the materials. Student 2 explains that:
- You will see that in some of the slides there is an introduction to the section, like this is what is coming. In some cases this was not in the slides that were initially offered on the internal website. We added that because now people are looking, and they [the lecturers] want to show that there is a progression and a structure there. Also they [the lecturers] were keen to not only have the slides, but also to have problem sets and tutorials and so on.
- Include metadata that accurately describe the topic and its intended use for each resource. Students pointed out the materials on the departmental website did not initially include descriptive data about the resources, as this required the lecturer concerned to know 'about meta and like tags and that sort of thing' (Student 1). However, the students did see the value of including metadata to make the materials searchable and therefore findable. Student 1 maintained that 'having it centralised means, I guess, there is potential for [the resources] to be indexed better. So if people are searching for that kind of thing they might find it more readily than the older format.' The provision of metadata in the form of keywords and descriptors turned out to be an explicit rule as the uploading process required metadata for each resource, including the type of material, the discipline, the teaching context, the latest update, etc.
- Include alternative licensing conditions for each resource. A further explicit rule that contributed to the successful adaptation of digital educational materials for reuse by others was the use of alternative licensing systems, such as Creative Commons, to indicate the conditions of reuse. What became evident during the interviews was that the students themselves, despite having received one-to-one tutoring from the OER technical consultant from CET, were sometimes a little unsure about what actually constitutes copyright infringement, what the regulations are around fair use (or fair dealing in South Africa) and specifically how Creative Commons endeavours to address copyright uncertainty. Students were also more hesitant about the value of alternative licensing than they were about the value of adding descriptive metadata. Although they agreed that 'licensing could potentially lead to more clear use of things' (Student 1), they were uncertain whether potential users were sufficiently aware of licensing and consequently 'barely notice legal notices' on digital materials. When pressed for their opinions about the risks of not including specific licensing conditions, students suggested that in the past lecturers did not include their copyright conditions as some of the materials that they referred to on the departmental website were copyrighted to others. The students suggested that while the lecturers were aware of copyright infringement, they 'didn't think it would be a problem' (Student 1).

Check changes with academics and prepare metadata. According to the interviews with the students, checking changes with the lecturers was a relatively uncomplicated part of the OER development process as they felt that 'the lecturers actually trust[ed them]' (Student 3) and 'everyone just sort of ok'ed it' (Student 1). Student 3 goes on to explain the benefits of being the tutors on the courses for which they were reworking the materials as OER:

> I think we know them quite well and we have been involved for a long time. It's quite a small department and we all know the lecturers quite well and they trust us. If it had been an outsider I think it would be more difficult. The fact that we were students there and tutors there; we in fact were tutors for the courses we were actually dealing with.

Uploading the materials and link to UCT OpenContent. The process of creating a page to link to the UCT OpenContent directory seemed to be a very easy process for the senior students. As Student 2

commented to the interviewer: 'So you saw the Physics OpenContent page that we created, it was just a page with tables and links.' Student 2 goes on to explain where they host the materials and how they link to UCT OpenContent: 'At the moment we are hosting almost all of our shared materials on the Physics server in a newly created, dedicated directory called 'Physics OpenContent' linked to from our homepage, so there is little difference in most cases.'

Update materials for subsequent year. Although the students were not involved in updating the materials again for a following year, at least one student noticed the constant updating as a challenge that would need to be addressed:

> The problem I think in sharing in OpenContent is that it's going to require more work, to get the primary materials in that form. It's also one of these things that change year to year. So it requires constant updating. I think that is one of the things that bothered at least one of the lecturers. (Student 3)

Challenges Current and Future

The students faced a number of challenges in the OER adaptation process, but the two most frequently mentioned are the need for better project management and not being given permission to share materials from all the physics lecturers.

Although the students had been given one-to-one tutoring by the OER technical consultant, they acknowledged that more explicit objectives and rules would have made their task unambiguous. As Student 1 recalls: 'I think at the beginning the main problem was we were not entirely clear on what we were doing. So we were not working in a very focused way. I think with a clearer picture it wouldn't take that long at all.' Students confess that they would have taken far less time to adapt the digital materials into OER 'if it hadn't been an issue managing our own team' (Student 2). Student 1 suggests that in future students acting as dScribes should:

> have a pretty clearly structured timeline, so they know exactly what they are going to do and how they are going to do it. Separate it into, identifying materials, signing off to do this, conferring with you guys, presentation to the professors, and moving on from there. Just so they know the process and what part they can contribute to the process. Just being more focused about the task and having shorter deadlines.

The other challenge they encountered was not being given permission to adapt all the lecturers' materials. The way the students resolved this particular tension was to work with those members of staff who were willing to make their materials open. They also used the promotion they received in one of the institutional OER magazine items to 'punt open education and OER' at a regular departmental colloquium meeting (Student 2). Perhaps uncovering why lecturers are loath to share might surface other concerns such as not believing that their materials are worthwhile, as hinted at by one comment about a lecturer who apparently 'always has textbooks on the boil but [as] he is a perfectionist ... it's never good enough' (Student 2).

A potential challenge the students foresee in the future concerns the use of both the departmental website and the institutional LMS. The greatest challenge is to ensure that the Physics OER collection, now hosted on a section of the Physics webpage and linked to the UCT OpenContent directory, will continue to be used and updated and not ignored in favour of new materials that may not be designed or adapted to be open. Student 3 summed up the problem concisely: 'Yeah, the problem is then maintaining parity between the website and Vula. ... It's actually a bit of pain actually making sure what's on Vula is on the website and vice versa.' He reflected cautiously: 'I think, it's almost like for the Physics department the website is no longer relevant' (Student 3). However, as Student 2 points out, the Vula sites are mostly used for the service courses and not for the mainstream physics courses, so it does depend on one's perspective. As Student 3 has only tutored service courses, his view is understandable but contestable if viewed from the mainstream courses. Whether this is the case or not cannot be judged at this point, but certainly the relationship between the two systems will need to be resolved in some way in the near future.

Value of Senior Students Assisting Academics to Rework Materials as OER

Four key issues emerged from the interviews that indicated the potential value senior students contribute to assisting their lecturers in reworking existing materials as OER, namely the responsibility for creating OER, the time to do what the lecturers cannot do (or should not do), the knowledge to identify the important concepts in the materials and the technological skills to undertake this task. As the extract from Student 3 aptly illustrates: 'So it takes work for the lecturers to create new content. Whereas what we did it did not require that much work from the lecturers' side.'

Responsibility for creating OER. Interestingly the senior students did not consider it the role of lecturers at UCT to create OER. One student specifically said that it is the lecturers' job to teach, 'it's not their job to share content' (Student 3). The students were aware that even though lecturers might be willing to share their materials, they might not be in a position to undertake the adaptation process. Student 3 offered a realistic appraisal of when and how lecturers will adapt their own materials:

> I think the problem is that we are not going to get them to just change their slides unnecessarily. They're not going to rewrite them. It's only when they are making changes, or new additions that they might be more aware. They are not going to sit down and say, I better sort out my slides! I think, what they will do is the evening before their next lecture; I need to change these from last year or something. Then hopefully, they will be aware of making it more open friendly content. In the end they know if they want to share them that someone is going to have deal with these issues. I don't think they are in a position to actually do it themselves. (Student 3)

Lack of time and extra effort required. The students were very aware that they were fulfilling a role that most of the lecturers wanted undertaken, but they had no time to adapt materials into OER themselves 'because it involves a lot of reworking' (Student 3). He specifically notes that: 'It is much easier for lecturers to put their slides up on the physics website than to have it shared (and verified) through OpenContent. It requires more effort on the part of the lecturers to ensure that materials are shared legally, and it makes updating slides more difficult.'

One of the potential drawbacks of making existing materials available as OER is that it takes too long for the lecturers to do and that they would therefore need to pay someone to do this. In the interviews students were asked directly if this payment contributed towards their willingness to undertake this task. Surprisingly two responded that they would have done this without being paid and saw the payment as 'a nice bonus' (Student 1), but it did help them to 'prioritise' (Student 2) this work. Later during the same interview, Student 1 suggested that the process of reworking materials into OER was in and of itself 'a good thing to be part of; it looks good on your CV [and] that always motivates people' (Student 1). However, Student 3 was quite pragmatic and reflected that 'giving tutors extra workload or trying to convince them to take this work on themselves will be difficult'. He did, however, suggest that people interested in physics education and/or wanting to produce a 'thesis or paper' might be the kind people to be developing OER.

Appropriate knowledge. As the senior students were tutors in the Physics Department and had used similar materials in their undergraduate years, they had a sense of which resources had been most valuable to them and therefore which ones might be valuable to a wider audience. Student 2 reminded the interviewer that 'these are courses that [they] have all done, so [they] know what is important and what is not important'. Student 3 mused: 'Looking back over the years, there are some really spectacular lecture notes that we have been given (Some are not quite as spectacular, and some are spectacularly bad).' As they know the materials personally they 'generally recognised the textbooks or the style and could find these things [unreferenced images and text]' (Student 2) to adapt them as OER.

Range of technological tools. The students reported that in the Physics Department 'Lecturer 2 keeps the server running, Lecturer 3, in principle, maintains the site, but each academic is responsible for their materials' (Student 2). The departmental website is developed in 'HTML, and [is] very simple' (Student 2). In adapting their lecturers' teaching materials as OER, the students drew on a range of

additional technological tools. The tools included the free encyclopaedia, Wikipedia; free media repository, Wikimedia; reverse image search engine, TinEye; web-based office suite and data storage service, Google Docs; web-based book search engine, Google Books; web-based file hosting service, DropBox; web-based video hosting service, YouTube; South African search engine, Aardvark; and web-based email service, Gmail. Student 3 explains their use of web-based tools in particular:

> Well it was the first time we had used Google Docs for anything other than storing documents. We all use Gmail constantly, we are always online, and we sent messages to ourselves to remind us. We are complete Google fan boys. Google Docs was actually really nice, it really worked well. Also it saved us the administration of finding the latest version, or lost copies. The other thing we used quite a lot is DropBox ... we used it most often to transfer lecture slides from person to person. The basic idea is that we used a lot of internet resources and that made our lives a lot easier.

Discussion

In order to understand the potential role of senior students in adapting their lecturers' teaching materials as OER, this article endeavoured to investigate the processes that senior students employed in assisting their lecturers to adapt existing materials as OER, the challenges they encountered and the contribution these students seem to be making.

The processes that these senior students followed drew upon the 8-Step process devised by the University of Michigan, but combined Step 4 and 6 (Table II).

OER processes followed by University of Michigan	OER processes followed by the University of Cape Town
Step 1: Connect – dScribes (faculty, student or staff) connect with Open.Michigan & develop plan to collaborate	Step 1: Connect – dScribes (faculty, student or staff) connect with UCT OpenContent & develop plan to collaborate
Step 2: Learn – dScribes receive training on copyright, licensing, OER, the Open.Michigan initiative & the dScribe methodology	Step 2: Learn – dScribes receive training on copyright, licensing, OER, the UCT OpenContent initiative & the dScribe methodology
Step 3: Gather & License – dScribes gather & license their own content, then solicit & license content from collaborators	Step 3: Gather & License – dScribes gather & license their own content, then solicit & license content from collaborators
Step 4: Assess – dScribes identify & document copyright concerns, then find & create new open content	Step 4: Assess – dScribes identify & document copyright concerns, make necessary edits to the material or create new material, add metadata, license info, add thumbnail image, etc.
Step 5: Clear – dScribes clear copyright & escalate difficult issues to Open.Michigan team	Step 5: Clear – dScribes clear copyright & escalate difficult issues to UCT OpenContent team
Step 6: Edit – dScribes make necessary edits to the material, add metadata, license info, etc.	Step 6: Review – UCT OpenContent team reviews material
Step 7: Review – Open.Michigan team reviews material	Step 7: Publish - UCT OpenContent team publishes materials to the UCT OpenContent website
Step 8: Publish - Open.Michigan team publishes materials to the Open.Michigan website	

Table II. Comparison of OER processes.

The senior students were able to assist the academics by following a fairly systematic and rigorous process of materials adaptation. Key time-consuming activities included the location of the original teaching materials and storage of these on a central server; reviewing each of the materials for potential copyright infringements and identifying the original textbooks or websites from where images or text had been obtained; and then removing, replacing, referencing or redrawing elements deemed problematic and adding elements to accommodate a wider audience. Only then were the lecturers asked to comment on the materials and asked about the licence they would prefer. The students were then able to take the process the last few steps and upload the materials

to the Physics server or YouTube and link the OER to UCT OpenContent, adding descriptive metadata and a suitable image for each resource.

Although the location of materials and editing steps by the students took the longest time, in future it could be speeded up by a clearer sense of the process and possibly by the use of the OERca web-based content clearing application. Based on the participating physics lecturers' acceptance of the students' adaptations of their materials, this process appears to be a sufficiently systematic process to inform other senior students in the process of OER adaptation. Further use of the process and the list of 'heuristics' devised by the physics senior students will need to be extended to other departments and refined. A key strategy that seemed to make this process successful revolves around the lecturers selecting their own students whom they could trust with their materials.

To overcome the project management challenges that the students faced, future projects would need more directive management by at least one of the lecturers and perhaps additional support from the OER team at UCT. As this was the first time a group of senior students had been used to assist lecturers to adapt teaching materials as OER, future such initiatives could draw on the lessons learned and refine the processes. Apart from a set procedure, negotiated deadlines for the adaptation of resources would assist keeping the students on track.

Overcoming the reluctance of lecturers to contribute OER will involve a more comprehensive response from the institution as a whole. As the students point out, there is not much incentive for the lecturers to produce quality teaching resources as the main focus is on the face-to-face lecture. One strategy is to increase the use of videoed lectures which will capture the presentation and interaction with the class that the static materials do not.

Conclusion

When the OER team at UCT were developing the UCT OpenContent directory, lecturers in the Department of Physics were approached about sharing their online materials that they had been making available online for over 10 years. Most of the lecturers said that they were happy to share the materials online, but had no time to ensure they were suitable for a wider audience, appropriately licensed or accurately indexed and linked to UCT OpenContent. Three senior physics students appointed by the physics lecturers assisted them in adapting a range of materials as OER. The students report having sufficient time, knowledge of the field and skill in using a range of technological tools that made the OER adaptation process of their lecturers' materials quite easy. Based on the participating physics lecturers' acceptance of the students' adaptations of their materials, it would seem that the strategy of using senior students to support busy lecturers to adapt existing teaching materials as OER is worth considering.

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Notes

[1] http://www.ocwconsortium.org/en/aboutus/whatisocw

[2] http://opencontent.uct.ac.za/

[3] http://www.phy.uct.ac.za/courses/

[4] https://open.umich.edu/wiki/DScribe

[5] https://open.umich.edu/wiki/OERca

[6] http://www.tineye.com/

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