

## Using open source technologies to design courses for student-student interaction and building elearning skills

### Introduction

According to UNESCO, demand for higher education increases globally by approximately 1% annually (Marginson, 2016). The Open Education Resource universitas (OERu) is responding to this demand. The OERu is a network of international tertiary institutions collaborating to provide accredited education to students everywhere. The OERu uses open source social networking technologies in courses produced as OER while implementing open educational practices (OEP). This paper describes the OERu's role in open education, and the OERu's specific OEP of its open source technologist developing a sustainable and affordable Next Generation Digital Learning Environment (NGDLE). The NGDLE is used in a micro-course entitled "Learning in a digital age" delivered by the OERu. This paper also examines the concept of NGDLE and the tools of the OERu's NGDLE. Practical approaches for using online social networking tools will be discussed.

The OER Foundation is the parent organisation of the OERu and has three aims: to create educational materials as Free Cultural Works and using Free and Open Source Software (FOSS), to be a global leader in expanding access to higher education, and to create a platform for delivering accredited courses. To provide affordable education, the OERu does not hire teachers. As a practitioner of open philanthropy, the OERu encourages other institutions to copy their approach (Lane, 2019b).

The FOSS are developed and adapted by an open source technologist. Much of his work consists of maintaining the OERu's platforms for publishing its planning documents and developing openly licensed courses. He is responsible for protecting learners' data from being lost and making aspects of technology easier to understand for users (Lane, 2018b). The open source technologist also writes blog posts containing instructions for using open source technologies (Lane, 2019a). As an example of the OERu's practice of open philanthropy whereby anyone is welcome to copy and use its materials for their purposes, the open source technologist wrote:

We believe our approach has a lot of advantages and, if emulated by our partners and other academic institutions, could revolutionise both the quality of digital services used in education, as well as vastly reducing costs and increasing the autonomy and resilience of technical solutions while providing unprecedented technology-related learning opportunities and agency for learners and educators alike (Lane, 2018a).

The tools supporting student-student interaction in OERu micro-courses have been tested and improved based on usage by millions or tens of millions of people (Lane, 2018a). They are open source, are free to use, and are scalable because of the design of their service software patterns. The system of open source tools is intended to be used by OERu collaborators and global learners. Additionally, the OERu offers technical support to its partners in using these tools (Lane, 2018a). The tools that the open source technologist has adopted, customised, or developed for learners to use in OERu micro courses are based on existing code (see Figure 1). It is important for the OERu to provide tools that support student-student interactions because the OERu generally doesn't provide tutorial support. Each tool has a specific function, and they are loosely assembled to form a component-based *Next Generation Digital Learning Environment* (NGDLE) intended to support learning on the internet as opposed to working within the confines of a single application like a LMS (Lane, 2017a). The tools are :

- Semantic Scuttle for social bookmarking: [bookmarks.oeru.org](http://bookmarks.oeru.org)
- Hypothes.is for social annotation: <https://web.hypothes.is/start/>
- Mastodon for social networking and micro-blogging: [mastodon.oeru.org](http://mastodon.oeru.org)
- Discourse for open discussion forums: [forums.oeru.org](http://forums.oeru.org)
- WENotes for comments on the course website developed by the OERF
- Blogs

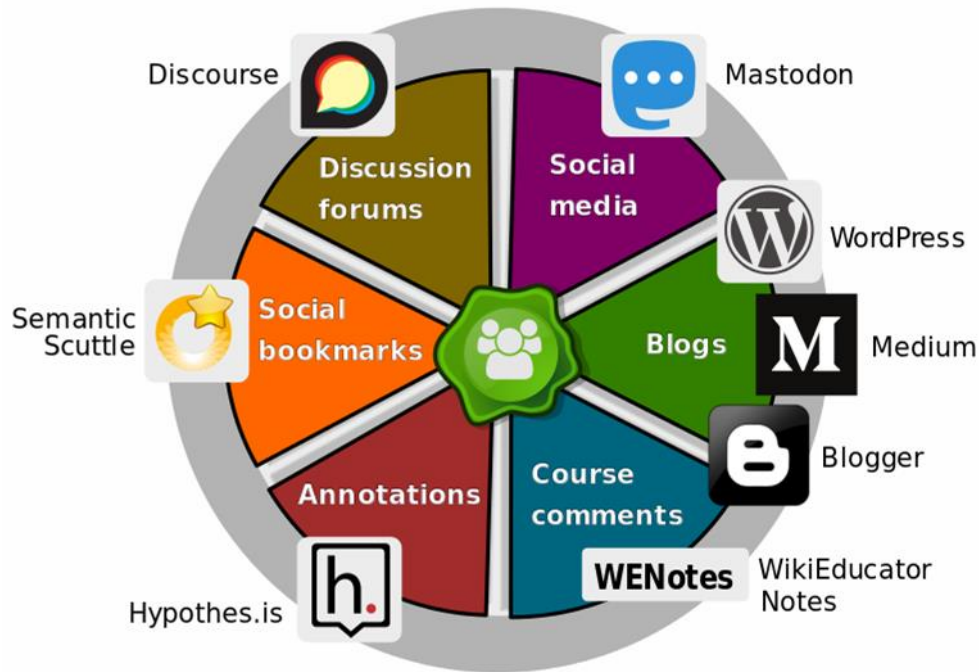


Figure 1. Some of the services composing the OERu's NGDLE (Lane, 2018a)

When using these tools in the OERu micro-courses, learners are asked to use specific tags in their posts like #lida103. The posts containing the correct tags are harvested by a tool called WENotes and shown to the learners as a series of posts in the course feed (Lane, 2017b). Learners also have the option of creating blogs where they can post course work which they can retain once the course is completed.

### Literature review

An attempt to perform a literature review to find research-based reasons to use a NGDLE revealed that there are no empirical studies on this topic. What exists are articles reported by Educause (Abel, Brown, & Suess, 2013; Brown, 2017; Brown, Dehoney, & Millichap, 2015; Educause, 2014; Maas, Abel, Suess, & O'Brien; 2016; Pomerantz, Brown, & Brooks, 2018) that seem to only describe the positive aspects of NGDLE. Since there were no empirical studies for them to cite, and since no drawbacks of NGDLE were presented, there is a concern that the literature on NGDLE is biased. One source provides an authoritative description of LMSs and how they compare with social networks including NGDLE and personal learning environments (PLEs) while providing a description of a social networking system (Anderson & Dron, 2017). In addition, a report discusses risks and possibilities of NGDLE and associated technology (Phipps, Allen, and Hartland, 2018).

Advantages and disadvantages of digital learning environments are summarised. PLE and NGDLE provide the potential for developing social and professional networks (Anderson & Dron, 2017) and for developing content curation skills (Phipps et al., 2018). Risks include data mining by commercial companies, lack of control over the tools, concerns over security (Anderson & Dron, 2017; Phipps et al., 2018) as well as students' need to learn how to manage the tools, and challenges in integrating the tools in a system (Phipps et al., 2018).

Many of these points are addressed in the development of the OERu's NGDLE. The OERu's open source technologist has sought the best applications for specific purposes, adapted them for OERu courses, and integrated them into a cohesive system. In addition, he has provided instructions on using the applications and is available to correct technical errors as they arise. The result is that learners need only to spend time creating accounts for the tools that they choose to use. There is a loss of freedom in that learners do not choose all of the tools used in the system. However, the OERu will have the opportunity to conduct learner surveys to determine whether this is an

issue worth addressing. Data collected through the applications by the OERu are limited to users' names and email addresses with no option to triangulate using personal information such as birth dates. Additionally, the OERu is General Data Protection Regulation (GDPR) compliant despite not having a legal requirement for this compliance; the OERu believes in ethical management of learner data.

### **Methodology and findings**

We now turn to the examination of a portion of an OERu course where the above-mentioned tools were used. In this micro-course, I acted as both a volunteer co-facilitator and as an observer. I examined course content, activities, discussions, and assessments. I also observed how students interacted, though identifying information is not reported in my findings. I obtained approval to conduct this research from the Educational Research Human Ethics Committee at the University of Canterbury.

The course is entitled *Learning in a Digital Age* (LiDA), and it is intended for tertiary students seeking to develop online learning skills. The course consists of four micro-courses: *Digital literacies for online learning* (LiDA 101); *Digital citizenship* (LiDA 102); *Open education, copyright, and open licensing in a digital world* (LiDA 103); and *Critical media literacies and associated digital skills* (LiDA 104). The portion of LiDA that I observed was LiDA 103 (see Fig 1 for the introductory page of LiDA 103, and OERu 2018a for information about this micro-course). This micro-course was offered from May 9th to May 23rd 2018, and it was a rare instance in that it was being facilitated by the OERu CEO.

Before the course started, the OERu used an automated notification system called Mautic to send learners one message per day for three days. These messages contain information about the course platform, the social networking tools in its NGDLE, tags and hashtags to include in posts, and links to obtain technical support. These messages were found to increase student retention because of the support they provide.

The OERu provides additional guidance on informational web pages for using each of the social networking tools in its courses (OERu, 2018e). The OERu has a privacy policy and a policy notice where it explains what kind of information the OERu collects on learners and how this information is managed (OERu, 2018c; 2018d). Additional information about learners' copyright, information about the public nature of posting in OERu courses, guidelines for netiquette, and more topics are covered in the OERu's terms of service (OERu, 2018f).

Startup + Course guide + Interactions + Learning pathways + Assessment +

## Open education, copyright and open licensing in a digital world

# COPYRIGHT

### Register

**Step 1:** As an open course, you can access all the learning resources on this course site without a password. Register to receive course announcements via email (click on the 📧 graphic above). You will also need to login with your account credentials to post on WENotes, or participate in course discussions on forums.oeru.org.

[REGISTER](#)

### Orient

**Step 2:** Explore the course website to find out what the course is about, what is required and where the syllabus, course materials and learning challenges are located. Complete your orientation by establishing your own personal learning environment and declaring yourself to the group using your own course blog.

[START HERE](#) [SYLLABUS](#)

### Study

**Step 3:** Commence your study from the syllabus page. You can study at your own pace or follow the course with the group. Instructions are posted on the announcements page and you can monitor live interactions from the course feed.

[ANNOUNCEMENTS](#) [COURSE FEED](#)

Content is available under the Creative Commons Attribution-Share Alike License. Privacy Policy | Authors 

 OTAGO POLYTECHNIC  
A University of Otago

Figure 2. Front page of LiDA 103 (OERu, 2019).

In this section, we will examine the tools used in LiDA 103 and how they were used. These findings based on the OERu's NGDLE will be examined in the discussion while referring to empirical research on the use of Personal Learning Environments in higher education.

**Social bookmarking with Semantic Scuttle.** There is one instance where the social bookmarking is used, and it is in the last section of the syllabus. Learners are invited to examine resources to guide the process of reflective writing and then to examine content on a topic of their choice. Once they have chosen a topic, learners are asked to conduct a search for published research and share it on a designated page where bookmarks for all of the LiDA course are collected. Learners are instructed to use the tag "lida103" when sharing their resources.

**Social annotations with Hypothes.is.** Hypothes.is is a tool for collaborative online annotation, and there were three instances in LiDA 103 where learners were invited to annotate or reply to annotations. The first exercise provided questions for learners to reflect on and inspire annotations on online magazine article. The second exercise asked learners to examine two online pages and use them as inspiration for annotating and discussing facts related to the content they read. The third exercise invited learners to annotate an openly licensed research article. In each instance, learners were asked to use the tag "lida103".

**Micro-blogs with Mastodon.** The OERu's main microblogging tool is Mastodon. In LiDA 103, Mastodon is used for micro-blogging. The posts written in Mastodon are called "toots". In a toot, a user can insert a photo, insert a content warning (spoiler, trigger, etc). It also allows the user to select the audience of the toot: Public, unlisted (not posted publicly), Followers-only, and Direct (posted only to mentioned users). Users can write up to 500 characters and can insert a wide selection of emojis. The toots are published in a feed called "Home" as shown in Figure 3, the

OERu CEO suggested that micro-blogging could be used in the same way students in an on-site course would discuss their work at a café, that is, for informal and social purposes.

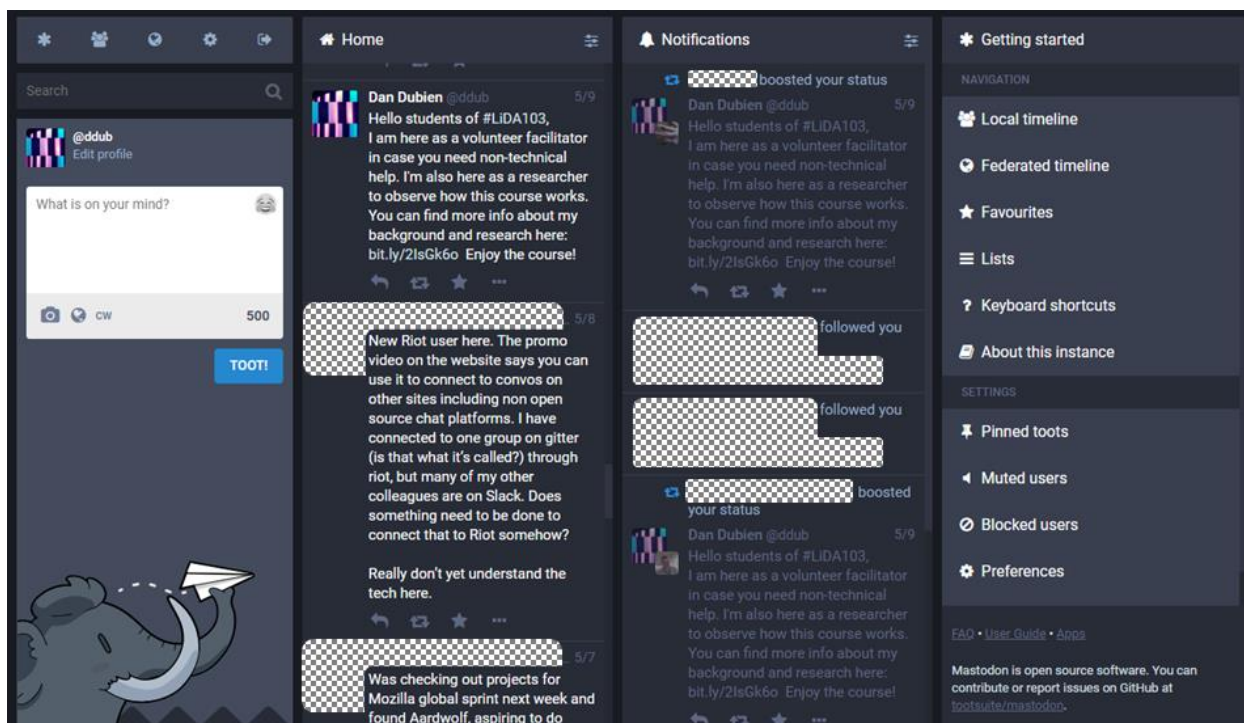


Figure 3. The Mastodon page at the time I was co-facilitating LiDA 103. Areas in checked grey and white are covering information that would identify others.

**Open forums with Discourse.** In LiDA103, the students are frequently asked to answer questions in a discussion forum. The OERu uses an open access forum called Discourse. The original post was made by the OERu CEO and includes a “stimulus resource” (a resource to inform and stimulate discussion) and five sequenced tasks. Students are asked to scan the list of sustainable development goals (linked in the post), to think of a learning project for an OERu course where learners work on a real-world problem and release their outputs as OER, to post the project in the forum, to “favourite” or “like” posts and to post replies and suggestions to refine the ideas. The original post concludes with a commitment to integrate “outstanding ideas”.

One forum was used as a poll containing two questions about the use of OER and textbooks (OERu, 2018b). On the page listing the LiDA103 forums, the number of “views” per forum is indicated, and they ranged from 331 to 434 at the time of my observations. Generally, the forums with more posts are the ones with more views.

**Blogs.** The OERu CEO explained that OERu courses have learners create accounts in blogs for social interaction. According to him, the blogs have an advantage over a LMS that students can retain their course content as blog posts even after the course is completed. This means that learners have total control over everything they produce. While that is true, it is possible for learners to copy content from a LMS or to have it provided by the teacher in a suitable format. While there are advantages to blogs, the OERu CEO explained that there are also challenges. He elaborated that since the students’ posts are public, and everyone can see everyone else’s postings, there are implications for course design and assessment design.

## Discussion

This section discusses findings from the literature about the benefits and disadvantages of personal learning environments and common social media tools used online in higher education. Educause (2009) define PLEs as the “tools, communities, and services that constitute the individual educational platforms that learners use to direct their own learning and pursue educational goals”. PLEs and NGDLEs including that used in LiDA have much in common

in terms of being flexible learning environments based on components available openly online that students can use to share knowledge, to share resources, and to socialise, among other purposes. The aim of this discussion is to provide recommendations for online instruction using social networking tools in general and for the OERu.

When presenting PLEs to students, one can use different approaches. One option is to provide an overview of what PLEs offer and involve in terms of advantages and disadvantages in an early part of the course. Another option is to allow the students to discover how to use tools on their own (Kompen, Edirisingha, Canaleta, Alsina, & Monguet, 2019; Korhonen, Ruhalahti, & Veermans, 2019). The OERu provides guidance in the form of emails released to learners in advance of a micro-course's launch. Whichever option you choose, an effective practice to use is to gradually introduce tools for building a PLE (Kompen et al., 2019). This approach was effective particularly since students reported feeling overwhelmed by the options available to them (Kompen et al., 2019). The OERu does not use tutorial support, but it does provide guidance in an Orientation Pathway in its courses plus instructions for using its tools (OERu, 2018e). If it wanted to provide additional support, it could recruit learners who know how to use a PLE, have them assessed as such through an automated test, and invited these learners to guide others to use their PLEs.

A study by Bartolomé and Cebrian de la Serna (2017) found that students found simple tools to be beneficial, particularly if they could conveniently adopt them and make them part of their habitual learning processes. Students also preferred tools that were well designed aesthetically and that required only a low learning curve to use. Consequently, it is recommended to present tools that are well presented aesthetically and that are simple to use.

Some challenging points about PLEs are that they can take a significant amount of time to build, can lead to distraction from learning activities (Kompen et al., 2019), and the volume of content contributed by other students can be overwhelming to read (Davis & Mackintosh, 2013). Consequently, it is recommended to introduce tools for specific purposes, and at strategic moments in the course.

In PLEs that included blogs, the students valued learning about RSS feeds, which are used by the OERu. Students also learned how to use social media tools for educational purposes (Kompen et al., 2019). Thus, PLEs present opportunities to learn about different tools depending on how they are composed.

It is valuable to present students with opportunities to reflect on how they build their PLEs. It is also worth teaching students to take a general approach to learning how to use a tool (e.g. learn how to build a profile page or troubleshoot) rather than focusing on a specific tool (Kompen et al., 2019). In other words, "the key message is to focus on needs and how they are fulfilled by various applications, but not on the applications themselves" (Kompen et al., 2019, p. 206). When students are interested in tools, they go on to use them in different formal and informal environments (Bartolomé & Cebrian de la Serna, 2017) and professional ones (Korhonen et al., 2019). This practice of maintaining the use of online tools beyond the course in which they were presented may be easy to do with tools that are commonly used and widely known. The tools offered by the OERu are less commonly used, but they have the advantage of not being hosted by corporate entities. Consequently, users' personal information is not collected by third party companies.

In open online courses, it is important to be cautious about how students might feel in an extremely exposed environment. In a study by Waycott, Sheard, Thompson, and Clerehan (2013) of an open online course, some students spent disproportionately more time on their publicly posted assignments than on privately posted ones. This study reported that lecturers see this as a positive result. However, having a public audience can cause anxiety in students, particularly when early drafts are shared publicly. Students also felt vulnerable to criticism or felt a lack of confidence about their ability to represent themselves online in a positive manner. In other words, they were afraid of being misinterpreted negatively (Waycott, et al., 2013). In addition, some students participating in open and online environments expressed concerns about feeling powerless to control the privacy of their posts or being found in Google searches (Waycott, Thompson, Sheard, Clerehan, 2017). Other students expressed the importance of separating their social networks from their educational ones (Waycott, et al., 2017). When students compared their work with others, some students expressed anxiety about not measuring up their classmates' standards while others felt motivated to make improvements (Waycott, et al., 2013). Some positive aspects of having learners post personal content were that learners developed a sense of belonging to a community and that they responded to each other and formed social bonds over shared interests (Waycott, et al., 2013). Some recommendations for mitigating some of these concerns are provided:

Students need to have a clear understanding of who the intended audiences will be for the work they produce. They need to know what kind of practices and parameters determine who has access to their online assignments. They require guidelines on what constitutes appropriate and inappropriate feedback in online environments. Finally, students need to be able to discuss any concerns they may have regarding online privacy settings both with their peers and with their lecturers. (Waycott, et al., 2017, p. 19)

In short, educational technologies and platforms - both private and public - have advantages and disadvantages. Instructors need to consider these points and introduce them with care to their students.

## Conclusion

The contribution of this article to knowledge is to provide an overview of the OERu's Free and Open Source Software-based Next Generation Digital Learning Environment in an open online course. Findings from observations of the use of the NGDLE tools used in an OERu micro-course were reported, and they were discussed in terms of empirical studies on Personal Learning Environments. For future research, we recommend conducting research on more micro-courses to broaden the scope of examining how learners use tools in a NGDLE. We also recommend the examination of how these tools are used by course designers and learners in different subject areas and cultural contexts. An interesting comparison would be to see how students use these tools in open versus closed environments and to interview the students if there are differences.

## References

- Abel, R., Brown, M., & Suess, J. (2013). A new architecture for learning. *Educause Review*, 48(5), 88-90.
- Anderson, T., & Dron, J. (2018). Integrating learning management and social networking systems. *Italian Journal of Educational Technology*, 25(3), 5-19. doi:10.17471/2499-4324/950
- Bartolomé, A., & Cebrian-de-la-Serna, M. (2017). Personal Learning Environments: A study among Higher Education students' designs. *International Journal of Education and Development using Information and Communication Technology*, 13(2), 21-41.
- Brown, M. (2017). The NGDLE: We Are the Architects. Retrieved from: <https://er.educause.edu/articles/2017/7/the-ngdle-we-are-the-architects>
- Brown, M., Dehoney, J., & Millichap, N. (2015). The next generation digital learning environment: A report on research. Retrieved from: <https://library.educause.edu/-/media/files/library/2015/4/eli3035-pdf.pdf>
- Davis, N. E., & Mackintosh, W. (2013, November). A mOOC prepared to make a difference. DEANZ. Retrieved from: [https://ir.canterbury.ac.nz/bitstream/handle/10092/8767/12647056\\_DEANZ%20Magazine%20nov13%202.pdf?sequence=1](https://ir.canterbury.ac.nz/bitstream/handle/10092/8767/12647056_DEANZ%20Magazine%20nov13%202.pdf?sequence=1)
- Educause. (2009). 7 things you should know about personal learning environments. Retrieved from: <http://www.educause.edu/library/resources/7-things-you-should-know-about-personal-learning-environments>
- Educause. (2014). Next Generation Digital Learning Environment Initiative. Retrieved from: <https://library.educause.edu/resources/2014/9/next-generation-digital-learning-environment-initiative>
- Kompen, R. T., Edirisingha, P., Canaletta, X., Alsina, M., & Monguet, J. M. (2019). Personal learning Environments based on Web 2.0 services in higher education. *Telematics and Informatics*, 38, 194-206. doi:10.1016/j.tele.2018.10.003
- Korhonen, A. M., Ruhalahti, S., & Veermans, M. (2019). The online learning process and scaffolding in student teachers' personal learning environments. *Education and Information Technologies*, 24(1), 755-779. doi:10.1007/s10639-018-9793-4

- Lane, D. (2017a, May 8). Many simple tools, loosely coupled. [blog post]. Retrieved from: <https://tech.oeru.org/many-simple-tools-loosely-coupled>
- Lane, D. (2017b, Aug 24). WikiEducator Notes: OERu's course feed aggregation and messaging system. [blog post]. Retrieved from: <https://tech.oeru.org/wikieducator-notes-oerus-course-feed-aggregation-and-messaging-system>
- Lane, D. (2018a, Oct 31). 2018 update on the OERu Technology Stack [blog post]. Retrieved from: <https://tech.oeru.org/2018-update-oeru-technology-stack>
- Lane, D. (2018b, May 18). Insight: what does the Open Source Technologist at the OER Foundation do? [blog post]. Retrieved from: <https://tech.oeru.org/insight-what-does-open-source-technologist-oer-foundation-do>
- Lane, D. (2019a). Blog posts. Retrieved from: <https://tech.oeru.org/blog>
- Lane, D. (2019b, Jan 21). Democratising Higher Education with OERs & FOSS. [blog post]. Retrieved from: <https://tech.oeru.org/democratising-higher-education-oers-foss>
- Maas, B., Abel, R., Suess, J. y O'Brien, J. (2016, June). Next-Generation Digital Learning Environments: Closer than you think! Paper presented at the Conference entitled "Crossroads where the past meets the future", Thessaloniki, Greece. Retrieved from: [http://www.eunis.org/eunis2016/wp-content/uploads/sites/8/2016/03/EUNIS2016\\_paper\\_4.pdf](http://www.eunis.org/eunis2016/wp-content/uploads/sites/8/2016/03/EUNIS2016_paper_4.pdf)
- Marginson, S. (2016). The worldwide trend to high participation higher education: Dynamics of social stratification in inclusive systems. *Higher Education*, 72(4), 413-434. Available at: <https://link.springer.com/article/10.1007/s10734-016-0016-x>
- OERu. (2018a). LiDA103: About. <https://course.oeru.org/lida103/startup/about/>
- OERu. (2018b). LIDA103 Spot poll - Learner experience with OER. Retrieved from: <https://forums.oeru.org/t/lida103-spot-poll-learner-experience-with-oer/329>
- OERu. (2018c). Privacy notice. Retrieved from: <https://oeru.org/privacy-notice/>
- OERu. (2018d). OERu Privacy Policy. Retrieved from: <https://oeru.org/privacy>
- OERu. (2018e). OERu support: Help resources for studying with OERu. Retrieved from: [https://wikieducator.org/OERu\\_learner\\_support/Home](https://wikieducator.org/OERu_learner_support/Home)
- OERu. (2018f). Terms of Service. Retrieved from: <https://oeru.org/terms-of-service/>
- OERu. (2019). LiDA103: Open education, copyright and open licensing in a digital world. Retrieved from: <https://course.oeru.org/lida103/>
- Phipps, L., Allen, R., & Hartland, D. (2018). Next Generation [Digital] Learning Environments: Present and future [PDF file]. Retrieved from: [http://repository.jisc.ac.uk/6797/1/JR0090\\_NDGLE\\_REPORT\\_FINAL.pdf](http://repository.jisc.ac.uk/6797/1/JR0090_NDGLE_REPORT_FINAL.pdf)
- Pomerantz, J., Brown, M., & Brooks, D. C. (2018). Foundations for a next generation digital learning environment: faculty, students, and the LMS. Retrieved from: <https://library.educause.edu/-/media/files/library/2018/1/ers1801.pdf>
- Waycott, J., Sheard, J., Thompson, C., & Clerehan, R. (2013). Making students' work visible on the social web: A blessing or a curse? *Computers & Education*, 68, 86-95. doi:<https://doi.org/10.1016/j.compedu.2013.04.026>
- Waycott, J., Thompson, C., Sheard, J., & Clerehan, R. (2017). A virtual panopticon in the community of practice: Students' experiences of being visible on social media. *The Internet and Higher Education*, 35, 12-20. doi:10.1016/j.iheduc.2017.07.001