Recognising learner autonomy: Lessons and reflections from a joint x/c MOOC

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Higher Education Institutions are increasingly called upon to provide more flexible student learning pathways – in degree programs as well as through the introduction of methods for micro-credentialing. However, the rhetoric of establishing such open and personalised learning pathways is far easier than the reality of implementation and organisational change. For instance, universities have long struggled to break away from the "credit hour" even while learners are being challenged to be more independent in their learning choices and education needs. The intent of this paper is to explore new models of education that embrace open learning pathways for lifelong learning and productive participation in the information age. The paper draws on the recent research and experiences gained from running a simultaneous xMOOC and cMOOC (a dual layer MOOC) using newly developed software based on the principles of student self-regulated learning. The software, ProSOLO, links a user's nominated learning goals and experiences directly with their achievement of stated competencies. This process provides learners with greater autonomy in their study by removing the rigidity of more traditional education programs and offers new models of micro-credentialing.

Keywords: MOOCs, self-regulated learning, connectivism

1. Introduction

The widespread growth and adoption of digital technologies has influenced all aspects of contemporary life. The so-called digital revolution has resulted in massive changes to a vast number of industries from entertainment, to travel, to media and communications and retail. The ability to connect globally and provide information and communication services at speed and at anytime and anywhere are defining characteristics of the digital world. It is reasonable to expect that this trend for greater digital innovation will continue to expand across all sectors. In this context, the education sector is not immune to the prospect of dramatic change. Education has already been influenced and impacted by an ever-evolving suite of technologies and increases in digital connectivity. Learning with technology is no longer

perceived as an add-on to the education experience. It is implied and subsumed within the very concept of learning for the modern age. Essentially, the rapid uptake of digital technologies has enabled key affordances, notably in the scale of access and adoption that is now available. The ability to re-purpose, re-edit and aggregate digital information in new ways produces a growing quantity of data around learner activity. The analysis of this data offers numerous opportunities for universities to add value to the student learning experience, particularly through establishing predictive models of academic performance and retention (Dawson & Siemens, 2014). Alongside the very significant pressures arising from a global education market and economy, and the changing nature of work, these affordances are beginning to reshape how education is both designed and delivered more broadly.

The long-standing model of education has been structured around the concept of the on-campus classrooms with formalised credentials being the exclusive domain of education institutions. While distance education (DE) has provided an alternate approach, DE remains ostensibly an extension of the traditional classroom and a duplication of existing education practice (Moore & Kearsley, 2004). The concept of credits, standardised assessment tasks, timetables and an established and accredited curriculum remain embedded into the very fabric of an institution's educational offerings (Laitinen, 2012). Arguably the most influential organisational process shaping course design and delivery is the allocation and adherence to the credit hour (Silva, White, & Toch, 2015).

For over a century there has been limited change in or departure from the concept of the credit hour in higher education (Silva et al., 2015). The credit hour has become a unit for measuring student progress and the basis of teaching practices. The accumulation of credits is required for graduation where each credit represents a set amount of workload. Education reformers have long argued that adherence to the credit has stifled any possibility of large-scale change and are detrimental to student learning. Reformists note that students should be measured by the demonstration of their mastery of course learning outcomes in lieu of the amount of time they must spend in a particular program or course of study (Wellman & Ehrlich, 2003). A break from the credit concept would enable students to undertake learning at a pace that better reflected their competence and mastery of learning outcomes. For instance, some students could conceivably complete a course faster than the standard 13 week period (semester) while others may require an extension to this time. The structured and restrictive education model now runs counter to the noted importance for lifelong learning and recognising that learning is also acquired outside of the parameters of formal education institutions (Wolfe & Andrews, 2014). This paper begins to discuss the complexities the rise of such new models of education may raise for learning and teaching practice.

1.1. MOOC Overview

A small step in the direction of a more flexible and personalised education may lie in the foundations of open and online learning. Despite the stasis of higher education models, open education has frequently adopted a more liberal view of how education can be effectively designed and delivered to promote access and equity through a vision of lifelong learning (Yuan & Powell, 2013). For instance, the increased sophistication and access to Open Education Resources (OERs), and more recently, Massive Open Online Courses (MOOCs) and open badging are giving rise to the emergence of alternate models of education that have the potential to force a re-think and re-consideration of how education is provided locally and globally (Yuan & Powell, 2013). As the popularity of MOOCs swells and the offerings gain further traction and recognition, students will increasingly request certifications for

completion and performance on assessment items giving rise to new processes for recognising formal and informal learning pathways.

Massive Open Online Courses (MOOCs) are a relatively recent addition to the education market. While the term was first coined in 2008 to describe an open course on Connectivism and Connective Knowledge offered by a group of Canadian researchers, it was not until 2011 that the initiative received much coverage and interest in the public media as top tier universities began offering open online courses. MOOCs can be considered as an extension of online and distance education models (Gasevic, Kovanovic, Joksimovic, & Siemens, 2014). While there are many similarities there are also some notable differences. For instance, MOOCs are offered as free courses where students register with limited restrictions such as pre-requisite skills or experiences (Baggaley, 2013). As a free and open course there are no mechanisms for preferential selections (Burd, Smith, & Reisman, 2014).

The current suite of MOOCs have been characterised into two distinct approaches to pedagogical design (Siemens, 2013). The most common form is the xMOOC provided by companies such as edX and Coursera. The design of the xMOOC is reminiscent of more behaviourist learning models where student engagement is centred on the access of information and assessment of content understanding in lieu of active construction and de-construction of concepts through social interactions with peers and teachers. This approach mirrors and supports the credit hour. The second form of MOOCs is the connectivist MOOC. The cMOOC draws heavily on the concepts of learner autonomy and networked learning facilitated through social technologies (Siemens, 2013). While individuals collaborate through discussions and the sharing of knowledge and resources, the learners often define their own outcomes and goals to achieve. The cMOOC takes the position that all participants are active agents in their learning and therefore engage in both teaching and learning (Siemens, 2013). This learning approach can function within a credit hour model, but is better suited to learning that is less formal and more reflective of knowledge needs in a networked era.

While the free and open access of MOOCs is admirable in its intent, the scale of such initiatives and the number of students participating creates numerous complexities when designing engaging and impactful learning activities. Courses in excess of 100,000 students have been noted. As such, it is exceedingly complex to design such courses around contemporary learning theory (e.g. socio-constructivism) where students unpack concepts through group work or communities of practice. The sheer scale of many x and cMOOCs effectively diminishes the level and time of instructor support that can be provided to each student. As with many open education resources, the value of such products will only be realised when individual learners have effective learning strategies. Student engagement in MOOCs requires the individual learner to be self-motivated and autonomous in all aspects of their learning.

1.2 Recognition and Validation of Prior Learning

The recognition of prior learning is not new for higher education. However, frequently institutional policies are restrictive in determining what can count as equivalent learning and the degree of quality of the lived experience and outcome for the student. Universities have tended to limit the amount of credit that can be applied to any given program of study. However, regardless of the perceived limitations there is presently a growing list of universities that will provide students with course credit for MOOC completion (Sandeen,

2013). The recognition of MOOC certificates is generally positioned in terms of extending the institution's reach and share of the education market. While this is merely a first step in the process, universities internationally are further examining their procedures and policies to recognise and validate formal and informal learning experiences and certifications (Sandeen, 2013).

Recognition and validation of informal and formal study is by no means as simple a task as mapping the noted experiences and curriculum into existing university courses and programs. The options and pathways for student participation and assessment are wide ranging in the current suite of MOOC offerings. As these expand, it is likely that assessment types and criteria will further stretch the curriculum possibilities and create greater complexity in aligning and mapping student experiences with established university degrees. While the inclusion of digital and open badges has the potential to ease this complexity (Gibson, Ostashewski, Flintoff, Grant, & Knight, 2013), ultimately any process for establishing certification and accomplishment will require a large degree of learner autonomy (Wolfe & Andrews, 2014). Essentially individual students plan their learning and collect the evidence that effectively demonstrates their achievement of competencies or learning outcomes. This approach to learning requires individuals to be autonomous and self-directed. However, the research literature in workplace learning would suggest that individuals seldom have the necessary skills and strategies to be effective and productive learners (Margaryan, Milligan, Littlejohn, Hendrix, & Graeb-Koenneker, 2009). Furthermore, our current educational practices are largely ineffective at developing student self-regulated learning proficiency (Dunlosky & Rawson, 2012). This research places many questions on the viability of new education models that are reliant on self-directed and autonomous learners.

1.3 Learner Autonomy

It is at this intersection, where the current hegemonic education model runs counter to the importance for recognising and validating learning that occurs outside of formal institutions. The need exists for developing increased learner autonomy through personalised and adaptive learning pathways. As such, the intent of the paper is to begin to unpack the complexities associated with "new" models of education that actively seek to embrace the concept of open learning pathways for lifelong learning and productive participation in the information age. The paper does so in light of the results of a jointly delivered xMOOC and cMOOC called Data Analytics and Learning (DALMOOC)[1]. In comparison to the xMOOC, the cMOOC provided a greater level of learner autonomy as the student defines both the learning activities undertaken as well as the processes for demonstrating competency and understanding. Hence, the present study examines the importance of learner autonomy through the lens of these two models of MOOC delivery in terms of the completion rates and types of learning interactions undertaken. The analysis of the DALMOOC provides a novel opportunity to identify how learner autonomy may impact on the development of future education models and delivery pathways. In so doing the study aims to examine what the impact different MOOC pedagogical models may have on learner autonomy.

The paper discusses the research question in the context of the literature related to future education models, student motivation and self-regulated learning. The study unpacks the importance of learner autonomy for future education models and therefore the necessity to

[1] https://www.edx.org/course/data-analytics-learning-utarlingtonx-link5-10x

understand student motivations for learning and the impact this has on design, delivery and demonstration of outcomes and competencies.

2. DALMOOC Study and Discussion

2.1 Study Context

The present study analyses student participation in the Data, Analytics and Learning MOOC (DALMOOC) offered by the University of Texas Arlington. The course was part of the edX offerings and ran for nine weeks covering the field of learning analytics broadly with a focus on introduction to data analytics, social network analysis, predictive modelling and text mining. The course attracted more than 23,000 students from a diversity of cultural backgrounds and educational experiences. DALMOOC was an innovative course in providing multiple options for enrolled students. The participants could take the course as a traditional instructor led edX version (i.e. xMOOC) with sequenced content, activities and assessment based on a course credit model. The cMOOC version was created on a competency model that emphasized more open engagement with peers. The cMOOC was based on a social learning design where the instructors were facilitators and co-participants in the discussions. This option in the DALMOOC carried some learner expectations. For instance, the learners were expected to be independent and self-directed and establish their own study groups, learning networks and artefacts for assessment against self-nominated competencies. The cMOOC was supported by ProSOLO. ProSOLO is social learning software that facilitates and tracks student learning processes and their achievement of course competencies. For the remainder of the paper ProSOLO is used interchangeably with cMOOC to refer to the connectivist version of the course offering. The term edX is used to note the xMOOC offering.

To receive a certificate of completion in DALMOOC, students were required to complete 70% of the 26 competencies available in the course. The submissions for completion of the competencies were via the edX platform. Even when students had solely opted to participate in ProSOLO, they were still required to use edX when demonstrating completion and achievement of their set competencies. However, in such cases, the students could simply submit a URL in their ProSOLO profile indicating where the evidence for the respective competencies was available. In weeks five and six of the course, even the students who opted to use ProSOLO exclusively, had a further requirement to access the edX platform to perform the designed learning activities. This was due to the version of ProSOLO[2] implemented for the DALMOOC. This version did not support the IMS LTI-based integration of the Cognitive Tutor Authoring Tools (CTAT)[3]. Integration of CTAT was only available via the edX platform.

2.2. Participants in EdX and ProSOLO

Overall, a total of 23,330 learners registered for the DALMOOC course out of which 13,535 showed any signs of activity in the course. From this cohort of registered users, 6,993 actively engaged with the edX course content within the first week. Consistent with other xMOOC offerings, the number of participants showed a steep decline in attrition over the first three weeks of the course before stabilising to more consistent number of active students

[2] Latest version of ProSOLO is IMS LTI compatible and would support the integration with CTAT.
[3] http://ctat.pact.cs.cmu.edu/

(see Figure 1). In the cMOOC offering using the ProSOLO software, a total of 1,665 unique students participated. The number of participants was highest in the first week with 1,025 students accessing the course. A similar attrition trend to the edX version of the course was also observed with only 56 active users remaining in the cMOOC by week 9 (Figure 2). It should be noted that these figures (Figure 1 and Figure 2) illustrate the number of unique users engaging in either the edX or ProSOLO platforms. As such it is likely that there is a cohort of users that accessed both forms of the DALMOOC (i.e. edX and ProSOLO supported versions).

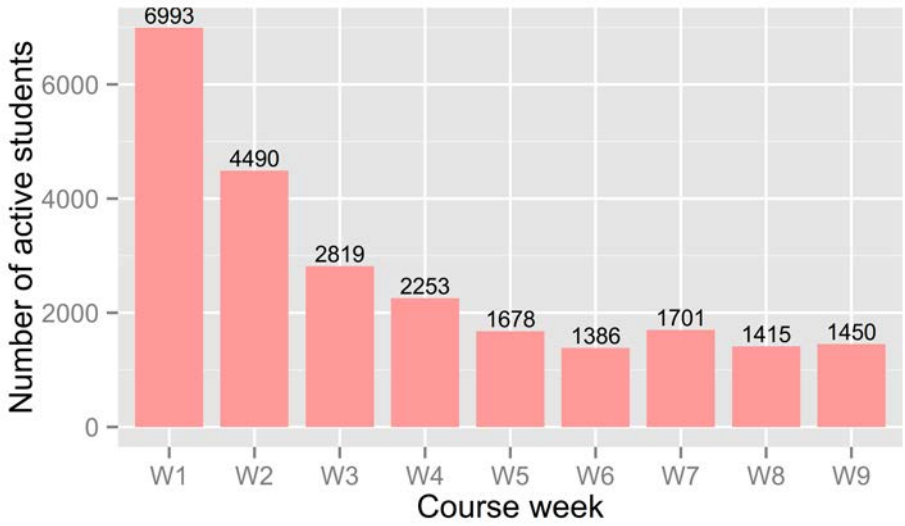

Figure 1. Number of active edX students per week

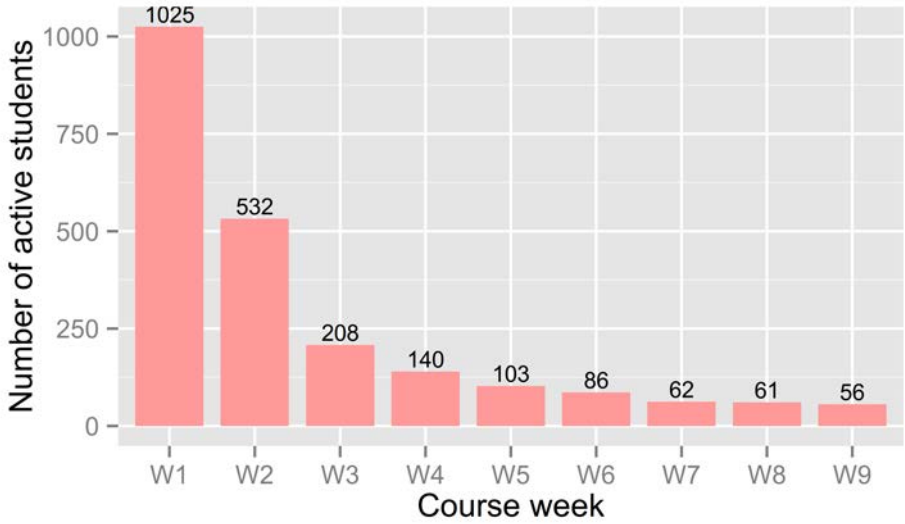

Figure 2. Number of active ProSOLO students per week

Figure 3 illustrates the percentage differences in student retention for the edX and ProSOLO platforms. It is interesting to note the high number of users initially registering for the MOOC. The higher attrition rate in ProSOLO in weeks five and six can be at least partially explained by the availability of the CTAT intelligent tutor being only accessible via the edX platform (as noted in Section 2.1). The number of active users as a percentage of the previous week showed a slight increase for both learning pathways (see Figure 4). This suggests that

despite the high attrition, there were stable numbers of students accessing edX and ProSOLO platforms.

Understandably the high attrition rate in MOOCs has received much criticism. For example, Onah et al. (2014) identified that the completion rates for the majority of MOOCs was between 6-8%. Others have argued that the completion rate is irrelevant as learners only engage in the topics of immediate interest and need. The structure and offerings of MOOCs effectively affords learners the opportunity to access the material as they require – irrespective of the course schedule and structure. This essentially renders the course assessment redundant or at best as a formative process.

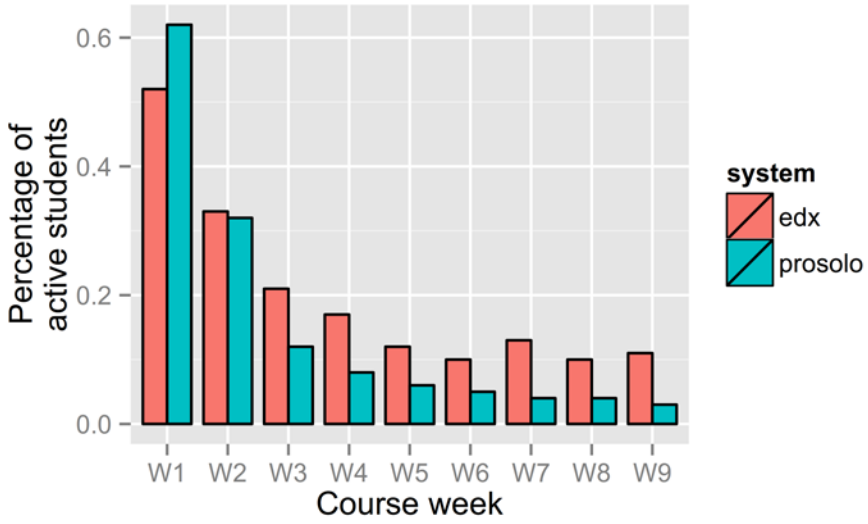

Figure 3. Percentage of active students each week for edX and ProSOLO versions of the DALMOOC

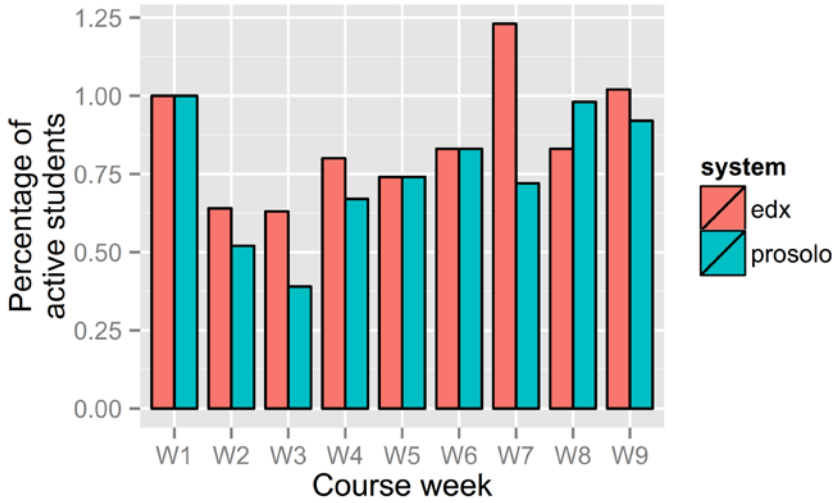

Figure 4. Number of active students. Percentage of active students calculated from the previous week.

2.3. Course Assessment trends

The edX version of the course was similar to the standard MOOC offerings whereby students could complete a series of sequential assessment items for certification. However, in the DALMOOC, there was less emphasis on students completing these prescribed assessment items. The primary topics of the course (i.e., introduction to data analytics, social network analysis, predictive modelling, and text mining) were designed so that each of the four components could be undertaken independent of any preceding content or course activity. Furthermore, in the cMOOC version, students were encouraged to devise their own assessment tasks to demonstrate completion of their stated competencies. The assessment tasks for the DALMOOC (x and c pathways) could be simply characterised as formative self-assessment items to facilitate student understanding of course concepts and stimulate self-regulated learning (Clark, 2012). This design feature also enabled students to further 'unbundle' the course into discrete competencies. This capacity for students to "dip in and out" of the assessment is reflected in the following figures. For instance, Figure 5 depicts the assessment tasks undertaken for the edX version. Only a minority of the active students completed an assessment task for any given week. Over the duration of the course the maximum number of students completing an assessment was 595 in week 9. This represents a mere 21% of the total number of active users for that week. Likewise, in the cMOOC pathway, only a minority of students completed the competencies each week (see Figure 6).

There are two plausible reasons for the observed distribution of assignment completion (Figures 4 and 5). First, the course encouraged students to create their own personal spaces (e.g., blogs and ProSOLO profiles) to host the artefacts created as evidence for completion of the course competencies. The students were requested to link to these personal spaces, (external to the edX platform), in the assignment submissions area via the edX platform to demonstrate completion of competencies. As the course approached its end, students interested in receiving a certificate of completion were motivated to commence linking to their external resources using the prescribed assignment submissions process in the edX platform. This may in part explain the increase in the number of assignment submissions in the edX pathway for week 9 (the final week of the course). Second, as shown in self-regulated learning research, students lack effective study skills in general (Bjork, Dunlosky, & Kornell, 2013) and do not tend to manage their time for learning effectively (Stoeger & Ziegler, 2008). Rather, there is a general tendency to procrastinate and block learning activities that typically decreases the quality of learning outcomes. This also calls for further research on scaffolding to promote a systematic and timely approach to learning, especially in the environments that provide students with a high level of autonomy.

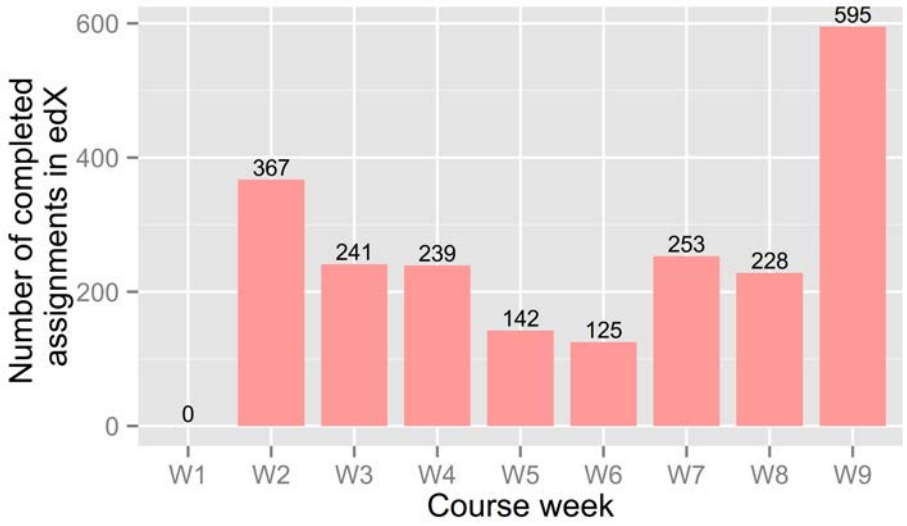

Figure 5. Number of edX assignments completed per week

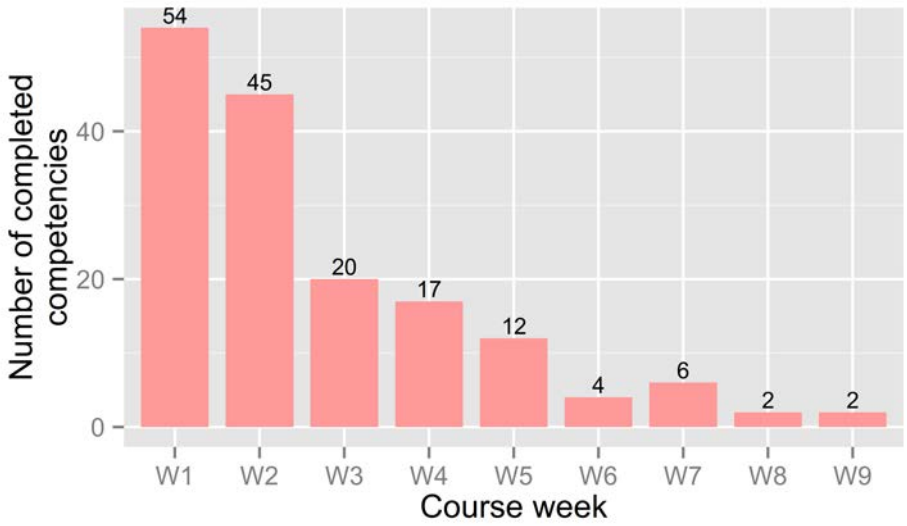

Figure 6. Number of completed competencies in ProSOLO per week

The changing perspective and role of assessment in MOOCs is reflected in the number of students completing the assignments (see Figure 5). In this context, it was hypothesised that the cMOOC pathway would present an advantage for the autonomous learner. ProSOLO has the capacity for students to create their own competencies associated with the course goals and to simply request verification of completion within the student's time frame. However, as the results indicate (see Figure 6) this level of self-regulated learning requires much intrinsic motivation and maturity to sustain completion and to identify how the achievement of the stated competencies can be best demonstrated. Despite the high level of personalisation and adaptive learning associated with ProSOLO and its genuine alignment with new and alternate approaches to education delivery, it is still reliant on students demonstrating a high level of self-awareness and autonomy.

The number of active users and competencies completed via the ProSOLO platform was likely to be heavily influenced by the student's self-regulated learning proficiency (self-awareness and autonomy). For instance, most students would not have been familiar with

either the study approach promoted by ProSOLO or the technology. This lack of awareness was well noted in the various transcripts of online discussions on the edX platform. The transcripts highlighted that the availability of the two platforms for the course and/or the self-directed approach supported by ProSOLO, was seen to be confusing for some students. McGill, and Klobas (2009) noted that students in a state of dissonance will typically fall back into study strategies that reflect more familiar instructional norms. It is likely that for the majority of the DALMOOC students, their prior online experiences would have been in a more structured and linear instructional model. The level of autonomy provided by the cMOOC pathway and afforded by the ProSOLO technology may have resulted in a level of dissonance as students attempted to revise their learning strategies.

3. Discussion and Conclusion

This study aimed to address the impact different MOOC pedagogical models has on learner autonomy. Both MOOC pathways had relatively low levels of student participation (in relation to the total number of students registered). These results suggest that pedagogical models affording high levels of learner autonomy require greater technical and learning scaffolds. This will be increasingly important as learners are required to not only determine the competencies to be undertaken but also how these competencies relate to longer term career goals. This process would allow for the stated outcomes and competencies associated with courses (formal and informal) to be disaggregated and re-aggregated in new ways that meet the learner's specific career needs and requirements. However, as the results above indicate, current education practice must do more in developing a student's proficiency in self-regulated learning.

The concept of unbundling course content or micro-credentialing is receiving increasing attention in education circles (Elliott, Clayton, & Iwata, 2014). Selingo (2013) proposed that higher education institutions should embrace the unbundling of courses and provide digital badges (micro-credentialing) to facilitate the transition to more competency based education models. This would in effect allow learners more flexible options for accessing and demonstrating competency. In the present study the ProSOLO platform provided the necessary functionality to allow students to unbundle the course structure and establish competencies that may result in micro-credentials. While the capacity for awarding badges was absent for this course, students did have the option to identify the specific activities and type and timing of assessment to demonstrate their learning. However, this unbundling of education and the potential for micro-credentialing places much emphasis on the individual learner. The number of completed competencies for the DALMOOC was low (see Figure 6). It is unknown whether students were not motivated to pursue this model or were simply not familiar with this form of learning design. Even in the more structured edX version the number of completed assessment tasks was very low when considering the number of active students (Figure 5).

The observations from this study have practical implications for introducing alternate models of education. The proposed models have been positioned in terms of their flexibility, personalised learning and cost efficiencies. Missing from this discourse is the increased reliance on student self-regulated learning. If MOOCs and other open education resources are going to be prominent forces in the development of new models of education then there is an imperative to establish more effective technical and instructional scaffolds to support students in developing productive learning strategies. As the suggested in the present study, students

are largely experimenting with MOOCs and the content and activities on offer. As these courses have no associated costs, with no restrictions on access there is a reliance on the individual to have sufficient motivation and well-established learning strategies to see the relationship between the activities, assessment and future learning or career goals.

Self-regulated learning theory provides an established framework for explaining the subtle and overt motivational forces influencing student learning. The concept of learner agency is critical in this context. This implies that students will routinely monitor their learning process and choice of learning strategies and level of engagement in activities (Winne & Hadwin, 1998). As Pintrich (1999) noted, this combines both motivational and cognitive components of learning. Cognitive and meta-cognitive strategies relate to specific learning tasks such as rehearsal and summarising techniques and reflection on performance and planning (Pintrich, 1999). Regular engagement in these processes is dependent on high levels of motivation or self-efficacy. As the present study illustrates, regular engagement in the course curriculum was certainly not undertaken by the majority of enrolled students. This leads to questions surrounding student motivations for undertaking such MOOCs.

Internationally there are many large-scale government initiatives that aim to alter current models of higher education delivery. These initiatives recognise that a nation's future economic productivity is heavily linked to higher education and the concept of lifelong learning. As such, there is a rapidly advancing need to broaden and extend access to post-secondary education through lowering costs and recognition of alternate modes of learning. The cost of education and burgeoning student debt has been most marked in the United States, prompting President Obama to call on colleges and universities to introduce more affordable yet high quality education pathways that lead to increased completion and employment rates (White House - Office of the Press Secretary, 2013, August 22). Example outcomes from this call include the re-emergence of competency based programs (e.g. Penn State University, education program), the announcement of the $10k degree in Texas, and the rapid growth of post-secondary one year certificates (Carnevale, Rose, & Hanson, 2012). A core component for establishing more flexible and alternate pathways relates to recognising that learning is not only acquired in formal education settings. Recognition of MOOCs for course credit or certificates of completion will obviously play a major role in this movement. Likewise, the rise of open or digital badges through micro-credentialing will also provide avenues for recognising learning acquired in non-traditional contexts. However, clearly these models are dependent on establishing effective strategies to support learners in becoming more autonomous and self-directed.

It is well recognised that higher education can no longer adhere exclusively to a practice that employs the traditional lecture as the dominant form of instruction. The importance of the teacher as the "sage" is diminished. The 21st century teacher needs to be equipped with real disciplinary and procedural expertise as a "usefully ignorant" (Leadbeater, 1999) co-inquirer and designer of a 'remix' curriculum (McWilliam, 2005). In other words, the teacher is not merely a content-free facilitator but a very smart designer of learning experiences. It is in the designing of learning experiences that teachers must develop student proficiency in self-regulated learning. It is only through these mechanisms that we will effectively empower our students to embrace these more unstructured educational pathways for effective and productive lifelong learning.

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