Student Engagement and Achievement in Open Online Higher Education

Research Programme – Project Descriptions

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INTRODUCTION

In recent years, free access has been provided to content which previously had a price: searches, software, music and references, to name but a few. Access to the Internet and broadband has increased rapidly and huge growth in mobile connectivity has brought online content and interaction to a global audience. New web technologies allow for scalable ways to deliver video lecture content, implement social forums and track student progress. Open Education, Open Courseware, Open Educational Resources, Open Source Software and more recently Massive Open Online Courses (MOOCs), appear to be a significant force within higher education.

A typical MOOC of 2014 might take place over 4 to 10 weeks. Students, on average, dedicate two to six hours a week to the course. Materials are consumed in diminishing volumes throughout the MOOC as many learners' commitment wanes. Course applicants can be numbered in the tens of thousands, while those who complete and obtain certificates are usually numbered in the hundreds. As in regular higher education, the value of a MOOC for student learning highly depends on how learning processes are facilitated, stimulated and assessed. The most influential categorization of MOOC pedagogy relates to the notion that there are two main kinds of MOOCs, each of which determines a particular pedagogical approach: the connectivist or cMOOC, driven by pedagogical principles of social learning, and the institutionally-focused xMOOC, reliant on video-lecture content and automated assessment. However, there is a move away from the cMOOC/xMOOC dichotomy towards recognition of the multiplicity of MOOC designs, purposes, topics and teaching styles, sometimes using alternative terms such as Distributed Open Collaborative Course (DOCC; Jaschik, 2013), Participatory Open Online Course (POOC; Daniels, 2013), Small Private Online Course (SPOC; Hashmi, 2013) or Big Open Online Course (BOOC; Tattersall, 2013).

Open online learning in higher education has quickly gained popularity, expanded, and evolved. However, it is still unclear how higher education is harnessing this opportunity and engaging with open online learning and what effect, if any, open online learning will have on the HE sector in the longer term.

OPEN ONLINE HIGHER EDUCATION

This research program focusses on open online higher education, following widely accepted broad definitions of open online education (see Call for proposals Open and Online Higher Education, NRO, in press). Online education is described as education which is completely or partly organized online. The latter includes the term Blended learning. Open education includes educational materials which is licensed under an open license and/or education that is open in time, location, pacing, access, and/or programming and/or education which is free.

In open online education, low barriers to registration attract large number of students with diverse interests and backgrounds, and student use of course content is asynchronous and unconstrained. In line with DeBoer, Ho, Stump and Breslow (2014) we argue that data in open online education are not only plentiful and different in kind, but require reconceptualization – new educational variables or different interpretations of existing variables. Increases in the amount and kind of educational data offer researchers new opportunities to observe, analyze, and ultimately improve the learning process. Yet the uncritical application of old variables to new contexts risks irrelevant or inaccurate interpretations. Differences between traditional classroom data and data of open online education refer to the magnitude of data gathered in terms of numbers of registrants per course, observations per registrant and type of information, the diversity of registrants in reasons for registration as well as in their background, and the registrant use of course tools which is asynchronous and relatively unrestricted in sequence. DeBoer et al. (2014) suggest a reconceptualization of enrolment in open

online education (e.g., based on registration, course activities, course assignments and assessment, or final exam), participation (the authors show 20 participation metrics which are linked to students' general attendance, their clicks, the hours they spent on course activities, and the assessments), curriculum (curriculum activities showing a variability in sequence), and achievement (which can be based in various indicators of performance and participation).

Learner participation is one the most examined aspects in literature and debates about open online education. The key dilemmas center on what participation actually means, how it should be measured, and what metrics of success and quality are appropriate. Milligan, Littlejohn and Margaryan (2013) describe a continuum of active, lurking and passive participation, and Hill (2013) distinguishes five archetypes of no-shows, observers, drop-ins, passive participants and active participants. The notion that people might sign up for a course not intending to complete the assessments is common in free courses where the barrier to entry is usually as low as clicking a registration button and entering an email address. This means that new measures of success and quality are required, because participant behaviors and intentions are so diverse.

Learner participation is not only an interesting educational variable from a researcher's perspective allowing for numerous and novel operationalizations of participation. It is also a crucial indicator of learner engagement in open online education, with students access various parts of a course in very different ways and coming into "class" from very diverse backgrounds and motivations. Some students watch videos. Others take assessments or interact in discussion platforms. In MOOCs for example, course applicants can be numbered in the tens of thousands, while those who complete and obtain certificates are usually numbered in the hundreds. So, student participation seems to be a crucial variable, as in traditional face-to-face higher education, but also needs to be reconceptualized in open online education. This also means that participation patterns predict student achievement in different way than in traditional campus education.

This research program addresses open online higher education within the definitions mentioned above. The aim of the research program is to get more insight into how student engagement and student achievement in open online higher education can be described, explained and improved. Hereto three clusters of explanatory variables are distinguished: 1) student characteristics, 2) characteristics of the design of the learning environment and 3) characteristics of teaching. The three perspectives (student, learning environment and teaching) are worked out in three PhD-projects with student engagement and achievement in online higher education as the common dependent variables.

PROJECT 1. TEACHING IN OPEN ONLINE HIGHER EDUCATION
APPOINTMENTMENT AT AND SUPERVISION FROM LEIDEN UNIVERSITY
CO-PROMOTOR FROM ERASMUS UNIVERSITY ROTTERDAM

In their literature review, Bayne and Ross (2013) extracted the role of the teacher as one of the emergent issues in open online education. The role of the teacher in the MOOC has been under-examined as most research has investigated the learner perspective (Liyanagunawardena, Adams, & Williams, 2013). Two main teacher roles appear from the literature, which are connected to the way the MOOC is designed: the academic celebrity teacher in xMOOCs and the facilitator in cMOOCs. The academiic celebrity teacher is the role of a respected authority based in an elite institution. These lecturers are not available to MOOC participants in any interpersonal way but primarily through the recordings of their lectures. The recordings are supplemented with automatically marked quizzes, discussion posts and pass/fail tasks. In cMOOCs, the teachers' role focusses on facilitating self-directed learning. A more sophisticated distinction between teacher roles in MOOCS is necessary in order to get a better understanding of effective pedagogies in open online higher education. Literature on moderator roles in computer conferencing from the 90s (Admiraal, Lockhorst, Wubbels, Korthagen, & Veen, 1998) might be helpful in this.

The main research question of this project is *"How is teaching in open online higher education related to students' engagement and achievement?"*

Topics of this project may include but are not limited to: instructional methods, quizzes, discussion forums, teacher feedback, peer learning, collaborative learning and assessment. Experimental designs in which particular teaching aspects are manipulated can be a valuable way to study differential effects of teaching in open online higher education.

The doctoral candidate Tim van der Zee is part of the ICLON Research Group at Leiden University: http://www.iclon.leiden.edu/scientific-research/doctorate/phd-students.html

PROJECT 2. DESIGN OF THE LEARNING ENVIRONMENT IN OPEN ONLINE HIGHER EDUCATION
APPOINTMENT AT AND SUPERVISION FROM DELFT UNIVERSITY OF TECHNOLOGY
CO-PROMOTOR FROM LEIDEN UNIVERSITY

New technologies allow for scalable ways to deliver video lecture content, implement social forums and track student progress. Learning analytics offer the possibility to use data from the learning environment to adapt the support of student learning. Calibrated feedback and assessment, by peer or teachers, and automated assessment procedures are just some other examples of how the design of the learning environment can be related to students' engagement and achievement in open online higher education.

The main research question of this project is *"How is the design of the learning environment related to students' engagement and achievement in open online higher education?"*

Topics of this project may include but are not limited to: large-scale learning analytics and learner modeling, human-centered web & multi-media, mobile learning, scalable calibrated feedback and automated assessment. Digital learning environments do not exist in isolation, they are embedded in the rich infrastructure of the Web. Learners regularly seek out additional materials available elsewhere on various portals, educational websites, etc. A related question we consider here is to what extent these externally existing material sources (their quality, the languages they exist in, etc.) might also be influencing factors in students' engagement and achievement within the learning environment.

The doctoral candidate Daniel Davis is part of the Web Information Systems Research Group at TU Delft: http://wis/ewi.tudelft.nl

PROJECT 3. STUDENTS IN OPEN ONLINE HIGHER EDUCATION
APPOINTMENT AT AND SUPERVISION FROM ERASMUS UNIVERSITY ROTTERDAM
CO-PROMOTOR FROM DELFT UNIVERSITY OF TECHNOLOGY

Open online education attracts large numbers of students with diverse interest, learning styles and social, economic, cultural and educational backgrounds. In a conceptual literature review, Hew and Chung (2014) indicated four types of reasons why students sign up for MOOCs: 1) the desire to learn about a new topic or to extend current knowledge, 2) curiosity about a MOOC 3) for personal challenge or 4) the desire to collect as many completion certificates as possible. Up to 90% of the drop out was due to reasons including a lack of incentive, failure to understand the content materials and having no one to turn to for help, and having other priorities to fulfill. These reasons were clearly connected to student characteristics such as prior knowledge about the topic, lack of time due to other priorities and commitments, course expectations, and attitudes towards education and learning.

The main research question of this project is "*How are students' characteristics related to their engagement and achievement in open online higher education?*"

Topics of this project may include but are not limited to: students' prior knowledge, their social, economic, cultural, language and educational background, their attitudes toward teaching, learning, and technology, their connections to other students, and their reasons to sign up.

One major activity could be to discover student profiles of engaged and successful students, and how these profiles could be used to improve engagement and achievements. Having determined which of these rather coarse-grained characteristics that are good indicators of student engagement and achievement, the follow-up step is then to focus on the most important indicators for the lack of engagement or achievement and how these can be addressed in the design of the environment and teaching strategies to improve student engagement and achievement. Experimental designs or quasi-experimental designs can be used to study the effects of manipulation of students' characteristics in the learning environment and teaching.

The doctoral candidate Jacqueline Wong is part of the Department of Psychology of the Faculty of Social Sciences at Erasmus University Rotterdam: http://www.eur.nl/fsw/english/psychology/

PROFILE OF INVOLVED PROFESSORS

PROF. WILFRIED ADMIRAAL - Chair of the research program teaching and teacher learning of ICLON - Leiden University graduate school of teaching. His research interest combines educational sciences, social psychology and technology. After his master social and organizational psychology (university of amsterdam, 1988), professor Admiraal completed his dissertation 'Teachers' coping with daily hassles in class' (Utrecht University, 1994). He worked at the teacher education institutes of Utrecht University (1989-2006) and the University of Amsterdam (2006-2012).

PROF. GEERT-JAN HOUBEN - Full professor of web information systems (wis) at the software and computer technology (sct) department at Delft University of Technology (TU Delft). Professor Houben leads a research group on web information systems (wis) and is involved in the education in computer science in Delft. He is also scientific director of Delft Data Science (DDS), TU Delft's coordinating initiative in the field of data science, he leads TU Delft's research program on open & online education in the TU Delft Extension School, is and principal investigator in the AMS: Amsterdam Institute for Advanced Metropolitan Solutions.

PROF. FRED PAAS - Graduated in 1988 in kinetic sciences at the Maastricht University. In 1993 professor Paas took his doctoral degree at the instruction technology section of the Twente University on the dissertation 'Instructional Control of Cognitive Load in the Training of Complex Cognitive Tasks'. Thereafter he worked as a lecturer at the kinetic sciences section and the psychology department of the Maastricht University. In 1999 he joined the educational technology centre (OTEC) of the Open Universiteit Nederland as a senior lecturer. In 2005 he was appointed professor educational psychology at the Open Universiteit Nederland and the Erasmus University Rotterdam. Between 2005 and 2009 Fred Paas has been programme director learning & cognition at Celstec and Nelll of the Open Universiteit. In the period 2003-2008 he was 8th (and the only Dutch researcher) on the list of the world's most productive educational psychologists. In 2009 he became an honorary professor at the Open Universiteit and from that moment on he has split his time between Erasmus University Rotterdam and the University of Wollongong, Australia. In the period 2008-2015 he was the most productive researcher in the field of educational psychology.

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