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# THE RELATIONS BETWEEN MOOC PARTICIPANTS' MOTIVATIONAL PROFILES, ENGAGEMENT PROFILE AND PERSISTENCE

**1. Proposal overview.** This research proposal brings together a multidisciplinary team with diversified expertise in distance education and educational technology. It uses a self-regulation and a socio-cognitive motivation approach theoretical perspective to analyze the impact of initial motivations on behavioral and cognitive engagement by learners and to identify the factors associated with MOOC course persistence. It uses a mixed methodology based on questionnaires and trace analysis of participant activity that reflects a learning analytics framework. The study will provide a better understanding of the factors that affect quantitative and qualitative engagement with course materials and design and should identify potential measures to improve MOOC completion rates.

**2. Literature and existing research review.** Interest in the educational potential of MOOCs has become mainstream. The 2013 Horizon report situates the time of MOOC adoption within one year or less (Johnson et al., 2013). As the original cMOOC involved a community of participants taking part in the creation of open content, the high volumes of the behaviorist xMOOCs attracted the interest of many higher institutions and literally hundred of thousands of participants (Daniel, 2012). 2012 was dubbed "the year of the MOOC" in the New York Times (Pappano, 2012), but apart from a few articles on cMOOCs, most of the debates and discussion occur in blogs or websites such as "Chronicle of Higher Education" rather than in scholarly journals (Daniels, 2012). There is a great need for more formal and structured research, and we think that MOOC research can be directly inspired by research methodologies used in distance education for decades.

MOOCs are alternatively conceptualized as heirs of the distance education tradition (Wikipedia, 2013) or the OER movement (Kolovich, 2012), even though the relative openness of MOOCs has been cast into doubt (Kolovich, 2012; Daniel, 2012). It seems that MOOCs do to some extent reflect openness (removing some barriers to access to university courses), but not really access to higher education since they usually attract participants who already have a diploma in higher education (Hill, 2013; Poellhuber et al., to be submitted).

In fact, although we see some debate about xMOOC pedagogy (Daniel, 2012; Bates, 2012), xMOOCs share many of the characteristics of the industrial model of distance education, in which significant resources are invested in the design and implementation of a high quality course that is distributed to a large number of students who have typically access to some sort of optional tutor support. While the quality of MOOCs is the object of hot debate, this course model scales very well, as delivery costs are marginal for additional participants, particularly if the human interaction (tutor) component is removed or substituted by teacher videos, which is typically the case in MOOCs. MOOCs typically follow a shortened, paced or cohort-based distance course model in which the starting point of the course, the assignments and the final exams are scheduled at the same time for all participants. The mini video lectures is an essential element of most xMOOCs instructional strategy providing low cost but virtual "teaching presence" (Garrison, Anderson & Archer, 2000). MOOCs differ from online course by the number of participants, the mini video lectures format, computer-graded and/or peer-graded assignments, optional but unmoderated discussions forums, and for xMOOCs, open content (Glance et al., 2013).

As MOOCs share many of the characteristics of distance courses, it is not surprising that they also share many of the same problems. The drop-out rate in distance courses and programs has long been a subject of concern in the distance education movement (Bernard *et al.,* 2004), and early literature

on completion rates seems to show that the problem is much more acute in MOOCs, with completion rates usually ranging between 15% and 20% (Daniel, 2012; Yuan et al., 2013; Jordan, 2013). Considering that MOOCs typically remove many of the tutor-interaction components and other student-support provisions typically used by distance education institutions to alleviate their drop-out rate problem, the lower completion rate is not surprising. Kizilcec et al. (2013) redefine completers, however, demonstrating that the profile of MOOC participants is diverse, the 'auditing' type (at least 9%) staying engaged with the video lectures for the entire class, even though they have no intention of completing the assignments and earning the course credits. MOOCs low persistence rates are the object of a lot of discussion and debate. MOOCs challenge both definitions of completion and of participation. If literature reports generally low completion rates, no scientific articles published to date in peer-reviewed journals have implemented an approach aiming at understanding completion or withdrawal behaviors from participants perspective.

MOOC participants register for a variety of reasons, ranging from curiosity to mandatory professional development, but an overwhelming 95% of the participants who answered our first survey were taking the course primarily to gain the knowledge offered (Poellhuber et al., to be submitted). While at first sight this appears to be a quite intrinsic and self-determined form of motivation (Ryan and Deci, 2000), in fact, the reasons participants seek content knowledge and their personal objectives vary quite a bit along a self-determination continuum. How can we gain a better understanding of how participants engage with the course materials in light of these initial intentions? Are these attitudes and motivations associated with persistence?

**3. Context.** EDUlib (http://edulib.hec.ca for "Education Libre" or Open Education) was the HEC ("Hautes Études Commerciales") Montreal response to the burgeoning MOOC movement. HEC Montreal is the premier business and economic research and teaching institution in Quebec and acts as the business faculty of the University of Montreal (Canada's second largest university). Even if the School has some programs offerings in English, it was felt that the anglophone market for MOOCs was very well covered by Coursera, EDx and Udacity initiatives and it was decided to focus on the francophone clientele, which is very important in Canada, Europe, Haïti and Africa. HEC Montreal wanted to be the first university to offer MOOCs in French so they acted quickly and launched their first course, *Introduction to mMrketing*, in the fall 2012. Since then two more followed in 2013: *Understanding Financial Statements* and *Economic Problems and Policies*. The courses were completely free and open to everyone with a computer and an Internet access. The most recent course ("Economic Problems and Policies") is the object of this proposal. Since the school has been successfully using the Sakai open source LMS for a number of years to support its own courses, the decision was made to use Sakai as the delivery platform for the EDUlib courses. While the majority of participants were French-Canadian, more than 36% are from Haiti or French African countries. Edulib courses follow a classical and typical xMOOCs pattern (Glance et al., 2013) which consists of sequencing the course in modules (sequences) (usually weeks), each module (sequence) being essentially constituted of short video lectures, with some sort of complementary material, followed by a formative quiz and a summative one. Edulib courses follow a 6 weeks format.

**4. Research questions.** The main research questions of the project are: 1) What are the ongoing relationships between the participants' motivations, learning goals, type of engagement with the course materials, intermediate results (tests), resource management strategies and motivation regulation strategies? 2) Do participants with more or less self-regulation capacities engage

differently with the course materials than other participants? 3) What factors and variables predict engagement with course materials, persistence and cognitive engagement?

### *4. 1 Conceptual framework*

This research is grounded in self-regulation and sociocognitive approach to motivation. In Cybernetics, the concept of self-regulation refers globally to systems that have a capacity to adjust and regulate their functioning in order to attain some target results or behavior according to some feedback. This view of regulating systems have provide heuristic value in the field of educational psychology and self-regulation have been the focus of numerous studies. "Self-regulated learning (or self-regulation) refers to the process by which learners personally activate and sustain cognitions, affects, and behaviors that are systematically oriented toward the attainment of learning goals." (Shunk & Zimmerman, 2008, p.9). In human behavior, psychological variables such as motivation (perceived value, self-efficacy) play an important role in regulation processes. Metacognitive strategies such as monitoring and correcting learning strategies is also an inherent component of learning self-regulation. "There is general agreement that self-regulation is a process in which people organize and manage their capacities – that is – their thoughts (e.g., competency beliefs), emotions (e.g., interest), behaviors (e.g. engagement with learning activities), and social-contextual surroundings (e.g., select a quiet, comfortable place to study) – in the service of attaining some desired future state (Pintrich & De Groot, 1990; Zimmerman, 2000)" (Reeve, Ryan, Deci & Jang, 2008), p. 237). In the perspective of self-determination theory (SDT) (Deci & Ryan, 1985), regulation of behavior can be controlled by forces outside the self (such as positive reinforcement), or, it can be relatively autonomous. With intrinsic motivation, regulation of behaviour is autonomous and adjusted according to an individual own interests and values. The SDT proposes a continuum of different types of motivation, ranging from a-motivation, to extrinsic motivation. Some types of extrinsic motivations can become more internalized and integrated than others: identified and integrated regulations can be also considered as additional forms of autonomous self-regulation (Reeve et al., 2007). Self-regulation theories focus alternatively on the what? e.g., the goals leaners seek to attain, the why?, e.g. the motives and reasons for which learners engage in some behaviors, and the how they engage, e.g. the strategies used to monitor and adjust behavior (Reeve et al., 2008).

Theories of motivation consider that "beliefs that people have about themselves are critical elements in the exercise of control and personal agency" (Pajares, 2008, p.123). In online and distance education courses, several aspects of motivation has been related to different aspects of performance, and persistence, this being particularly true of self-efficay (Poellhuber, 2007; Wang & Newlin, 2002; Jourdan, 2003; Joo, Taplin, Yum, Jegede, Fan, & Chan, 2001). Most sociocognitive motivation theories propose an expectancy-value model in which motivation is viewed as composed of a value component pertaining to the reasons why a learner engage in tasks (such as interest, usefulness, relevance), as well as of an expectancy component pertaining to the beliefs held about one's capacities (self-efficacy) or control over the output of a task. The general premises of expectancy-value models is that perceived value accorded to a task and expectancies about this task impacts on engagement, and the quantity and quality of their use of different self-regulatory strategies (Wigfield, Hoa & Klauda, 2008). In his definition of self-regulated learning, Pintrich (1999) outlined three categories of learning strategies: cognitive, metacognitive, and resource management, but this way of categorizing learning strategies is fairly common.

## 5. *Methodology*

The research proposal uses a mixed methods research methodology (Johnson & Onwuegbuzie, 2004) at the intersection of learning analytics and motivational research. The opportunity to cross-reference data from questionnaires (perception data) with actual trace analysis offers a greater possibility of understanding the participants' behavior in the environment. While traces of participant activities pertain to behavioral engagement (Blumenfeld *et al*., 2005), and tell little about cognitive engagement related to the strategies used by participants while they interact with the courses resources. The opportunity to associate perceptual data about motivation and learning strategies with trace analysis fits within the definition of Learning Analytics, and offers opportunities for an in-depth understanding of participants behaviors than an approach based only on trace analysis or perception data alone. Moreover, self-regulation models (Pintrich 2003, Zimmermann & Shunk, 2011) based partly on the MSLQ questionnaire (Pintrich et al., 1991) will be used to investigate the participants' engagement intent and motivation. Reasons to follow the course will be categorized along the extrinsic–intrinsic motivation continuum proposed by Ryan & Deci (2000).

### *5.1 Population*

Participants are obviously French speaking. EDUlib MOOC inititative targets a smaller market than English MOOCs but the french speaking population is estimated at about 700 million people globally, including many who live in Africa, an area where MOOC deployment could positively impact access and related development. Preliminary analysis of EDUlib MOOC clientele shows that it is very similar to published MOOC participants characteristics on many essential socio-demographic data (University of Edinburgh, 2013) : age (34,4 % in the 24-33 group compared to 33 %, academic highest level of academic study completed (85,4 % with at least a college degree compared to 83,5 %), aspirations for MOOC participation (95 % to learn new things compared to 95 %).

**6. Data sources.** In the *Economic Problems and Policies* course, each week offers 6 short (10-12 min.) video lectures, accompanied by the possibility of downloading the slides used in the video lectures, as well as book chapter for "mandatory" reading. Two forums are proposed: one specific, related to the week content, and one general, permitting questions on course content (monitored by a course assistant). The evaluation of students consists of weekly quizzes and a final exam. Only the best four out of six quizzes are taken into consideration for the final grade. The material is released on Sunday night and the test on the following Friday. The students are given one week to submit their answers. The quizzes are computer graded and results provided immediately to participants. Peer evaluations are not used, mainly because Sakai did not provide tools to do so. A certificate of accomplishment is sent to those who maintained an average of at least 70%.

*Traces*. The data sources considered for this research proposal are traces of the participants behavior in the Sakaï[1] environment and answers to 4 questionnaires. Traces are available in the Sakaï environment for all available courses resources for a specific set of users and a specific time frame through the Sakaï report tool; video consultation, readings and powerpoints downloads, grade obtained as well as non completed attempts to formative and summative tests, discussion forum consultations, discussion forums contributions.

[1] « Over 350 educational organizations use Sakai as a learning management system, research collaboration system and ePortfolio solution. »( http://www.sakaiproject.org/)

*Questionnaires*. Initial participant motivation toward the course is measured by the Motivated Strategies for Learning Questionnaire (MSLQ) (Pintrich *et al*., 1991), as well as by the DSSES (Distance Study Self-efficacy Scale), an instrument developed to measure student self-efficacy towards distance courses (Poellhuber, 2007). The initial questionnaire also contains socio-demographic variables, reasons for taking the course, anticipations, digital literacy scale, etc. A short questionnaire is distributed after the end of the two first weeks of the course, composed of the variations of the participants objectives of participation, in the course, as well as of the MSLQ resource management strategies scales. The final questionnaire was composed of an adaptation of the MSLQ cognitive strategy scales (Bouffard, 2005), satisfaction scale (Vallerand & Bissonette, 1990), and some items pertaining to course evaluation and participants' future intentions. In the MOOC course being investigated 4895 participants registered for the course, 1278 logged in at least once in the two first weeks of the course, and of these, 749 answered the initial survey, for a 58.6% return rate (which compares quite well with returns from survey questionnaire reported by other MOOC researchers Mackness et al., 2010). 230 participants answered the final survey. The Sakaï report tool (which collects data on all participant activities in the course) will be used to extract data in order to determine course participation profiles using a methodology inspired by Kizilcec et al. (2013). The traces of interaction with course materials will be analysed to form learning profiles emerging from a cluster analysis procedure (Field, 2010, Garson, 2012).

The MSLQ had been previously translated and validated into French following a transcultural validation approach (Vallerand, 1989) involving translation, reverse translation, pilote testing with a small number of participants and statistical validation with Fench-speaking postsecondary students (Poellhuber, 2007; Deschaines et al., 2012). As some adaptations had to be made in the MOOC context and the MOOC clientele, exploratory factor analysis will be used, as well as reliability analysis (Kim, 2009; Vallerand, 1989). In our previous experience with the MSLQ, the cognitive and metacognitive scales did not behave well; results from principal component analysis did not reproduce the factor structure supposed to be associated with the theory (showing a confusion between the metacognitive strategies scales and the critical thinking one). We thus decided to replace this part of the MSLQ by a French-Canadian instrument (Bouffard, 2005), that was used and validated with a francophone clientele.

### *6.1 Data analysis*

*Traces analysis*. Traces will first be extracted from the Sakaï environment and imported into a SQL database. Data for the questionnaire respondents will be extracted and the rest of the data will be anonymized (e.g. stripped of any identification information). After data cleansing and integrity verifying, SQL queries will be constructed to aggregate data according to the activities and resources associated with each course (week 1, week 2, etc.).

Traces will feed a statistical procedure of Two-Steps cluster analysis. This procedure is preferred whith a sample over 200 participants. Moreover, while combining hierarchical and k-mean methods, Two-Steps analysis can work with continuous and categorical data (Garson, 2012), a feature which will be particularly relevant to this analysis with quantitative test results and qualitative data on resources (consulted/ not consulted). To ensure cluster stability, two procedures will be conducted. First, dataset will be split in halves and the two solutions' cluster centroid will be compare. Second, cluster analysis can be sensible to sample order (Garson, 2012). Therefore, to determine final solution, multiple analysis will be conducted on randomize sample order (Mooi and Sarstedt, 2011). The final cluster model will be compared to the categorisation offered by Kizilcec et al. (2013).

Furthermore, participants will be assigned to a category for each course period to determined variation in the ongoing course. Those results will provided both general and specific portrait of students' participation in MOOC activities.

*Questionnaire analysis*. Data from each questionnaire will be extracted, cleansed and imported in SPSS. All motivational, cognitive engagement and resource management scales will be computed and validated using confirmatory factor analysis and scale reliability calculations. The questionnaires will be merged in a single file along with the unique identifier provided by respondents (the Edulib access code). The results of the cluster analysis categorization will also be integrated for each participant at each time period, as well as all the formative and summative tests results or tests attempts. The individual's socio-economic characteristics and the motivational variables of the first questionnaire will be used to predict engagement in the first week according to logistical regression procedures. Participating minimally in the course will correspond to at least an 'auditing' behavior, auditing being defined as watching at least 4 of the 6 videos mini-lectures with no attempts at quizzes. Variables from the first week questionnaire will then be added to the logistical regression model to build a model predicting engagement in the second week. This new model will be tested to predict engagement in week 3 and course completion. Completion will be defined as having at least an auditing behavior throughout the course, i.e. viewing more than 67 % of the video lectures (this cutout point has been discussed and set with the course teacher and represents what he considers being a relatively complete course. Using the same technique (logistic regression) we will try to analyze the changes in the behavior of participants between the first and second week. We will then use a longitudinal structural equation modeling approach (Little, 2013) to analyze how initial goals and motivations impact on early course engagement (resources viewed and resources management strategies), how quiz results or attempts are related to learning goals and further course engagement. For each sets of analysis, clusters assigned to each students will be used as an independent variable. The research project has been submitted and approved by the Université de Montréal ethics review committee.

### *6.2 Forces and limits of the methodology*

While MOOC research based on a learning analytics approach (e.g. Kizilcek et al., 2013), or on perceptual data (University of Edinburgh, 2013) is emerging, we found no example of how traces analysis and perceptual data are crossed and analyzed in a longitudinal way throughout a MOOC. This mixed methods approach will help understand MOOCs' participants variations of engagement throughout the course and shed new light on factor influencing MOOC success. The MOOC course itself follows a very typical xMOOC format, and the participant population does not seem to differ demographically from typical English speaking MOOC participant, except for the spoken language. There might be cultural variations associated with this MOOC clientele. Even though MOOC participantion is voluntary and that the sample does not represent a systematic or probabilist sample of international French speaking population (which does limit the generalizability of results), there is no reason to believe that this population is very different from typical MOOC participants in any language.

**7. Research team.** Bruno Poellhuber, faculty member of the Educational Science Faculty of the Université de Montréal, has been conducting research on factors and interventions to improve retention rates in distance education for over 10 years. Along with Terry Anderson (AU professor and former Canada Research Chair on Distance Education), one of the top Canadian scholars in the field of distance education, he led a research initiative on the use of social networking and webconferencing in a partnership of four distance education institutions. Jean Talbot is a professor

of information technology at HEC Montreal where he focuses on the pedagogical uses of IT, business process management and IT governance. He is the director of the Centre for learning and teaching at HEC Montreal and the originator of the Edulib project. Jacques Raynauld is a faculty member at HEC Montreal where he holds the Chair on Teaching and Learning in Management Education. He is the director of MATI Montreal, a Université de Montréal campus research lab on technology, teaching and learning. He has taught one Edulib MOOC. Normand Roy is associate professor at UQTR. His experience with quantitative and qualitative data analysis is extensive highly diversified and involved complex statistical methods (multilevel analysis, growth latent model, logistical regression, cluster analysis, structural equation modeling) and mixed methods analysis (content analysis, time-series with qualitative data, sequential analysis).

This research team offers strong and complementary practical, pedagogical and research expertise in the area of distance teaching, quantitative and mixed methods research, MOOCs and learning with technology.

**8. Budget and calendar.**

All expenses will go towards the remuneration of a doctoral student research assistant.

| Task | Hrs | $ | Date |
|---|---|---|---|
| Recuperating, cleansing and merging of questionnaires data, with documentation of the error proof procedure | 36 | $908 | Sept |
| Validation of the single identifier (Edulib code) | 12 | $303 | Sept |
| Exploratory or confirmatory factor analysis and reliability analysis; interpretation | 12 | $303 | Sept |
| Scales computation and descriptive statistics | 5 | $126 | Sept |
| Extracting traces from the Sakaï environment in a SQL database | 14 | $353 | Sept |
| Elaborating SQL queries to agregate data for each period | 21 | $530 | Sept |
| Validation of activities declaration (2nd and 3rd questionnaires) with SakaÏ traces | 8 | $202 | Sept |
| Data merging and final cleansing | 25 | $630 | |
| Cluster analysis of traces and validation with research team members until satisfactory model | 28 | $706 | Sept |
| Computation of traces category for each period for each participant, and merging with questionnaire data | 21 | $530 | Oct |
| Logistical regression model elaboration and interpretation | 28 | $706 | Oct |
| Data preparation for structural equation modeling | 21 | $530 | Oct |
| Structural equation modeling analysis with SPSS Amos | 28 | $706 | Oct |
| Preliminary report preparation for the research team (tables, graphs and elements of interpretation) | 28 | $706 | Oct |
| Discussion of results and further analysis | 28 | $706 | Oct |
| Redaction of detailed methodological procedures | 21 | $530 | Nov |
| Draft of the IRRODL paper plan | 18 | $454 | Nov |
| First draft of the IRRODL paper | 56 | $1 412 | Nov |

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|---|---|---|---|
| Draft of the conference presentation | 36 | $908 | Nov |
| Revision of the first draft of the IRRODL paper according to conference feedback | 24 | $605 | Dec |
| Report to the ethics committee | 6 | $151 | Jan |
| Participation to research team meetings (every 2 weeks) | 42 | $1 059 | ongoing |
| Final article revision | 24 | $605 | |
| Final report production | 72 | $1 816 | Feb |
| **TOTAL** | | **$15 485** | |
| Administration fees for research contract (Université de Montréal): 40 % of Grant total | | $6 194 | |
| **TOTAL** | | **$21 678** | |

The budget includes University of Montreal administration fee, but does not provide for any administration fee that might be asked by Athabasca University. At University of Montreal, remuneration of assistants is under a collective agreement that fixes the salary at 22,72 $/hour, to which we have to add about 11 % for diverse employers' contribution, for a total cost of 25,22 $/hr. The proposed calendar has been elaborated in order to optimize quality of what will be presented at the MRI conference early December and of other outputs (article, research report). Work on the project will start early and the prospective doctoral student working on the project has been identified. University of Montreal already had a research contract with Athabasca and it will be easy to use it as a model for this particular project.

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