

Examining Motivation to Learn in Massive Open Online Courses

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Abstract

Massive open online courses (MOOCs) are web-based learning environments in which participants, worldwide, can acquire knowledge for free without any commitment or prior requirements. Recent studies examined students' dropout rates and attrition; however, little is known about learners' motivation to learn and its connotation to their cultural background. Guided by the sociocultural and social cognitive theories, this study was set to examine motivation to learn in two MOOCs: English and Arabic. Applying the exploratory case study method, data was collected via pre- and post-questionnaires and online forums. Findings indicated a cross-cultural effect of MOOC participants' motivation to learn. Our findings suggest that although MOOC participants come from different academic backgrounds, countries, and ethnicities, they are driven to learn by similar goals. Both intrinsic and extrinsic motivation, especially career motivation with high self-determination had the strongest effect on participants' commitment and engagement in both English and Arabic MOOCs.

Keywords: Massive open online course; Motivation; Social interactions; Social cognitive theory; Sociocultural theory

Introduction

MOOCs are web-based courses available for anyone anywhere in the world, with no admission requirements (Barak & Haick, 2014; Cormier & Siemens, 2010). This new mode of content delivery and the vast amount of participants challenge the organizational structure and the teaching and learning culture of science and engineering academic institutions worldwide (Watted & Barak, 2014). Recent studies examined the problem of learners' attrition (Baggaley, 2013; Daniel, 2012); however, little is known about what motivates learners to complete the MOOC. Additionally, little is known about the relations between learners' motivation and their cultural background. In light of the aforesaid, this study was set to examine motivational mechanisms of MOOC learners who come from different cultural backgrounds. Accordingly, our theoretical background was based on two educational theories: the sociocultural and social cognitive theories.

Theoretical Background

The main two theories which frame this study are: the sociocultural theory and the social cognitive theory. The Sociocultural theory maintains that cognitive development occurs while learners are engaged in social activities (Palincsar, 1998; Vygotsky, 1987). It poses an opposition to cognitive theories that perceive education as merely a systematic knowledge acquisition process, disconnected from the context and surroundings in which it occurs emphasizing the important role of culture and context in constructing knowledge and enhancing meaningful learning. According to this theory, individuals construct cognitive schemes through interactions and communication with each other; meaningful learning occurs by engaging in social activities (Lemke, 2001). In this study, the sociocultural theory guided both the pedagogical and methodological approaches. The pedagogical approach emphasized open learning assignments, designed to enhance interactions among learners in a gradual manner, from sharing information via online forums, through peer-grading of open assignments, to working in small groups on a joint project. The methodological approach looks at similarities and differences between students who study the same course, but in different languages: Arabic and English.

The social cognitive theory, the second theory supporting this study, is based on the work of Bandura (2001; 2006). It maintains that learning occurs in a social context and that much of what is learned is gained through observations. According to this theory, students' learning is most effective when they understand, monitor, and control their motivation and their behavior. In the past two decades, the social cognitive theory has been applied in studies that sought to understand what motivates people to learn in a classroom setting (Bryan, Glynn & Kittleson, 2011; Schunk, Pintrich & Meece, 2008). However little is known about what motivates learning in online settings. In this study the social cognitive theory explains the significance of understanding motivation to learn in a MOOC.

Goal participants and setting

The goal of this study was to examine motivational mechanisms of MOOC learners who come from different cultural backgrounds. The study included 325 learners who studied nanotechnology in two MOOCs, English (N=289) and (N=36) Arabic and answered both the pre- and post-questionnaires.

The nanotechnology and nanosensors MOOC was designed to present innovative contents and advanced approaches for the fabrication of nanosensors in diverse science and engineering fields. It introduced nanotechnology principles and the vital role of nanomaterials in novel sensing applications. The course was 10 weeks long, discussing broad and interdisciplinary areas that encompass chemistry, physics, biology, material science, and electrical engineering. It included three types of graded assignments: weekly quizzes, open-ended questions, and a final project, designed to encourage innovative thinking among participants. The course was delivered at the same time in English and Arabic. All learning materials were prepared in two

languages, including the course guidelines; presentation slides, learning assignments, and lecture videos

Research Tools and Analysis

We used an exploratory case study method, applying a pre- and post-test design with two comparison groups: English vs. Arabic MOOC. The qualitative data were collected by Motivation Questionnaire, which included 20 items, divided into four main categories: Intrinsic motivation, Career motivation, Self-determination, and Self-efficacy, adapted from Glynn and colleagues (2011). The questionnaire was delivered twice at the beginning and at the end of the Nanotechnology MOOC. The qualitative data were collected via online forums. An inductive content analysis (Hsieh & Shannon, 2005) was carried out to reveal patterns, and categories in the online forums that relate to participants' motivation to learn.

Findings

The examination of learners' motivation to learn nanotechnology indicated relatively high post adjust means for intrinsic motivation and self-determination, and relatively low means for self-efficacy and career motivation, in both the English and Arabic courses (Figure 1). No significant differences were found between the two courses for each motivation category. This means that learners from both MOOCs had a similar motivation profile, based on their curiosity, personal interest, career advancement and willingness to allocate effort in the learning process.

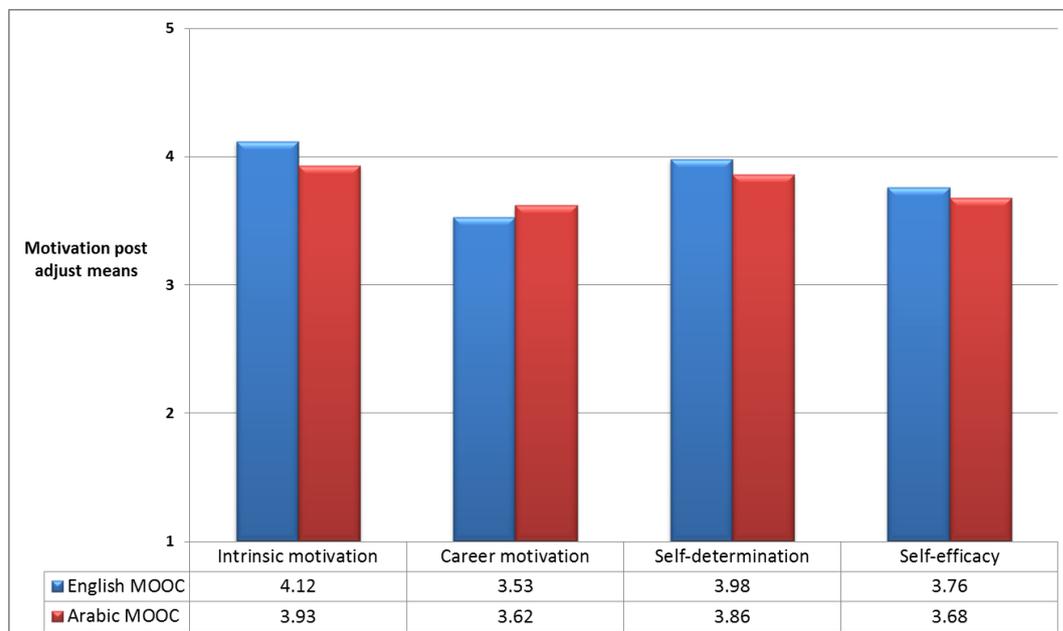


Figure 1. Learners' post adjust means for motivation to learn

For example, J.B. a MOOC student who participated in the Arabic MOOC, wrote at the end of the course:

" It wasn't that easy, but your course taught me many things about nanomaterials and nanosensors which **I wish to apply in my career as an engineer...**I'd like to learn more for the benefit of other people."

Another MOOC student, H.L., who participated in the English MOOC wrote:

I am very **interested in nanoscience**... now I work with iron nanorods to improve the MRI agents contrast, I like the many applications in medicine, drug delivery, Nanoemulsions, Nanocapsules for Drug Delivery and Nano-based Drug Synthesis and Delivery [presented in the course].

When separating graduates from non-graduates, in both courses, those who completed the course (graduates) showed a moderate increase in motivation (solid lines in Figure 2), but those who did not graduated, showed a decrease in motivation (dashed lines in Figure 2). A repeated measures analysis indicated, interactions between time (before and after the course) and graduation status (graduates vs. non-graduates), for both English and Arabic MOOCs (Wilks' $\lambda = .79$, $F(1, 287) = 76.73$, $p < .001$, $\eta^2 = .21$; Wilks' $\lambda = .55$, $F(1, 34) = 27.38$, $p < .001$, $\eta^2 = .45$, respectively). This result is interesting since it suggests that time and participation in course activities has a significant positive effect on learners' motivation in terms of personal interest, willingness to put effort in the learning process, confidence in their ability to learn, and career advancement. It is also interesting since this result indicates a cross-cultural effect.

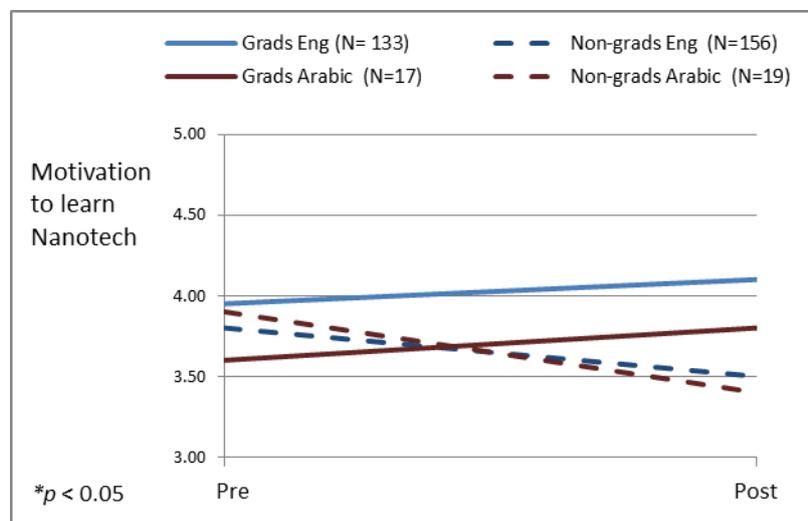


Figure 2. Motivation to learn nanotechnology before and after the MOOC, comparing grads and non-grads in the English and Arabic MOOCs

A deeper analysis, looking into motivation sub-categories of each course separately (Figure 3) comparing between the English course graduates and non-graduates' post adjusted means for motivation, indicated that the graduates asserted higher ratings in all four categories, with statistically significant differences in self-determination and self-efficacy categories ($F(1, 287) = 7.80$, $p < .01$, $\eta^2 = 0.03$; $F(1, 287) = 12.20$, $p < .05$, $\eta^2 = .04$, respectively). A similar pattern was observed among the graduates of the

Arabic course, with statistically significant differences in the self-efficacy category ($F(1, 34) = 5.60, p < .05, \eta^2 = 0.03$).

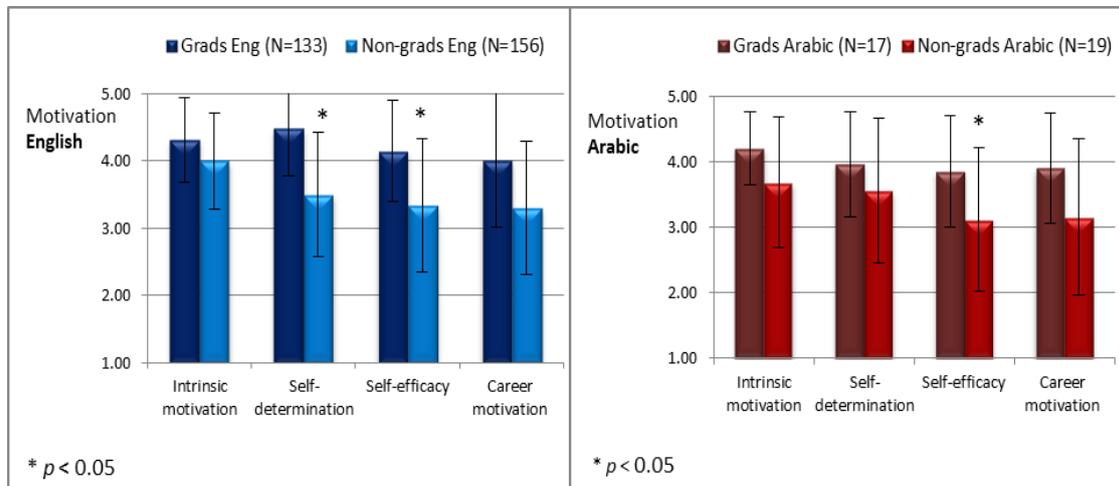


Figure 3. English (left) and Arabic (right) post adjusted means for motivation to learn, by graduates and non-graduates

The findings presented in Figure 3 suggest that participants' low self-efficacy, i.e. low confidence about their ability to learn online, is one of the main reasons for the high dropout rates. Our findings also suggest that low self-determination– the willingness to put effort into learning, and low career motivation–the belief that learning will benefit their career, are important factors that may explain learners' attrition and dropout rates.

Short Discussion

In this study, the Arabic MOOC was delivered alongside the English MOOC to provide access to innovative contents in nanotechnology for non-English speakers. Consistent with the sociocultural approach, it was designed to provide a lingua franca for learners to interact and co-construct knowledge (Vygotsky, 1978).

While examining the cultural aspect of MOOC learning, we found little differences between the English and Arabic courses in participants' motivation to learn nanotechnology. Even though the two MOOCs differed in language and cultural diversity, a similar motivation profile was revealed, indicating high ratings for intrinsic motivation and self-determination. Participants in both courses asserted an inherent satisfaction to be engaged in science and engineering learning and an ability to be in control and regulate the learning process. Our study suggests that intrinsic motivation and self-determination are necessary conditions for learning in a MOOC setting.

In both MOOCs, a similar motivation profile was also revealed when we compared between graduates, those who successfully completed the course assignments, and non-graduates. In both courses, the graduates showed an increase in motivation throughout the course; whereas non-graduates showed a decrease in motivation. In addition, in both courses, low self-efficacy was prominent among non-graduates. This

suggests that low confidence about the ability to learn online might be one of the main reasons for participants' lack of success. Low self-efficacy hinder learning achievements in traditional classroom environments (Bryan et al., 2011; Glynn et al., 2011). In online environments, it can result in attrition and dropout.

References

- Baggaley, J. (2013). MOOC rampant. *Distance Education*, 34, 368-378.
- Bandura, A. (2006). Going global with social cognitive theory: From prospect to paydirt. In S. I. Donaldson, D. E. Berger & K. Pezdek (Eds.). *The rise of applied psychology: New frontiers and rewarding careers* (pp. 53–70). Mahwah, NJ: Erlbaum.
- Bandura, A. (2001). Social cognitive theory: An agentic perspective. *Annual Review of Psychology*, 52, 1–26.
- Bryan, R. R., Glynn, S. M., & Kittleson, J. M. (2011). Motivation, achievement, and advanced placement intent of high school students learning science. *Science Education*, 95, 1049–1065.
- Barak, M., & Haick, H. (2014). Nanotechnology for all: Introducing a massive online open course in nanotechnology and nanosensors. The 4th International Nanotechnology Conference & Exhibition. David Continental Hotel, Tel-Aviv, March.
- Cormier, D. & Siemens, G. (2010). Through the open door: open courses as research, learning & engagement. *EDUCAUSE Review*, 45, 30-39.
- Daniel, J. S. (2012). Making sense of MOOCs: Musing in a maze of myth, paradox and possibility. *Journal of Interactive Media in Education*, available from <http://www-jime.open.ac.uk/article/2012-18/pdf> (accessed 7 August 2014).
- Glynn, S. M., Brickman, P., Armstrong, N., & Taasoobshirazi, G. (2011). Science motivation questionnaire II: Validation with science majors and nonscience majors. *Journal of Research in Science Teaching*, 48, 1159–1176.
- Hsieh, H. F. & Shannon, S. E. (2005). Three approaches to qualitative content analysis. *Qualitative Health Research*, 15, 1277-1288. doi: 10.1177/1049732305276687
- Kop, R. (2011). The challenges to connectivist learning on open online networks: Learning experiences during a massive open online course. *International Review of Research in Open and Distance Learning*, 12. Available from: <http://www.irrodl.org/index.php/irrodl/article/view/882/1823> (accessed 7 August 2014).
- Lemke, J.L. (2001). Articulating communities: Sociocultural perspectives on science education. *Journal of Research in Science Teaching*, 38, 296–316
- Mackness, J., Mak, S., & Williams, R. (2010). The ideals and reality of participating in a MOOC. In *proceedings of the 7th International Conference on Networked Learning* (pp.266-275). Lancaster, UK: University of Lancaster
- Palincsar, A. S. (1998). Social Constructivist Perspective on Teaching and Learning. *Annual Review of Psychology*. 49, 345–375.
- Schunk, D. H., Pintrich, P. R., & Meece, J. L. (2008). *Motivation in education* (3rd edn.). Upper Saddle River, NJ: Pearson.
- Vygotsky, L.S. (1978). *Mind in Society: The Development of Higher Psychological Processes*. Cambridge, MA: Harvard University Press.
- Watted, A., & Barak, M. (2014). Students' preferences and views about learning in a MOOC. *Procedia - Social and Behavioral Sciences*, 152, 318-323. DOI: 10.1016/j.sbspro.2014.09.203