Assessment and learning engagement in massive open online courses

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Summary

Chapter 1 ***General introduction***

The low completion rates in Massive Open Online Courses (MOOCs), which are below 10%, contradict the intended effectiveness of teaching and learning at a large scale. Considering the diverse nature of learners and their primary role in MOOC learning, it is essential to understand learners' motivation for taking a MOOC, how they engage with course content, and their perceptions of the learning outcomes. This dissertation aimed to advance our knowledge about learning assessment in MOOCs and contribute insights into how we can make MOOC learning more effective and engaging to optimize learners' learning experience, ultimately leading to better learning outcomes. Four studies were carried out to gain knowledge about learning engagement and perceived learning outcomes in MOOCs by addressing four key themes: (1) the assessment of learning outcomes in MOOCs, (2) how individuals' motivation drives learner-determined learning in MOOCs, (3) how self-regulated learning shapes personalized learning paths in MOOCs, and (4) the social construction of knowledge in MOOC.

Chapter 2

A systematic literature review analyzed 65 studies to identify learning outcomes, related instruments, and assessment characteristics in higher education MOOCs, published between 2017 and 2019. Three categories of learning outcomes were distinguished: cognitive (i.e., knowledge and intellectual skills), behavioral (i.e., engagement in learning activities, and course completion), and affective outcomes (i.e., course satisfaction, perceptions of learning experience, and perceptions of learning benefits). In total, twenty-five types of assessment instruments were identified. The characteristics of assessment instruments related to each learning outcome category were reported separately.

The main findings of this review study indicate that: (1) By considering the assessment of learning outcomes at the beginning of course design, the alignment between intended learning outcomes and appropriate measurements could help formulate assessment goals explicitly and instruct learners to work towards the intended learning outcomes. (2) A combination of knowledge tests and skills tasks can be used to examine cognitive outcomes in

a particular MOOC. (3) Outcome-oriented feedback rubrics are beneficial to support learners' essay performance, and interpretations of the utilization of rubrics could better guide providers to give peer feedback. (4) A variety of behavioral and affective outcomes reflect multiple aspects of participants' learning in MOOCs, which might contribute to teachers' better understanding and supporting them to learn. (5) Assessment tasks throughout the course may differ in difficulty and complexity, which could align with different levels of motivation of the learners.

Chapter 3

In the study presented in Chapter 3, we examined how motivation, perceived learning support, learning engagement, and self-regulated learning strategies relate to learners' perceived learning outcomes in MOOC learning. Seven categories of reasons for participation in MOOCs were identified, including personal interests, earning credits, teacher's requirements, personal interest & earning credits, to supplement knowledge, self-development, and easy access to learning resources. Based on the shared regulation characteristics of these reasons, three motivational profiles emerged in terms of autonomous motivation, controlled motivation, and combined motivation. The findings indicated that compared with the controlled-motivation group, learners with autonomous motivation scored higher on perceived learning support (i.e., course design, interaction with instructors and peers, and learner autonomy), self-regulated learning strategies (i.e., cognitive and metacognitive learning strategies, and time management), and perceived learning outcomes. Furthermore, factors such as cognitive and metacognitive learning strategies, interaction with instructors and peers, course design, and engagement in learning activities significantly contributed to perceived learning outcomes. Finally, cognitive and metacognitive learning strategies significantly mediated the association of motivation, perceived learning support, and learning engagement with perceived learning outcomes.

Chapter 4

The study described in Chapter 4 investigated the interplay between attitudes, motivation, learning engagement, and perceived learning outcomes in MOOC learning. The findings revealed that attitudes served as a precursor of participation in MOOCs that significantly influenced self-efficacy, intrinsic value, and task effort cost; self-efficacy and intrinsic value were positive facilitators to both learning engagement and perceived learning outcomes, while attitudes were positively related to perceived learning outcomes only. Furthermore, the

mediation analyses highlighted that intrinsic value was a powerful mediator, which positively influenced the effects of attitudes and self-efficacy on learning engagement and perceived learning outcomes. The moderation analyses discovered that task effort cost moderated the effects of attitudes on learning engagement and perceived learning outcomes.

Regarding self-efficacy, what the current study adds is that self-efficacious MOOC learners are more motivated to undertake academic tasks in MOOCs. We argue about the substantial direct and mediating influences of intrinsic value in MOOC learning, indicating that learners with positive attitudes and higher self-efficacy tend to engage more and perceive better learning outcomes because they are more internally interested in the MOOC attended. The moderating role of task effort cost adds that the effects of attitudes on learning engagement and perceived learning outcomes vary with task effort cost. At a low task effort cost, MOOC learners with positive attitudes are more engaged with academic tasks and have greater perceived learning outcomes; while perceiving a high task effort cost can disrupt the contribution of positive attitudes to learning engagement and perceived learning outcomes.

Chapter 5

The study in Chapter 5 focused on the cognitive engagement modes manifested and how motivation and social interaction influenced cognitive engagement modes in MOOC discussion forums. The findings showed that learners were mainly engaged in constructive and interactive engagement modes, followed by the active engagement mode. Further analyses revealed that within autonomous motivation, learners motivated by personal interest demonstrated higher scores on active and interactive engagement modes than those learners who were motivated as the MOOC was related to their studies. The number of content-related messages was positively related to active, constructive, and interactive engagement. Social network metrics varied in their influences on cognitive engagement modes: indegree centrality was negatively related to constructive engagement, while outdegree centrality was negatively associated with active and constructive engagement but positively related to interactive engagement; authority scores positively predicted constructive engagement.

Learners' cognitive engagement is significantly uneven in MOOC forum discussions. The content of their contributions is key to revealing nuanced information in their cognitive processes and levels of knowledge construction. Learners who experience interest in a MOOC are driven to focus attention and manipulate course content to engage more actively in discussion tasks; they are more likely to co-construct meaning and developing knowledge

schemes through discussions with others. In contrast, learners motivated as the MOOC related to their study are less likely to exhibit the same level of engagement in active and co-construction knowledge-building processes. Regarding the social network metrics, the quantity of indegree and outdegree centralities does not necessarily imply learners make substantive contributions to MOOC forum discussions. Learners with higher authority scores tend to be more influential and prestigious in the discussions, and they are more likely to compose their posts by frequently utilizing higher-order cognitive skills.

Chapter 6 *General discussion*

This dissertation has deepened our understanding of the assessment of learning outcomes, and the mechanism of how learners' motivation, self-regulated learning, and social construction of knowledge can shape their learning engagement and perceived learning outcomes in MOOCs. We highlighted that, firstly, it was critical to build constructive alignment between intended learning outcomes, teaching and learning activities, and assessment. This allows instructors to develop and communicate the pathway for learners' learning progression and involves learners in constructive learning in MOOCs. As evidenced in our findings, learners' ability in self-regulation becomes crucial for effective MOOC learning, with learners taking a primary role in their own learning. Therefore, we proposed a *Constructive alignment + SRL model* that incorporates self-regulated learning as the fourth element, stressing the need for designing MOOCs that can support and develop learners' self-regulation for achieving learning outcomes. Second, the chapter emphasized that autonomous motivation was a significant facilitator to learning engagement and perceived learning outcomes in MOOC learning. Within autonomous motivation, intrinsic interest acted as an internal driver to shape motivation with the highest quality. Motivational incentives (i.e., self-efficacy, task value) and disincentives (i.e., perceived cost) had differentiated roles in influencing learning engagement and perceived learning outcomes. Third, the chapter underscored that triggering learners' higher-order thinking through the social construction of knowledge was crucial to enhancing cognitive engagement substantively in MOOCs. Social interaction indicators (e.g., number of content-related messages, degree centralities, and authority score) differentiated in their abilities to predict cognitive engagement in MOOC forum discussions.

Future MOOC research can include more qualitative resources that can reveal in-depth learners' perceptions to understand their learning processes and learning outcomes more thoroughly. For example, focus groups or in-depth interviews enable participants to express

more details of their thoughts, feelings, and experiences in their own ways, which can offer rich perceptions to interpret how they are motivated, how they engage in the learning process, and how they perceive the learning benefits in MOOCs. Experimental design can be valuable in focusing on specific influential variables to provide strong evidence of cause-and-effect relationships, which are more targeted for decision-making to improve teaching and learning in MOOCs. Furthermore, future research may consider the temporal dimension of learner learning. One meaningful direction could be conducting longitudinal research to capture the dynamic interaction between teaching and learning elements on a weekly or periodic basis.

Several practical recommendations are derived from this dissertation. Firstly, the implementation of the constructive alignment approach may help MOOC instructors and designers promote effective teaching and learning. Two principles are suggested for a robust quality of teaching and learning activities: (a) to align with intended learning outcomes and assessments, and (b) to elicit desired cognitive skills of learners for constructive learning. Second, offering contextual support to satisfy individual internal psychological needs for having freedom of choices (autonomy), experiencing competence mastery (competence), and feeling connected to others (relatedness). These supports necessitate personal growth and development, and can stimulate learners' autonomous motivation for improving engagement and succeeding in MOOC learning. Third, the creation of meaning through social interaction with others should be considered in MOOC design. Learning through activities, such as peer feedback and review, collaborative group work, and discussion forums, should be designed to engage learners in constructive learning.