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Behavior and Intention in MOOCs Research

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***Abstract*—Although many efforts have been done on Massive Open Online Courses (MOOCs) contexts, how to understand the behavior and intention of individuals is a key issue in MOOCs. This article focuses on a review of both behavior and intention concerning MOOCs from science citation index expanded (SCI-EXPANED) and Social Sciences Citation Index (SSCI) database on web of science. Research results indicate that (1) the number of citations on these topics mainly distributes in recent 3 years, reaching climax of 300 in 2015; (2) the main research territory is USA, accounting for 38.4%, then followed by Spain of 11.6% and Canada of 8.7% respectively; (3) the year of published articles distributed between 2013 and 2015; (4) in the view of research area, there are three main areas: educational research, computer science, and library science. Overall, the related research topics can be classified into four aspects: motivation, intention, acceptance and engagement.**

Keywords-behavior;intention;MOOCs;acceptance; engagement

I. INTRODUCTION

Massive Open Online Courses (MOOCs) provide an evolving ecosystem of open online learning environments as they are freely available via the Internet to unlimited numbers of learners across the globe [1]. In this way, they have been instrumental in supporting the provision of high-quality educational courses and resources more generally for learners in parts of the world where this has historically been challenging [2]. Thus, MOOCs are said to be a new form of online learning, which represent the latest stage in the evolution of open educational resources [3].

With their advantages of large scale, openness and self-organization, MOOCs have drawn large numbers of participants. And much learning analytics literature has focused on the effect of the conditions created for learning as well as individual learner behavior on successful learning [4]. As an outcome of the diversity and motivations of online learners, investigating these aspects of the learning engagement and intention in a socio-scientific way is essential for improving scholarly understanding of learning in MOOCs that share the technological or institutional characteristics [5-6]. Recent research shows that MOOCs are becoming a widely-discussed new phenomenon in education.

Learning engagement and intention of MOOCs involve various types of behavioral features and that can be analyzed to provide a learning strategy [4].

We review the relating literature and present findings that published in recent five years of Science Citation Index Expanded (SCI-E) and Social Sciences Citation Index (SSCI) database from web of science. As a result bibliometric data can be used to deepen the behavior and intention implications of adopting the new practices in MOOCs.

The rest of this article is organized as follows: Section 2 surveys the relating results analysis of MOOCs literatures. Section 3 briefly summarizes related work within MOOCs. Section 4 concludes the article with a summary of our key results and discusses new opportunities for future research.

II. ANALYSIS RESULTS OF RELATING LITERATURES

According to Science Citation Index Expanded and Social Sciences Citation Index Database in web of science, 138 articles title as “MOOCs” excluding the conferences papers are found in related discipline in recent five years.

A. Results of Citation Report

Published items in each year were shown in FIGURE I, which illustrated the tendency of increased research from 2013, reaching climax in 2015. Accordingly, the highest citations happened in 2015, as shown in FIGURE II.

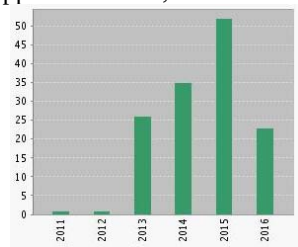

FIGURE I. PUBLISHED ITEMS IN EACH YEAR

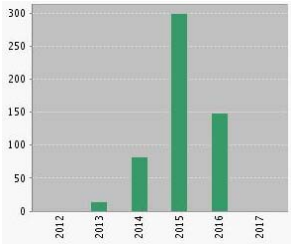

FIGURE II. CITATIONS IN EACH YEAR

B. Results of Countries/Territories

According to TABLE I of the analysis of countries/territories, USA, SPAIN, and CANADA ranked in Top 3. Specially, the articles from the Top 3 countries accounts for almost 58%, whilst USA accounts for 38%.

TABLE I. COUNTRIES/TERRITORIES

Countries/Territories	Record Count	% of 138
USA	53	38.406%
SPAIN	16	11.594%
CANADA	12	8.696%
AUSTRALIA	11	7.971%
ENGLAND	7	5.072%
PEOPLES R.CHINA	7	5.072%
SCOLAND	5	3.623%
CILE	3	2.174%
GERMANY	3	2.174%
TURKEY	2	1.449%

C. Results of Organizations

From the analysis results of organizations in TABLE II, UNIV CARLOS III MADRID, DUKE UNIV, STANFORD UNIV, UNIV OXFORD and UNIV TORONTO ranked in Top 5, which universities belong to SPAIN, USA, ENGLAND and CANADA.

TABLE II. ORGANIZATIONS

Organizations	Record Count	% of 138
UNIV CARLOS III MADRID	4	2.899%
DUKE UNIV	3	2.174%
STANFORD UNIV	3	2.174%
UNIV OXFORD	3	2.174%
UNIV TORONTO	3	2.174%
UNIV MELBORNE	2	1.449%
UNIV OBERTA CATALUNYA	2	1.449%
UNIV PENN	2	1.449%
UNIV SYDNEY	2	1.449%
VANDERBILT UNIV	2	1.449%

D. Results of Publication Years

Analysis of publication years as shown in TABLE III, illustrates the research tendency of starting from 2013, increasing steadily to reach climax in 2015. And the record in 2015 accounts for almost 38%.

TABLE III. PUBLICATION YEARS

Publication Years	Record Count	% of 138
2015	51	37.681%
2014	35	25.362%
2013	26	18.841%
2016	23	16.667%

E. Results of Research Areas

According to TABLE IV, research areas of MOOCs covered different disciplines, mostly in educational research, accounting for 55%. Then research areas of computer science, library science, and science technology account for 39%.

TABLE IV. RESEARCH AREAS

Research Areas	Record Count	% of 138
EDUCATIONAL RESEARCH	76	55.072%
COMPUTER SCIENCE	18	13.043%
LIBRARY SCIENCE	11	7.971%
SCIENCE TECHNOLOGY OTHER TOPICS	10	7.246 %
COMMUNICATION	7	5.072 %
LINGUISTICS	6	4.348 %
ENGINEERING	5	3.623 %
BUSINESS ECONOMICS	4	2.899 %
PSYCHOLOGY	4	2.899 %
GOVERNMENT LAW	3	2.174 %

F. Results of Web of Science Categories

Similarly in TABLE V, educational research ranked in the top 1, then the library science. More specifically, computer science is separated into three main categories of software engineering, theory, and methods. The record in these three categories accounts for almost 21%.

TABLE V. WEB OF SCIENCE CATEGORIES

Web of Science Categories	Record Count	% of 138
EDUCATIONAL RESEARCH	75	54.348%
LIBRARY SCIENCE	11	7.971%
COMPUTER SCIENCE SOFTWARE ENGINEERING	10	7.246%
MULTIDISCIPLINARY SCIENCES	10	7.246%
COMPUTER SCIENCE THEORY METHODS	10	7.246%
COMPUTER SCIENCE THEORY METHODS	9	6.522%
COMMUNICATION	7	5.072%
COMPUTER SCIENCE HARDWARE ARCHITECTURE	7	5.072%
COMPUTER SCIENCE INTERDISCIPLINARY APPLICATIONS	6	4.348%
LINGUISTICS	6	4.348%
PSYCHOLOGY MULTIDISCIPLINARY	4	2.899%

G. Results of Source Titles

Considering the source titles, international review of research in open and distance learning, distance education, and international review of research in open and distributed learning ranked in top 3, accounting for 23%.

TABLE VI. SOURCE TITLES

Source Titles	Record Count	% of 138
International review of research in open and distance learning	14	10.145%
Distance Education	11	7.971%
International review of research in open and distributed learning	9	6.522%
British Journal of Educational Technology	8	5.797%
Communications of the ACM	6	4.348%
COMUNICAR	5	3.623%
Technology Review	5	3.623%
Computers educations	4	2.899%
Computers in human behavior	4	2.899%
Library Journal	3	2.174%

III. RELATING TOPICS OF ACTIVITY AND INTENTION

Generally, relating topics and be identified from two hands of behavior (i.e., acceptance and engagement) and psychology (i.e., motivation and intention) respectively.

A. Acceptance of MOOCs

With the growing popularity MOOCs, the factors that influence students' acceptance of MOOCs were studied with the integration of the theory of planned behavior (TPB) and the self-determination theory (SDT).

According to the research results, attitude toward MOOCs and perceived behavioral control (PBC) were significant determinants of intention to use them. Autonomous motivation was an antecedent for all three core constructs of the TPB, while controlled motivation acted as an antecedent only for subjective norms [7].

As Rogers' diffusion of innovation (DoI) theory suggested that successful diffusion originates from developed social

systems, the theory can be used to explore MOOCs adoption to progress through the following five stages: awareness, interest, evaluation, trial before reaching the last stage, adoption.

As such, by using Rogers' DoI theory, the key findings of MOOCs adoption indicated that (1) MOOCs were viewed as innovative, however, adoption among lecturers is low; (2) the lecturers' levels of awareness and interest were high and there was a positive trend within the evaluation stage; (3)what was interesting was the mixed belief whether a bottom-up drive among lecturers will steer innovation to MOOCs [8].

B. Engagement of MOOCs

Although MOOCs provide a platform that promotes social learning, it is not enough for engaged learning to happen [9]. Learner engagement is a challenge to design for in MOOCs, because people are not expected to engage if they choose not to or are not required to [10].

Drawing on research into learner engagement conducted in the broader field of online learning in three pedagogical aspects: teacher presence, social learning, and peer learning . As three well-known pedagogical concepts, they are used to observe learner interactions and then interpret these interactions. As a result, richer meaning than analytics are able to be probed to help inform the design decisions to enhance or amplify engagement given the affordances of the MOOC format [11].

Although past research has sought to identify the factors of student engagement in traditional online courses, two questions remained largely unanswered with regard to MOOCs, including [12]: do the factors that could influence student engagement in traditional online courses also apply to online courses that are massive and open? What factors do students consider important in terms of their perceived ability to promote a satisfying or engaging online learning experience?

In order to address these two questions, a case study of three top-rated MOOCs in the disciplines of programming languages, literature, and arts & design was reported to understand the factors behind the popularity of these MOOCs [13]. And five factors were found and ranked in terms of importance: (1) problem-centric learning with clear expositions, (2) instructor accessibility and passion, (3) active learning, (4) peer interaction, and (5) using helpful course resources. Accordingly, the specific design strategies pertaining to each factor were discussed in depth, which can provide useful guidance for instructors for further experimental validation.

Furthermore, the five principles of effective teaching were found in MOOCs: student–faculty contact, student–student contact, active learning, prompt feedback and respect for students' diverse talents and ways of learning [14-15].

C. Motivation of MOOCs

The term engagement is sometimes used interchangeably with motivation. However, student engagement may be viewed as the observable display or manifestation of motivation, whereas motivation can be understood as the reason behind a given physical, emotional or cognitive response [16].

Therefore, students' differing motivations should be acknowledged, as they may simply be curious or be very selective in what they take from the course.

When considering the motivation of learners, interest is generally focused on the psychological constructs of motivation, self-regulation and metacognitive reflection. As a number of psychological challenges specific to the development and use of MOOCs, the motivational, emotional and intellectual commitment of MOOC learners, and the skills profile that effective MOOC learners require should be identified and highlighted from the psychosocial and cognitive profile of the learner, and provide a psychological characterization of MOOCs.

As a result, how individual differences in the learner profile present psychological challenges for MOOC-based learners have been identified and discussed, including: (1) individual differences in skills, preferences and cognitive profile; (2) engagement, motivation, learning and performance; and (3) the ability to monitor and appropriately respond to the demands of both the external and internal contexts of learning [17].

To probe how different learning motivations influence self-regulated learning behaviors in MOOCs, gathering empirical evidence on new forms of capturing, measuring and assessing learning that are specific to the MOOCs context is critical. Based on their activities in MOOCs, learners can be classified into three categories by their motivation, including Certification Earning, Video Watching and Course Sampling [18]. Then research results showed that earners in category A (certification earning) have highest activities while learners in category C (course sampling) have lowest activities. (motivation classification)

In addition, recent findings suggest that instructor interest and curiosity, personal gain and altruism are the motivation drivers for the learners in MOOCs [19].

D. Intentions of MOOCs

The increasing growth of MOOCs has provided people with more opportunities to connect, learn, and collaborate. To examine the important role of instructors in promoting student engagement in MOOCs, the research findings suggested that factors that could influence student engagement in traditional online courses, such as instructor presence and active learning also matter in MOOCs.

Thus, the factors behind the popularity of MOOCs include the following: problem-centric learning with clear expositions, instructor accessibility and passion, active learning, peer interaction, and using helpful course resources. These strategies can provide useful guidance for instructors and are a worthwhile subject for further experimental validation [20].

As for why students sign up for MOOCs, there are four reasons: the desire to learn about a new topic or to extend current knowledge, they were curious about MOOCs, for personal challenge, and the desire to collect as many completion certificates as possible.

And findings suggest three main reasons why instructors wish to teach MOOCs: being motivated by a sense of intrigue, the desire to gain some personal (egoistic) rewards, or a sense

of altruism. To prove the speculation that different learning styles could affect a learner's preference for MOOCs, the influence of learning styles on the learners' intentions to use MOOCs was investigated. The results showed that learners with a high-reflective learning style tended to have less experience in using MOOCs [21].

In the respect of the intention to continue using MOOCs, it was significantly influenced by perceived reputation, perceived openness, perceived usefulness, perceived, and user satisfaction. Perceived reputation and perceived openness were the strongest predictors and have not previously been examined in the context of MOOCs [22].

IV. CONCLUSIONS

MOOCs deliver education and learning resources to anyone who wishes to take the course. Thus MOOCs provide an opportunity for large numbers of people to become engaged through forms of social learning and interaction [23].

Designing for engagement in MOOCs not only acknowledges students' differing motivations but also leverages the massiveness and diversity of students attracted to promote valued and diverse forms of engagement [24]. Therefore, lack of engagement on MOOCs may be due to factors such as connectivity, digital skills, time zones, and institutional power dynamics. To support learner engagement, the focus of designing for engagement should be on understanding the particular tools and pedagogical affordances of the MOOCs. As the current study focused solely on student engagement with MOOCs.

Further research may involve creating instruments to delineate specific features of teacher presence, social learning and peer learning to enable comparison across different courses and surveying learners to gauge perceptions and practices. And in the future, extra constructs to be measured of activity and intention of MOOCs might include self-efficacy, competence, user involvement, and user characteristics. Future research may need to recognize multidisciplinary and interdisciplinary can improve the scholarly understanding of MOOCs and lead to pragmatic suggestions to improve MOOCs teaching and learning through social, pedagogical or technological approaches [25-26].

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