

Discovering the Two-Step Lag Behavioral Patterns of Learners in the College SPOC Platform

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ABSTRACT

Due to high retention rates, small private online course (SPOC) has become increasingly popular among universities. However, existing analyses of learning behavioral patterns in SPOC remain extremely lacking. This present study conducts an empirical analysis on the behavioral patterns of 12,517 undergraduates engaging in a college's SPOC platform, called StarC. In this study, the authors collected and summarized the learning behaviors generated from these learners during 348 days of observation. They further coded the behaviors and extracted the two-step lag sequences in learning processes of individuals. The frequency analysis and sequential analysis were subsequently adopted to discover the distributions and frequency transition patterns of the two-step behavioral sequence in StarC. Besides, grade similarities and differences were computed and analyzed in terms of behavioral patterns. With these results, the potential and inadequacies of the learning platform are discussed, and some suggestions are offered for future work on the study and development of SPOCs.

KEYWORDS

Learning Behavior, Small Private Online Courses (SPOCs), Transition Sequences, Two-Step Sequential Analysis

INTRODUCTION

Research Background of Behavioral Analysis in SPOCs

With in-depth application of information and communication technologies in education, massive open online courses (MOOCs) have drawn great attention in the multidisciplinary field of instructional technology. Many studies focus on the behavioral characteristics and performance of learners in the activities of MOOCs (e.g., Muñoz-Merino et al., 2015; Anderson et al., 2014; Wen, Yang, & Rose, 2014; Huang et al., 2014). Due to the characteristics of openness and autonomy, unfortunately, the high non-completion rates have become challenges to the development of MOOCs (Baggaley, 2014; Clow, 2013; Yang et al., 2013). To overcome these inadequacies, Fox (2013) proposed the idea of small private online courses (SPOCs), which only serve local learners on campus. Like conventional classrooms, SPOCs provide more opportunities for interactions between teachers and students. Since SPOCs restrain the access of learners, only a few learners are qualified to enter the virtual classroom. In this vein, teachers can conduct personalized instructions more easily. Piccioni, Estler, & Meyer (2014) found an encouraging result: when the SPOC mode was integrated into a computer science course, the participation rates reached 71% on average in each lecture, and the students passed all tests

in 80% of the sessions. However, researches still look for effective learning models with SPOCs. For example, a recent study showed that students could learn better and more stably in flipped classrooms with SPOCs than in traditional classrooms (Zhang, et al., 2015). Further analysis showed that such learning effect was influenced by students' learning time and resource utilization. Although learning effects could be examined, the corresponding behavioral patterns were still unclear behind positive results. Furthermore, students' motivations in SPOCs were still inconclusive. A log analysis showed that the accessing frequency of videos increased toward the period of examinations, suggesting that preparing examinations might be one of students' possible goals (Ziebarth & Hoppe, 2014).

In a SPOC, various teaching and learning approaches are incorporated and blended. In this vein, it is needed to consider behavioral sequences among students' actions, so that more precise patterns of learning behaviors can be discovered in SPOCs. In this study, the sequential analysis will be a main analysis approach. This approach has been proved effective to examine temporal learning patterns (Hou, Chang, & Sung, 2010), interaction patterns in discussions (Lin et al., 2014; Kapur, 2011; Hou & Wu, 2011; Jeong & Davidson-Shivers, 2006) and sequential processes in game-based learning (Hou, 2015; Hou, 2012; Loh, Sheng, & Li, 2015; Chen, 2014).

Research Motivation and Problems

Previous studies about sequential analyses mainly focus on the behavioral differences on gender (Kapur, 2011; Hou, 2012; Karakus, Inal, & Cagiltay, 2008; Chou & Tsai, 2007), learning performance (Yang, Chen, & Hwang, 2015; Wen & Rosé, 2014; Chang, et al., 2014; Kinnebrew, Loretz, & Biswas, 2013) and subpopulations divided by clustering or predefined measuring mechanisms (Desmarais & Lemieux, 2013; Kizilcec, Piech, & Schneider, 2013; Hou, 2015; Lin et al., 2014). These studies though have some limitations. For example, some studies mostly involved only short-term observation of learners' behaviors. SPOC platform is typically a closed system with some hidden problem which may restrain implementation of personalized learning. As Hou & Wu (2011) indicated, teachers often have difficulties detecting when to intervene for improving teaching quality. In addition, understanding learners' behaviors help learners adapt the online leaning mode (Park, 2009). Therefore, there is an urgent need for the analysis of learning behaviors in SPOCs.

The motivation of this research is to analyze the long-term, specific operations of learners studying in a SPOC and code each operation. With these behavioral codes, we performed the descriptive statistics in terms of grade. Additionally, a two-step lag sequential analysis approach was adopted to investigate behavioral patterns for whole group and four grade groups. The study seeks to address the following problems to facilitate future research and development on SPOCs:

1. What is the category distribution of learning behaviors generated by the learners?
2. What are the whole behavioral sequential characteristics of the learning group in resource module of the SPOC?
3. Which behavioral characteristics there are for each grade group? Which behaviors are significant different among four grade groups?

METHODS AND INSTRUMENTS

Participants

In this study, we utilize the StarC learning platform developed for the college students to conduct the sequential behavior analysis. There were 12,517 students who registered in the StarC platform before September 2014. These students are undergraduates from a college in China. This college launched and funded the development of StarC. The participants consist of 3997 freshmen, 4329 sophomores, 4021 juniors and 170 seniors. The behavioral data are automatically recorded during

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