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An Investigation of Stag and Hare Hunting Behaviors in a Computer-Supported Collaborative Learning Environment

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Abstract: This study investigated the stag and hare hunting behaviors of students in a computer-supported collaborative learning environment (CSCL). Our initial findings suggest that these behaviors do exist in a CSCL and that these behaviors have distinct characteristics. These behaviors are primarily driven by the personality traits of the students. Mobile CSCL will be improved based on the initial findings of the study. Future research directions and challenges are also discussed in this paper.

Keywords: collaborative learning, mobile games, personality

1. Introduction

Computer-supported collaborative learning (CSCL) is a technology-supported environment that aims to enhance students' social learning, knowledge sharing, and knowledge creation through increased peer interaction, collaboration, and discussion (Lipponen et al., 2003; Sung, Yang & Lee, 2017; Jeong, Hmelo-Silver, & Jo, 2019). Prior works confirmed the positive effects of CSCL on academic achievements (Sung et al., 2017), cognitive outcomes (e.g., understanding subject concepts), and affective outcomes (e.g., attitudes) (Jeong et al., 2019). Moreover, the impact of CSCL on behavioral engagement (e.g., problem-solving behaviors, individual participation, group discussion, group cohesion) is well-documented (Kapur & Kinzer, 2007; Siqin, Van Aalst, & Chu, 2015; Kwon et al., 2019). However, the stag and hare hunting behaviors in a CSCL environment are relatively unknown. These gaming behaviors are based on Skyrms' (2001, 2004) discussion of stag hunting behavior proposed by Rousseau. According to this social contract theory, people may choose higher or lower payoffs depending on the risks associated with these choices. This study investigated the stag (i.e., students who choose a faster game setting with higher points and penalties) and hare hunters (i.e., students who chose a slower game setting with lower points and penalties) in the context of a mobile CSCL environment.

2. Research Goals

The goals of this study are threefold. The first goal is to develop a model that could characterize the stag and hare hunting behaviors of students while solving arithmetic problems in *Ibigkas*! Math (subsequently referred to as the software). The second goal is to develop adaptive software based on the model. Finally, the revised software will be then deployed to test whether it has an impact on students' stag and hare hunting behaviors, and on their mathematics learning.

3. Methodology

Thirty-seven Grade 5 students (25 boys and 12 girls) participated in the study. The average age of the participants is 11 years old. The participants used the software for 15 minutes during their class session. A pretest and posttest were administered to determine their mathematics performance. All interaction

log files such as difficulty level, types of the problem solved, speed, time spent, number of attempts, correct attempts, and accuracy) were manually collected from the mobile phones. The personality types of the participants were also determined. The participants answered the Big Five Personality Types Test (John & Srivastava, 1999). Mann-Whitney U test, Spearman rho rank correlation, decision tree modeling, and lag sequential analysis (LSA) were employed to analyze the data.

4. Initial Results

It is found that stag hunters have higher game interactions than the hare hunters. However, stag hunters' interactions are not beneficial to mathematics learning. Decision tree analysis shows that the personality types of the students are the primary factor that could classify students' stag and hare hunting behaviors. Contrary to the existing literature, students with a neurotic personality type in this study tend to contribute to the welfare of the team and are cautious players. The LSA results suggest that all difficulty levels in addition were the most preferred game setting. It was also found that hare hunters attempt to solve different problems while stag hunters tend to stick to the same type of problem and level of difficulty.

5. Future Plans

Based on the initial results of the study, the software will be modified to make it more adaptive. The revised version will be then deployed to determine its impact on game interactions and mathematics performance of the participants.

6. Challenges and Questions

There are logistics implementation challenges because of the COVID-19 pandemic. Face-to-face experimentation may not be possible because schools shifted to online learning. The influence of the newly developed game on the mathematics performance of the students and the stag and hare hunting behaviors will be further explored. Moreover, investigation of the factors that push students with a neurotic personality to collaborate with their peers is worth-investigating.

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