Comparing Disengaged Behavior within a Cognitive Tutor in the USA and Philippines

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Abstract. We study how student behaviors associated with engagement differ across different school settings. We present a study to investigate the variation in gaming the system and off-task behavior in schools in the USA and Philippines, using quantitative field observations on students using the same Cognitive Tutor lesson on scatterplots. We find that students in the Philippines go off-task significantly less but game the system significantly more than our sample of students in the USA. This study suggests that ITS designed for different settings or used in different settings will need to emphasize adaptation to different disengaged behaviors.

Keywords: gaming the system, off-task behavior, school context

1 Introduction

In recent years, intelligent tutoring systems have left the research laboratory, expanded beyond the research classroom, and have started to see large-scale use worldwide [3, 5], creating the potential to use intelligent tutors to study cross-cultural differences in learners [cf. 5]. Beyond enabling scientific discoveries in this domain, greater attention to cross-cultural and cross-setting student differences in intelligent tutors has the potential to enable culturally-sensitive intelligent tutors that are educationally effective for a broader community of learners.

In this paper, we study how student behaviors associated with engagement differ across different school settings, comparing the frequency of gaming the system and off-task behavior in the USA and Philippines. Off-task behavior is much less common in East Asia than in the USA [1, 7], including in classrooms using educational software [7]. However, it remains unclear why students go off-task to such different degrees in East Asian and Western classrooms. Thus far, the primary hypothesis for this difference is that cultural factors explain the difference in incidence of off-task behavior [1]. However, it is also known that curricula are very different between East Asia and Western countries. We control for this possibility by using the exact same intelligent tutor and study design in both East Asian and American classrooms.

2 Methods

53 students in two public schools in the suburbs of Pittsburgh, PA, and 60 students in a public school in an urban area of Quezon City, Manila, participated in this study. The participating schools in both countries consisted predominantly of students from the local ethnic majority (e.g. Filipino students in the Philippines, white students in the USA). Students in both countries were in mainstream mathematics classes (e.g. neither gifted nor special needs).

In both studies, student ages ranged from approximately 12 to 14. The schools in the USA regularly use intelligent tutoring systems and other types of educational software, whereas the schools in the Philippines do not typically use these technologies (rather than a confound, we consider this an inherent attribute of two settings, as educational software remains rare in Philippines public schools [cf. 6]).

All students used a short Cognitive Tutor unit on scatterplot generation and interpretation [2], a topic not previous covered in class, for 80 minutes. We collected data on each student's pattern of behavior during tutor usage, using the exact quantitative field observation procedure from [2]. Our coding scheme consisted of six categories: on-task, on-task conversation, off-task conversation, off-task solitary behavior, inactivity, and gaming the system.

3 Results

The incidence of both categories of behavior was highly different between the schools in the two countries. Students in the USA were off-task an average of 19.7% of the time (SD=17.8%), within the typical range reported in traditional classrooms in the USA. Students in the Philippines were off-task an average of 2.7% of the time (SD = 5.2%), in line with previous observations of student off-task behavior in classrooms using educational software in the Philippines [7]. The difference between off-task behavior in the two countries was statistically significant, $t(111)=7.02$, $p<0.0001$, effect size = 3.26 SD.

Students in the USA gamed the system about 5.3% of the time (SD= 9.9%), in line with previous observed gaming frequencies in previous studies of the scatterplot tutor lesson [cf. 2]. Students in the Philippines gamed the system about 10.7% of the time (SD=15.3%). The difference in gaming the system frequency between the two countries was statistically significant, $t(111)=2.17$, $p=0.03$, effect size = 0.54 SD.

4 Discussion and Conclusions

In this paper, we have presented a study examining the prevalence of student behaviors associated with disengagement in the USA and Philippines. This study controlled for method and learning environment – hence, differences found can be attributed to differences between the schools and/or their populations. The study found that off-task behavior was significantly higher in the USA, but that gaming the

system was significantly more frequent in the Philippines. One possible account for this finding is that Filipinos value social acceptance, respect for elders, and discretion more than Americans do [4]. In the school context, students might have considered off-task behavior as indiscreet and disrespectful to the teacher, and therefore socially unacceptable. Gaming has the appearance of being on-task, at least from a distance. Replicating the analyses presented here, to see whether the same pattern is seen in other East Asian countries and other Western countries, will be an important area of future work. In the long-term, this work may enable understanding of how intelligent tutors should differ in different countries.

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