Struggly Classroom: Preliminary Evidence from Research

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September 2023

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Introduction

Struggly Classroom, a product of Boggl Inc., is a supplemental online curriculum, which aims to support the learning of conceptual mathematics that is critical for students. The tasks within Struggly Classroom were created to provide opportunities for deep, connected mathematical learning while encouraging persistence and a growth mindset. The activities are guided by three main themes – number sense, patterns, and shape and space. Struggly Classroom is suitable for students from kindergarten through eighth grade.

To support the goal of continuous improvement and investigate the potential for Struggly Classroom to support student learning, Boggl Inc. examined the relationship between using Struggly Classroom and students' learning in mathematics. Boggl Inc. conducted this study by comparing the assessment scores of a sample of fourth and fifth grade students who played Struggly tasks for at least a 6-week period throughout the school year to scores of students who did not have access to Struggly, at the end of the school year. Thus, the research question guiding this study was whether there are any statistically significant differences in assessment scores of students who used Struggly and those who did not. WestEd, a non-profit research organization, conducted additional data analysis to review and confirm the initial findings and prepared this report. The current report discusses the procedures of the study and the findings and conclusions from the analysis of data collected.

Methods

Boggl Inc. conducted a study to examine the relationship between using Struggly and students' mathematics knowledge. This section of the report describes the participants, the measures and procedures, and the methods utilized to analyze the data.

Participants

The Boggle Inc. research team recruited a total of 19 fourth and fifth grade classrooms, from 5 different schools, for this study. The participating schools were from the same school district in Northern California and demonstrated similar levels of achievement, such as the percent of students meeting or exceeding grade-level standards in mathematics on the California Assessment of Student Performance and Progress (CAASPP). See Table 1 for school level demographics of the participating schools.

Classrooms were assigned to either the treatment group, in which students were asked to play Struggly tasks, or to the control group, in which students received business-as-usual instruction. The treatment group consisted of a total of 256 students attending 11 classrooms, across three different schools. The control group consisted of a total of 214 students from 8 classrooms, across four different schools.

Table 1. School level demographics

School	Number of Treatment Classrooms	Number of Control Classrooms	Percent Students Meeting or Exceeding Grade-Level Standards in CAASPP Mathematics	Percent English Learners	Percent Students Receiving Free/Reduced Lunch
School 1	1	3	25.00%	38.70%	63.70%
School 2	5	0	29.23%	45.10%	63.80%
School 3	0	2	20.57%	87.00%	59.70%
School 4	5	1	44.00%	15.00%	22.50%
School 5	0	2	44.21%	30.30%	52.60%

Note. CAASPP = California Assessment of Student Performance and Progress. Source: cde.ca.gov.

Measures and Procedures

Students in the treatment group were assigned to play Struggly tasks for a minimum of 20 minutes, three times a week, over at least a 6-week period throughout the school year. Students in the control group had no access or exposure to Struggly and only received business-as-usual instruction.

Students in both groups were given a mathematics assessment at the end of the school year. The assessment consisted of 7 questions from the National Assessment of Education Progress (NAEP) assessment that were categorized under the content classification of Number Properties and Operations. These questions covered the topics of fractions, decimals, and number sense, which reflect the topics covered in the Struggly tasks that students in the treatment group completed. The assessments were graded, such that each question was worth a total of 1 point, with potential of receiving partial credit, for a total of 7 possible points on the assessment. Assessments were de-identified and scored by a trained grader, independent of the research team.

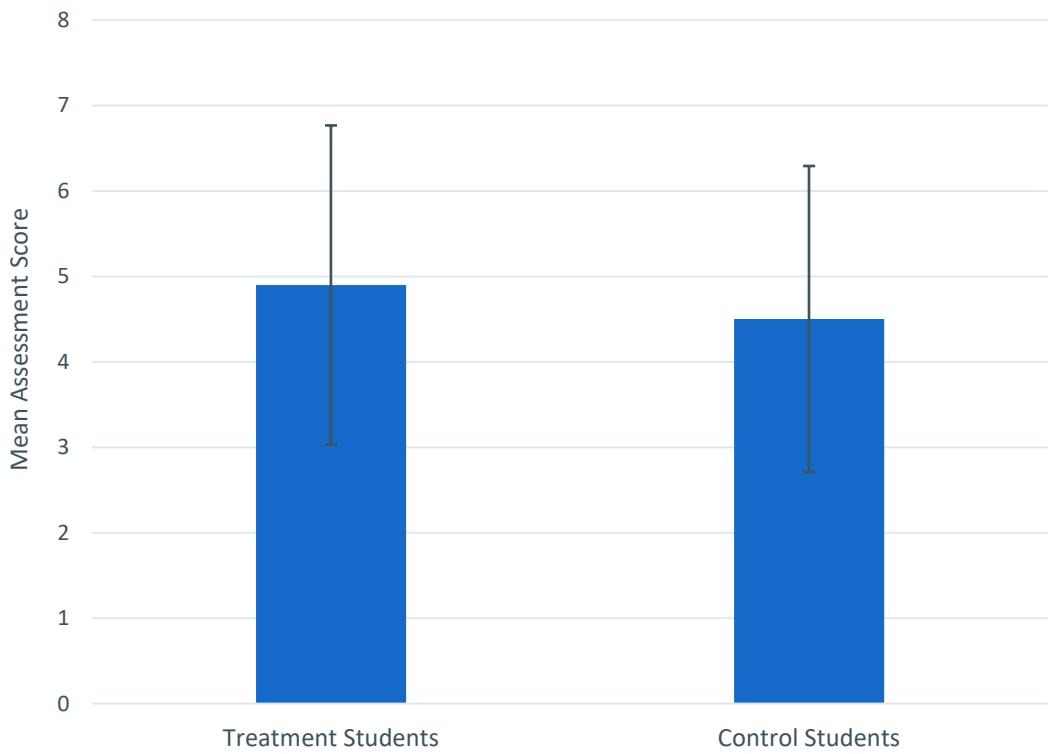
Analytic Strategy

The Boggle Inc. research team led the data analysis for this study, while the WestEd research team reviewed and conducted additional data analysis to confirm the initial findings. To answer the research question, an Independent Sample T-test was conducted to assess the differences between the treatment and control group students' assessment scores. The assumptions of normality and homogeneity of variance for conducting an Independent Sample T-test were assessed and met. Cohen's d was used as the standardized effect size for measuring the difference between the two group means.

Results

The results demonstrated a statistically significant difference in the scores of students in favor of students in the treatment group. Students in the treatment group, who received Struggly, (M = 4.9, SD = 1.9) compared to their peers in the control group (M = 4.5, SD = 1.8), scored statistically significantly higher on the assessment, t (468) = 2.35, p = .019. The results revealed this difference to have a small but educationally meaningful effect size (d = 0.22). See Figure 1.

Figure 1. Students' mean assessment score based on their study group



Note. Treatment students = students who used Struggly; Control Students = students who did not have access to Struggly. Error bars represent standard deviation.

Discussion

Limitations and Next Steps

While the results of this study helped demonstrate the differences in students' assessment scores, there are some limitations that need to be addressed and further research is necessary. Since adequate classroom-level or student-level data were not collected prior to the beginning of this study, baseline equivalence was not assessed, and statistical controls were not used. This could have made it more likely to have a selection bias. Moreover, while this study may elucidate a correlation between using Struggly and higher scores on a mathematics assessment, it does not allow for concluding whether playing Struggly impacted students' learning. Thus, further research, such as conducting an experimental study, is necessary to examine how and to what extent playing Struggly may impact students' learning of mathematics. Additionally, it would be important to measure the amount of time individual students actually use Struggly and examine their activity with the platform. Finally, conducting surveys with students who use Struggly may also help in better understanding students' perceptions of Struggly.

Conclusions

Struggly aims to help increase students' mathematics learning by providing students with a bank of tasks themed around number sense, patterns, and shapes and space, while encouraging persistence and developing a growth mindset. Overall, the results of this study highlighted that playing Struggly tasks may be associated with higher scores on a mathematics assessment for students in fourth and fifth grade. This provides preliminary evidence that Struggly may help students in learning mathematics, which could have important implications for improving students' mathematics achievement.

Compared to students without access to Struggly, students who played Struggly tasks scored significantly higher on a mathematics assessment at the end of the school year. The findings of this study highlight that Struggly Classroom may help support students' learning in mathematics, while further research is necessary to better understand this relationship.