

Fostering Student Engagement in the Lexia® Core5® Program Through Developmental Theory and Program Data

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Citation

Kazakoff, E. R., Bundschuh, K., Orkin, M., & Schechter, R. L. (2018). Fostering engagement in educational technologies through developmental theory and program data. In Roscoe, R. D., Craig, S.D., & Douglas, I. (Eds.), *End-user considerations in educational technology design* (pp. 99-122). IGI Global.

Key Findings

- Teachers and parents reported that students found Core5 **motivating** because it allowed them to **choose** activities and provided **targeted** instruction that fostered a sense of **autonomy** and **competence**.
- In a continuous effort to improve engagement, changes in Core5 have been informed by **motivational theories**, **teacher and student feedback**, and **program data**. Recent changes included adjusting difficulty levels of activities, limiting the number of times students can click on certain hotspots, decreasing repetitive instructions, and not having students repeat items after receiving scaffolded support.

Purpose

Kazakoff et al. (2018) review [relevant theory](#) and research demonstrating how Core5 embodies theoretical principles of motivation, which include student need for autonomy, competence, and relatedness. This review also includes how research has informed continuous improvements to the program's approach to motivating students. This brief summarizes a qualitative study on student engagement with Core5 and four quantitative analyses of program data aimed at improving student engagement through data-driven and theoretically-based program changes.

Student Engagement with Core5 - A Qualitative Study

Sample and Procedure

During a 5-week remedial summer program for struggling readers, 30 students (ages 7-10) used the Core5 program in the classroom and were also assigned the program as homework for 20 minutes, twice per week. Teachers and parents reported on students' Core5 engagement, including attitudes towards reading, time spent working on the program and observed changes in reading activity.

Results

Teachers and parents reported that students were positively engaged with Core5. The following table shows how the program fostered student engagement by facilitating a sense of autonomy and competence in students.

Autonomy	Competence
- Students enjoyed working on Core5 independently and liked having the opportunity to choose activities in the program. - Students could monitor their own progress in Core5 (see Figure 1 below).	- Core5 allows students to review challenging activities within an engaging environment. - Core5 provides teachers with targeted instruction for students based on student performance in the program.

Figure 1: Core5 student dashboard that allows students to track their own progress in the program.



These results were contrasted with findings from the previous summer program in which students did not use Core5 and were only assigned paper-pencil homework. One teacher noticed an increase in homework completion rate when students were assigned Core5 for homework instead of a paper-pencil task. A parent who participated in both summer programs reported that her child spent more time independently reading over the weekend compared to the previous year.

Improving Core5 Motivational-based Design - Quantitative Studies

Analyzing Activity Difficult: Rhyming

Sample and Procedure

The difficulty level of a Core5 rhyming activity was investigated based on teacher feedback and program data from students in 10 elementary schools. A central component of the Core5 program is the availability of scaffolded support for students who struggle with an activity. All students begin each Core5 unit in the “standard step”, which typically features a question along with a set of possible answer choices. If students struggle (i.e., making 1-2 errors), they are placed in the “practice step”, where they receive more direct instruction and practice. Students who are successful in the practice step, return to the standard step but those who continue to struggle are placed in the “instruction step”, where they are explicitly taught the skills in the unit. A design goal is to have 30% or fewer students in the instruction step; cases where a higher percentage of students need this kind of scaffolding may be indicative that the unit is too difficult and, as such, demotivating for students. This analysis examined how often students received scaffolded support during a rhyming activity.

Results

Over 60% of students entered the practice step during the rhyming activity, with almost 50% entering the instruction step and ultimately getting stuck in the program. These high percentages indicated that the rhyming activity was more difficult than intended and therefore potentially demotivating to students. To address this program issue, the activity was revised by simplifying the task, clarifying instructions, and changing images that could lead students to select an incorrect answer.

Balancing Engagement and Student Self-Regulation: Fun Facts

Sample and Procedure

A sample of approximately 270,000 elementary school students' program data were analyzed to better understand the relation between student engagement with “Fun Facts” in Core5 and student progress in the online program. “Fun Facts” were added to Core5 as a way to increase student motivation by connecting the Core5 activity with the larger world and thereby building relatedness for students (contextualizing learning to students’

interests, goals, or a larger body of knowledge). This feature allows students to click on a background object related to a theme (e.g., The Amazon Rainforest) and listen to a fact about that object. However, it is possible that some students might over-click these facts to the point of distraction. Program data were initially analyzed over six weeks to determine the number of students who engaged with Fun Facts. Students who clicked on a “Fun Fact” at least once during the six weeks were included in the sample.

Results

Students in the sample averaged 46 clicks over the six weeks. When compared to students who clicked 50 or fewer times, students who clicked at least 500 times completed significantly fewer units in Core5. Based on these findings, limits to the number of times students could click on “Fun Facts” were instituted in the program.

Impact of Repetitive Instructions

Sample and Procedure

An analysis of almost 80,000 elementary school students’ program data was conducted two years apart to compare student progress in Core5 before and after an update to the frequency with which the program repeated directions. Complaints were received by teachers and students about the repetition of Core5 directions each time a student attempted a unit. This repetition of directions had the potential to negatively impact students’ sense of autonomy and competence when they were repeatedly, yet unnecessarily, reminded of the instructions. To reduce the possibility for frustration, Core5 was updated to decrease the number of times directions were read to students.

Results

The program data analysis revealed that the updated program with reduced directions had improved program progress rate, with students averaging 194 seconds per unit versus 243 seconds per unit prior to the update-- a 20.2% improvement in time. In addition to the motivational benefits of reducing the repetitiveness of the directions (as previously described), the faster pacing can also help support a sense of competence for students as they are able to accomplish more in a shorter period of time. Fewer repetitive directions also means students spend more time engaging with targeted content during their time using Core5.

Retaining Credit for Completed Work

Sample and Procedure

The program data of 13,000 students were analyzed to address the following concern: Teachers reported that students were frustrated when after completing questions in the scaffolded support, they had to re-answer questions that they had previously answered correctly in the activity. This analysis explored the frequency of this occurrence.

Results

The analysis found that 43% of the time students correctly answered more than half of the items in an activity before needing scaffolded support. In these cases students had to repeat items they encountered earlier in a unit. This design element did not support students' perception of their competence and thus was likely demotivating. Core5 was reprogrammed so students could continue where they left off after receiving scaffolded support instead of having to answer the same questions again.

Conclusion

Core5 leverages motivational theories, feedback from users, and program data to create a program that fosters student motivation and engagement. In a qualitative study, teachers and parents reported that Core5 features promote positive student engagement by encouraging autonomy and competence. In a series of quantitative studies, teacher and student feedback along with program data were used to evaluate and update elements of Core5's program design to further enhance student engagement.