RESEARCH BRIEF

Fostering Student Engagement and Motivation in Lexia Core5 Reading Through Product Research

Highlights

- Design of Core5 is informed by motivational theory and research to address students' needs for autonomy, competence, and relatedness.
- Analyses of program data and user feedback drive a process of iterative redesign to foster student engagement. Examples include:
    - Modifications to a difficult activity to improve performance and reduce the potential for demotivation.
    - Modifications to a "Fun Facts" feature to balance motivation with limits to students' self-regulation.
    - Reductions in repetitive instructions to increase pacing in the program and promote autonomy and competence.
    - Reprogramming Core5 so students do not become frustrated by losing credits when they receive scaffolded support.

Introduction

Many educational technology (EdTech) tools are populated by extrinsic incentives (e.g., badges). However, intrinsic motivation is associated with higher levels of effort, satisfaction, and learning (Deci, Koestner, & Ryan, 1999). EdTech programs can build intrinsic motivation when they address students' needs for *autonomy*, *competence*, and *relatedness*. This brief illustrates how motivational theory informs the design of Core5, and how Lexia uses program data and user feedback to iteratively redesign Core5 to promote student engagement.

Autonomy. Autonomy is a sense of control over one's actions. In educational contexts, autonomy refers to students' perception of self-directed behavior or independent pursuit of goals and interests. Core5 addresses students' need for autonomy. Students have many choices in each session, including opportunities to select between various activities and explore up to six "Fun Facts" embedded in the background imagery of each level. A student dashboard allows students to monitor their progress in Core5, the skills they have mastered, and the activities they can choose from next.

Competence. Competence refers to students' beliefs that they are capable of learning challenging materials. Learning environments that foster competence can increase students' intrinsic motivation (Turner, Meyer, Cox, Logan, DiCintio, & Thomas, 1998). Core5 incorporates several strategies to promote a sense of competence. Students begin Core5 by completing an auto placement. This allows students to start the program working on skills at their own ability level and, thus, appropriately challenging. To progress in Core5, students must achieve a high level of success on each unit of an activity. A scaffolding feature offers direct instruction and support when students need it so they can demonstrate skill mastery, move on to more difficult skills, and build a sense of competence.

Relatedness. Student engagement increases when meaningful relationships are made between learning activities and the real world (Assor, Kaplan, & Roth, 2002). Core5 addresses relatedness in several ways. Core5 connects students to places around the world with culturally based characters and regional music. "Fun Facts" – which allow students to click on background art to learn new information – also align Core5 to the outside world. Core5's paper-and-pencil activities give students an opportunity to relate Core5 skills to various academic subjects. Teachers support a sense of relatedness when they help students

connect what they are learning in Core5 to real-life (e.g., using the idiom "it's raining cats and dogs" in everyday conversation).

Study Design

Lexia engages in product research and iterative redesign to address motivational aspects of Core5. This section highlights instances in which analyses of program data and feedback from Core5 users have driven design changes that impact student skill acquisition and engagement with the program.

Analyzing Difficulty Levels: Rhyming. Core5 offers embedded scaffolding for students who struggle with a particular skill. Students begin a Core5 unit in a standard step. If they struggle in the standard step, students are placed in a practice step where they work on the skill. Students who continue to struggle in the practice step move to an instruction step where they receive explicit instruction on skills covered in that unit. The design goal is to have 30% or fewer students in the instruction step. The performance of students working on a notably difficult activity – Rhyming – was analyzed to determine if the design goal was met. The number of students included in this analysis ranged from 16,000 to 40,000, depending on the unit. For each unit, the percentage of students who entered the practice and instruction steps was examined to assess alignment with the design goal.

Balancing Engagement and Student Self-Regulation: "Fun Facts". Core5 includes artwork with embedded "Fun Facts" designed to increase student motivation. Students can click on an object in the artwork and hear a "Fun Fact" related to the object. In addition to cultivating student motivation, "Fun Facts" may have also inadvertently taxed students' capacity for self-regulation – the ability to manage emotions, behaviors, and attention (National Association for the Education of Young Children, 2009). To this end, program data from a large national sample were analyzed over six weeks to assess students' interactions with "Fun Facts." Descriptive analyses looked at the number of students who used "Fun Facts" and the average number of clicks. Comparative analyses examined Core5 progress for students who clicked on "Fun Facts" 50 or fewer times versus those who clicked 500 or more times.

Impact of Repetitive Instructions: Pacing. The initial version of Core5 included several repetitions of instructions within each activity or unit. Teachers and students gave feedback regarding the frequency with which instructions were repeated, and research suggests that such repetitions could undermine students' intrinsic motivation (Przybylski, Rigby, & Ryan, 2010). Therefore, Core5 was revised to decrease the frequency of repeated instructions. To evaluate the impact of this change, program data from a national sample of Core5 users were analyzed two years apart (i.e., before and after reductions in repeated instructions). Records of student progress were grouped by accuracy category: High, Medium, and Low. Analyses compared the average time students spent in each unit across accuracy category, before and after repetitive instructions were reduced.

Retaining Credit for Completed Work. Feedback from teachers indicated that students often became frustrated when they "lost credit" for correct answers. Specifically, when students received scaffolded support and then returned to the standard step, they had to re-answer questions they previously answered correctly. Program data from a national sample of Core5 users were analyzed to determine how often students answered more than half the items in a given unit correctly before "losing credit" for their correct responses.

Results

Modifications were made to a difficult activity to improve performance and reduce the potential for demotivation.

More than 60% of students in the analytic sample entered the practice step for the second unit in the Rhyming activity, and nearly 50% entered the instruction step and subsequently got "stuck" in the activity. These percentages indicate that the activity was more difficult than intended and therefore potentially demotivating to students. As a result, the activity was modified. The task used in the standard step was moved to the practice step. The standard step task was simplified so students were less inclined to select an incorrect answer. These modifications improved student performance, and the activity now meets design goals (i.e., less than 30% of students in the instruction step).

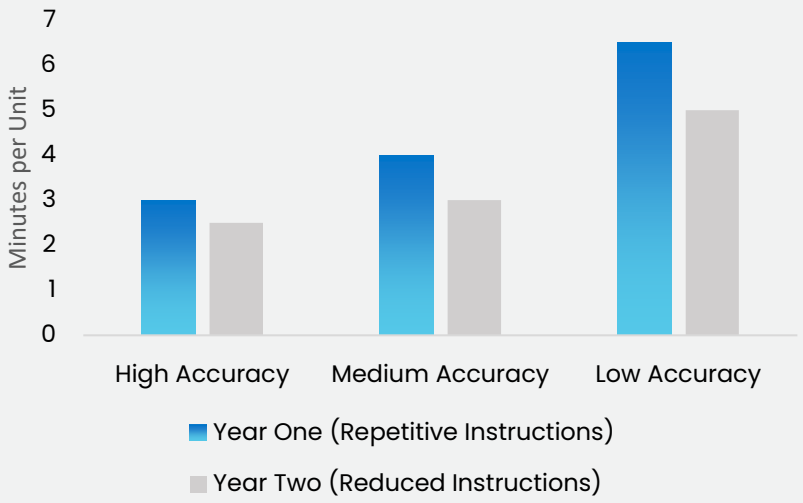
Modifications were made to a "Fun Facts" feature to balance motivation with limits to students' self-regulation.

In a large national sample, approximately 270,000 students clicked on at least one "Fun Fact" during a 6-week period. Students who clicked 500 or more times completed significantly fewer units in the program than students who clicked 50 times or less. This suggests that for some students, overuse of the "Fun Facts" may have impeded their progress. As a result, the design of this feature was modified to create limits on the number of times students can click on "Fun Facts."

By combining analysis of program data with developmental theory, Core5 was revised to balance motivational features with limits to students' capacity for self-regulation.

Reductions in repetitive instructions increased pacing in the program and promoted autonomy and competence.

Following the reduction of repetitive instructions, students' pacing through Core5 improved by 20.2%. Students in the Low Accuracy group benefited most, improving their pacing by 26.1% and saving nearly two minutes per Core5 unit. Faster pacing allows students to complete more units in the program, supporting students' sense of autonomy and competence.



Reducing repetitive instructions improved pacing in Core5.

Core5 was reprogrammed so students do not become frustrated by losing credits when they receive scaffolded support.

An analysis of data from 13,000 Core5 users found that when they dropped to scaffolded support, 43% of the time they had already correctly answered more than half the items in the activity. Returning to the standard step, they had to re-answer each item. This design element was likely demotivating. As a result, Core5 was reprogrammed so students could "pick up where they left off" after receiving scaffolded support. They now retain credit for items answered correctly. This change supports students' perception of competence, enabling them to progress through the program more quickly.

Want to Learn More?

For more information and updates on research related to Core5, please contact research@lexialearning.com

References

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