Educational video games can boost motivation to learn, study shows

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Math video games can enhance students' motivation to learn, but it may depend on how students play, researchers at New York University and the City University of New York have found in a study of middle-schoolers.

While playing a math video game either competitively or collaboratively with another player—as compared to playing alone—students adopted a mastery mindset that is highly conducive to [learning]. Moreover, students' interest and enjoyment in playing the math video game increased when they played with another student.

Their findings, which appear in the *Journal of Educational Psychology*, point to new ways in which computer, console, or mobile [educational games] may yield learning benefits.

"We found support for claims that well-designed games can motivate students to learn less popular subjects, such as math, and that game-based learning can actually get students interested in the subject matter—and can broaden their focus beyond just collecting stars or points," says Jan Plass, a professor in NYU's Steinhardt School of Culture, Education, and Human Development and one of the study's lead authors.

"Educational games may be able to help circumvent major problems plaguing classrooms by placing students in a frame of mind that is conducive to learning rather than worrying about how smart they look,"

adds co-lead author Paul O'Keefe, an NYU postdoctoral fellow at the time of the study and now at Stanford University's Department of Psychology.

The researchers focused on how students' motivation to learn, as well as their interest and performance in math, was affected by playing a math video game either individually, competitively, or collaboratively.

Specifically, they looked at two main types of motivational orientations: mastery goal orientation, in which students focus on learning, improvement, and the development of abilities, and performance goal orientation, in which students focus on validating their abilities. For instance, in the classroom, a student may be focused on improving their math skills (mastery), or, instead, trying to prove how smart they are or trying to avoid looking incompetent compared their classmates (performance).

Researchers consistently find that a mastery goal orientation facilitates learning because students are focused on accruing knowledge and developing abilities. They also view mistakes and difficulties as part of the learning process—rather than an indictment of their lack of ability. By contrast, performance goal orientations may hurt the learning process, particularly for those who do not feel competent—for instance, students who fear looking less intelligent than their classmates may avoid opportunities that would, in fact, bolster their understanding of the material.

However, scholarship has shown that typical educational contexts—notably, classrooms—lead students to adopt stronger performance goal orientations than a mastery goal orientation.

Consequently, researchers have sought to understand how to promote students' mastery goal orientations and weaken the performance goal

orientations that lead students to avoid potential learning opportunities.

One candidate is educational video games, which, at first glance, would seem to result in performance rather than mastery orientations given their competitive focus and that they are often played with others. But, given the popularity of gaming among school-aged students, exploring their potential value intrigued the study's authors.

To test this possibility, the researchers had middle-school students play the video game FactorReactor, which is designed to build math skills through problem solving and therefore serves as diagnostic for learning.

In order to test the impact of different settings on learning, students were randomly assigned to play the game alone, competitively against another student, or collaboratively with another student. The researchers controlled for students' abilities by conducting a pre-test.

The findings revealed that students who played the math game either competitively or collaboratively reported the strongest mastery goal orientations, which indicates that students adopted an optimal mindset for learning while playing the video game with others.

Their results also showed that students playing under competitive situations performed best in the game. In addition, those playing in both competitive and collaborative conditions experienced the greatest interest and enjoyment.

"The increased interest we observed in the competitive and collaborative conditions suggests that educational games can promote a desire to learn and intentions to re-engage in the material, and in the long run, may create independent and self-determined learners," notes O'Keefe.

The authors caution about generalizing their results, however.

"Although we found a host of beneficial outcomes associated with playing the game with a partner, our results may be limited to the educational content of the game, its design, or our experimental procedure," says Plass. "Future research will need to examine design features that optimize learning across curricula."

Provided by New York University

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