

Social Context, Motivation and Learning in an Educational Video Game to Teach Middle School Math

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Members of the multi-institutional **Games for Learning Institute** study the use of digital games for learning and investigate their socio-cultural, cognitive, and emotional impact. We develop **design patterns for effective learning games**

that industry partners can draw on to assure high quality when designing their own games for learning. Our current focus is on games that teach **science, technology, engineering and mathematics** to middle school students.

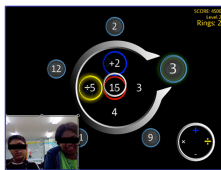
Study Goals

- Examine the effects of manipulating social context of playing an educational math game with early adolescents. The effects of mode of play on in-game and paper-pencil learning outcomes, situational interest, achievement goal orientation were investigated.

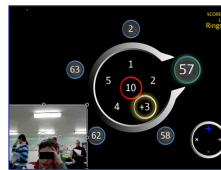
FACTOR REACTOR

A multiplayer game focusing on arithmetic skill designed to investigate the social context of game play

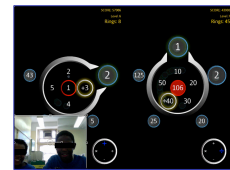
Collaborative Mode



Individual Mode



Competitive Mode



Method

Participants:

- 11- to 14-year-olds (N = 64) recruited from urban public middle schools

Measures

- Situational Interest Survey
- Patterns of Adaptive Learning Scales
- Pre- and Post Math Fluency

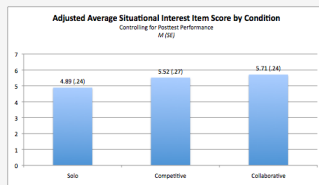
Procedure

- Randomly assigned to condition
- 15 minutes of game play

Results

Situational Interest

- Main effect for mode of play,  $F(2, 57) = 3.24, p = .05$ . Individual play was less situationally interesting than both competitive and collaborative.

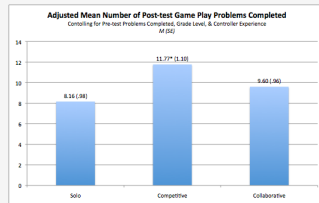


Achievement Goals

- **Mastery Goals**
  - Main effect for mode of play,  $F(2, 58) = 3.29, p = .04$ .
  - Competitive condition ( $M = 5.97, SD = 1.25$ ) caused students to endorse a stronger a mastery goal than the solo condition ( $M = 5.02, SD = 1.24$ ),  $p = .02$
  - Marginal difference between the solo and the collaborative conditions ( $p = .07$ ): those who had collaborated ( $M = 5.68, SD = 1.10$ ) adopted stronger mastery goals
- **Performance-Approach Goals**: No differences between modes of play conditions
- **Performance-Avoidance Goals**: No differences between modes of play conditions

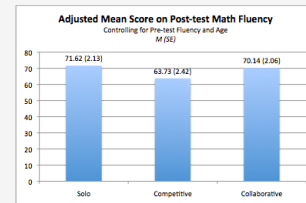
Game Performance

- Main effect for mode of play,  $F(2, 50) = 3.10, p = .05$ . Competitive play yielded better performance than individual play, though was not different from collaborative.



Math Fluency

- Main effect for mode of play,  $F(2, 53) = 3.25, p = .05$ . Individual play yielded better posttest fluency than competitive play, though was not different from collaborative.



Conclusions & Implications

- Results suggest ways in which long-term educational goals should inform design for this type of game:
  - Solo play may be better for short-term learning, but having a social element may result in greater long-term interest in playing and result in greater learning when the game is to be used over a longer period (e.g., a semester).
- Future work should examine the effects of other design factors and investigate if current effects are different for different types of games - e.g., Do discussions that are enabled by collaborative play result in better learning of more complex concepts?