To play or not to play: On the motivational aspects of serious games

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Introduction

The use of games as educational tools has gained increased interest over the last decennia. Referred to as serious games their primary purpose is to educate and train the player which differentiate them from pure entertainment games. Games are often assumed to possess an inherent motivational power through which individuals become immersed and absorbed in a game and experience the game play as enjoyable. This engaging potential of games is brought forward to argue that games are also suitable in the educational context. However, previous research indicates that the motivational appeal of games as demonstrated for entertaining computer games does not play out in the educational context.

The aim of this research is to investigate the role of different motivational forms in serious games and the influence of the game environment on students to get involved and stay involved in game playing.

Figure 1 Game 4 impression

Figure 2 Game 6 impression

Approach

Based on self-determination theory and a mixed-method research design the role of intrinsic motivation (IM), identified regulation (IR), external regulation (ER) and amotivation (AM) in seven serious games (Table 1) is determined and the influence of game attractiveness, game learning and game operativeness on these motivational forms is revealed. The data collection is conducted in two consecutive years of a postgraduate course in which the games are used. It combines observations, panel discussions, and questionnaire surveys for all games in both years.

Table 1 Overview of games investigated

No	Name	Type	Subject	Learning goal
1	GasSolution	Computer-based Single player	Building a gas network to deliver gas in a safe, reliable and sustainable manner	Understanding the complexity and trade-offs of infrastructure management decisions
2	RiskSwitch	Computer-based Single player	Increasing the reliability of railway switches	Understanding the consequences of decisions on reliability, cost, maintainability and availability of infrastructure
3	RAMSes	Computer-supported Single/Multiple player	Developing a competitive bridge design for a DBFM tender	Understanding the consequences of design decisions on the costs and risks over the life-cycle of infrastructure assets
4	HighwayStakes	Computer-based Single player	Improving the intervention strategy for a highway link	Understanding the consequences of decisions for different stakeholders involved in infrastructure intervention projects
5	AMImplementation	Computer-supported Single/multiple players	Improving a road section by taking strategic, tactical and operational decisions	Understanding the relationship between decisions on strategic, tactical and operational level of an asset management organization
6	RoadRoles	Board game Multiple players	Preparing tenders for the maintenance of a road network	Understanding the relationship between procuring road maintenance and the condition of a road network
7	BridgeGame	Computer-based Single/multiple players	Monitoring and maintaining a bridge to reduce performance risks	Understanding the relationship between infrastructure objectives, infrastructure performance, and infrastructure interventions

Results

Table 2 Motivation scores

		Game 1	Game 2	Game 3	Game 4	Game 5	Game 6	Game 7
Respondents		28	37	29	27	35	24	18
AM Score[1]	MDN	15	14	15	14	12	12	8
	IQR	5.75	6.5	8	7	7	5.75	6.25
ER Score[1]	MDN	17.5	16	17	16	15	17	13
	IQR	6	7.5	5,5	7	6	9	5.5
IR Score[1]	MDN	17	17	18	18	20	19	20
	IQR	4.75	5	5	9	4	5.75	4.25
IM Score[1]	MDN	19	17	17	17	17	20	19.5
	IQR	5	7	6	10	5	8.5	5.25
SDI Score[2]	MDN	5.5	4	3	8	13	20	28
	IQR	26.75	32	23.5	35	25	29	18.5

[1] maximum score = 28/minimum score = 4; [2] maximum score = 72/minimum score = -72

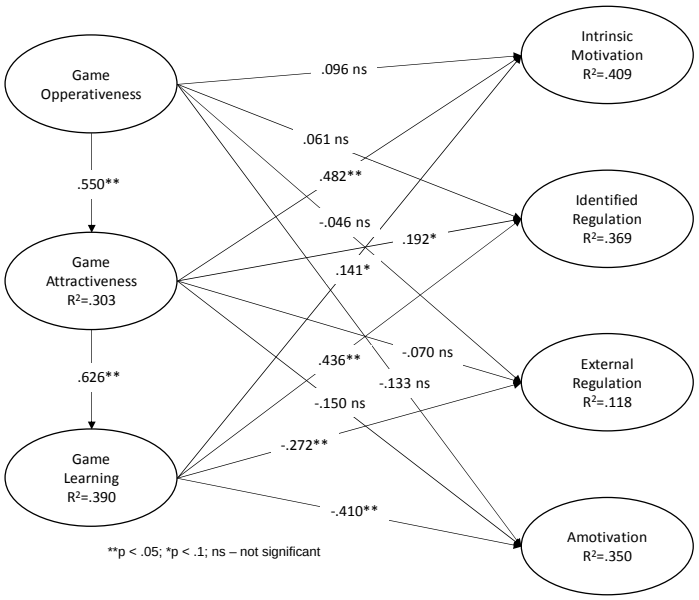

Figure 3 Motivation model estimation

Conclusion

- Different motivational forms can co-exist when students play serious games.
- The use of serious games, either computer-based or not, does not automatically lead to intrinsically motivated students in educational context.
- Game attractiveness is a driver for intrinsic motivation but not sufficient to explain the existence of other motivational forms.
- Game learning can particularly explain the emergence of different forms of extrinsic motivation.
- Game operativeness is a basis condition for serious games to unfold their challenge and engagement potential which in turn will frame the learning experience of students.
- Design and use of games for education purposes should address multiple forms of motivation and should not only focus on the game content but on operational and learning issues as well.

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