

Game-Based Assessment Literature Review

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Agenda

1. Overview of Game-Based Assessment
2. Methods
3. Findings
4. Future Recommendations
5. References

What is Game-Based Assessment (GBA)?

GBA can be defined as the utilization of game and game elements to measure individuals on certain skills and abilities (Bhatia, 2018).

Popularity has grown in research for three main reasons:

1. Technologically driven society→ four out of five US households own a video game device (ETA, 2015).
2. Education becoming independent and online (Verhaegh, et al., 2013).
3. Engagement and challenge (Lumsden, et al , 2016).

Commonly used in education, research on diagnoses and screening of disease and disability, and in business.

Method

Preliminary database search:

- PsychINFO
- PsychARTICLES

Keywords:

- “Game based assessment”
- “Game based assessment” and “cognitive ability” or “memory” or “performance” or “motor skills”
- “Game based assessment” and “education” or “disease” or “workplace”

Method cont.

Articles coded for:

1. Study Demographic Characteristics
2. Constructs Assessed
3. Research Methodology
4. Game Attribute Categories

43 potentially relevant articles

- 2 non-empirical studies
- 2 commentaries
- 1 editorial
- 1 irrelevant
- 5 review papers

32 studies coded with 47 independent samples

Study Demographics

Total number of participants = 5,652

Sample Information

- Children: $k = 18$; $N = 3,181$
- Undergraduate students: $k = 18$; $N = 1,383$
- Graduate students: $k = 1$; $N = 30$
- Adults – Non-employed: $k = 6$; $N = 251$
- Employees: $k = 4$; $N = 807$

Constructs Assessed

Construct Category	Number of studies	Number of games
Cognitive Assessment	32	22
Motor Skills	8	5
Motivation	7	6
Math knowledge	10	5
Other Content Knowledge	4	4

Research Methodology

Research Design	Number of Samples
Experimental	16
Repeated Measures	5
Correlational	21
Other	3

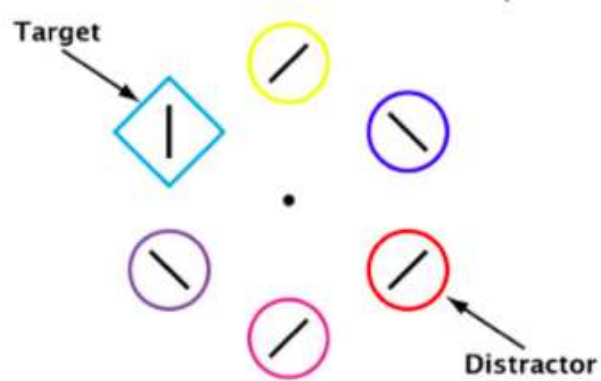
Other includes one case study, two quasi experimental

Game Attribute Categories

1. Action Language
2. Assessment
3. Conflict/Challenge
4. Control
5. Environment
6. Game Fiction
7. Human Interaction
8. Immersion
9. Rules/Goals



Number of Game Elements	Percent of Studies
1	0.00%
2	0.00%
3	3.12%
4	12.50%
5	3.12%
6	21.87%
7	15.62%
8	15.62%
9	18.75%



Future Recommendations & Conclusions

In regard to game elements:

- How individual game elements impact assessment
- What elements actually engage individuals
- How it impacts user experience

Are people using good research designs?

- Majority of studies have a correlational design
- cross sectional validation to predictive validation designs

GBA in business

- Little work has been done in an organizational setting
- Companies designing and selling games for employees are are conducting validation studies

References

- Bhatia, S.(2018). *Applicant reactions to game-based assessments: the effect of flow, fairness, and fit*. (Doctoral Dissertation). Retrieved from ProQuest Dissertations and Theses database. (UMI No. 10815411)
- Bedwell et al. (2012). Toward a taxonomy linking game attributes to learning: an empirical study. *Simulation & Gaming*, 43(6), 729-760.
- Entertainment Software Association. (2015). *Essential fact about the computer and video game industry*
- Lumsden, J., Edwards, E. A., Lawrence, N. S., Coyle, D., & Munafo , M. R. (2016). Gamification of cognitive assessment and cognitive training: A systematic re- view of applications and efficacy. *JMIR Serious Games*, 4(2), e11. [http:// dx.doi.org/10.2196/games.5888](http://dx.doi.org/10.2196/games.5888).
- Verhaegh, J., Fontijn, W. J., Aarts, E. L., & Resing, W. M. (2013). In-game assessment and training of nonverbal cognitive skills using TagTiles. *Personal & Ubiquitous Computing*, 17(8), 1637-1646. doi:10.1007/s00779-012-0527-0