**Pandemic induced remote learning increases need for mobile game-based learning to
engage learners**

Compliance with ethical standards

Conflict of interest

The author declares she has no conflict of interest, and fully complies with ETRD declaration of ethical responsibilities.

Abstract

The current global health crisis has reduced our mobility, consequently increasing the need to connect with others digitally. This brief provides a research perspective on Giannakas et al.'s (2018) manuscript, "*A critical review of 13 years of mobile game-based learning.*" To serve as a resource to educators navigating the transition to remote learning, this perspective summarizes key ideas relative to mGBL (mobile game-based learning), value of the work, application to the educator context, and limitations. Future suggestions provide a clear roadmap of ideas to continue research and development of mGBL.

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Key Ideas

The study under investigation, “*A critical review of 13 years of mobile game-based learning*” (Giannakas et al., 2018) identified strategies, characteristics, trends, and important issues to address the integration of mGBL into instruction. Framed by situated learning, constructivism, and behavioristic theories, data analysis aligned with the study’s six-dimensional framework: spatio-temporal; collaboration/social; session; personalization; data security and privacy; pedagogy.

Value of the Work

Because learning and engagement are enhanced with the addition of play (Chen et al. 2015), Giannakas et al. (2018) view mGBL as an opportunity to improve student achievement. Effective mGBL hinges on unique affordances—mobility, pervasiveness, collaboration, context-awareness, and adaptability. A concern, 23 of 36 (63.89%) included studies were single-player, even though mGBL can help foster social skills (Troussas et al., 2020). Moreover, 23 of 36 studies also failed to adopt a learning theory, despite the known benefit associated with designing mGBL when connected to a framework (Giannakas et al., 2018). Another concern not clearly identified by Giannakas et al. (2018) is that mobile platform availability is currently too broad and inaccessible, with only 3 of 36 games available on iOS.

Application

To address a sudden *shift to digital*, researchers and practitioners might consider providing secondary and higher education students with mGBL development opportunities.

Based on the collective findings of Giannakas et al. (2018), smartphones allow for uGBL (ubiquitous mobile game-based learning) and personalized instruction, an opportunity to apply mGBL research in practical educational settings. Because maintaining attention is more challenging for students in a remote setting, educators can elevate their curriculum by integrating mGBL strategies to increase student engagement. For example, when learning switched to a remote environment, pre-service teachers enrolled in one literacy course attended a **virtual screen-recorded 15-minute workshop** to learn block coding on their laptop and mobile devices, and then created a digital storybook, accessible on the web and viewable in AR (Author, under review).

Limitations

There appears to be a large initial sample of mGBL publications, with 7,340 articles retrieved in the initial search (Giannakas et al., 2018). Narrowed to include 81 studies, only 36 specifically address mGBL environments, of which 20 were conference proceedings. Additionally, consistency of the availability of apps on various platforms varied greatly.

Future Suggestions

The few studies focused on mGBL learning environments indicate the need for additional research. If social distancing guidelines persist, there will be an even greater need to connect teachers and students remotely, with AR and context-aware ubiquitous emergent technologies. The following recommendations guide future research endeavors in the areas of design, pedagogy, and impact on student learning.

Design

- The characteristic of personalization should be utilized to provide students with improved learning support (Cordova & Lepper 1996), using adaptive response features and self-paced learning modules.
- Emphasize the integration of context-aware emerging realities such as AR, QR, and cloud computing resources. This connection to the user's context allows for a more personalized and authentic connection to content.

Pedagogy

- Develop more engaging and collaborative mGBL learning opportunities, such as a digital escape room to teach curriculum content, which can increase student engagement and problem-solving abilities (Huang et al., 2020).
- Increase visual design and presentation of slides, speaker view, etc., as noted in Korving et al. (2016).

Impact

- It is important to measure the impact of mGBL on cognitive gains rather than overemphasizing the influence on affective domains, noted among 4 of 36 (4.11%) mGBL studies that assessed student learning utilizing a test.
- To focus “on knowledge to advance a given method’s ability to achieve given goals under given conditions” (Reigeluth & An, 2009, p. 370), there is a need to design larger-scale studies to measure broad impact, increase collaboration, and test for additional effects, such as students’ demographic and interest preferences. Only 4 of 36 included studies qualified as medium and none were considered large, according to Slavin and Smith (2009), who define sample sizes with less than 100 participants as small, medium between 100 and 250, and a large sample classified as more than 250 participants.

Conclusion

mGBL is gaining momentum and there is an expansive opportunity to extend mGBL research, but this research should seek to improve rather than prove impact (Reeves & Lin, 2020). In response to the pandemic and required social distancing, many researchers, educators, and IT designers are working remotely. Computer access allows for successful collaboration among these stakeholders, to investigate the future suggestions in an effort to improve the design quality and impact of mGBL. This research perspective provides a starting point to more creatively addressing remote learning, yet communities of researchers and practitioners should continue to engage in critical dialogues and sharing of resources.

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