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# Editorial: “Serious location-based games”

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## Editorial on the Research Topic “Serious location-based games”

Mobile devices and mobile internet have led to the recent emergence of location-based apps. Location-based apps evaluate the current position of the hosting mobile device such as a smartphone or a tablet for displaying and visualizing position-specific information or enabling interactions between users. Among the location-based apps that first attracted significant public attention were game apps (e.g., Ingress and Pokémon GO). While these games have entertainment as the primary goal, they are also well suited for achieving secondary goals, such as learning (Laine, 2018; Ribeiro et al., 2021) and physical activity (Althoff et al., 2016; Ellis et al., 2020; Laato et al., 2020). They can thereby also be considered Serious Location-based Games (SLGs)—understood as location-based games serving additional purposes beyond entertainment (Westerholt et al., 2020), such as learning and physical activity—as name above—or data collection and fostering teamwork or collaboration contextualized in social and cultural aspects of the game tasks. From a didactical perspective, learning-focused SLGs feature tools and characteristics that make their use as learning tools very appealing: SLGs guide learners to a real object’s location and supplement these objects explicitly or implicitly with educational information (Walker et al., 2017).

The contiguity principle is a multimedia design principle derived from the Cognitive Theory of Multimedia Learning (Mayer, 2014). It states that learning effects are reinforced by the temporal and/or spatial combination of object and information. Further principles of multimedia learning, such as signaling (i.e., the insertion of additional clues), might easily be provided through SLGs. Additionally, SLGs may serve as social interaction triggers for collaborative learning settings, such as the joint development of learning content in groups or for making decisions and achieving goals as a team. Overall, SLGs are a promising learning tool that warrants further development efforts as well as research.

Accordingly, this compact but selective article collection highlights with its heterogeneity essential facets of the design, development and application of location-based games in learning contexts. Therefore, it illustrates the power of mobile learning approaches based on the situational presentation of location-based information. Specifically, the collection explores the following themes:

The article by [Sheahan et al.](#) centers on tacit knowledge. Tacit knowledge is to be understood as informal and process-based knowledge that is developed through practice. The authors see media art as the origin of location-based games, which have advanced to the cultural mainstream, and show the possibility of conveying tacit knowledge using three different location-based games as examples. Embodiment and multisensory stimulation are seen as distinctive characteristics that make location-based games a unique informal learning experience. Overall, the study is to be seen as a clear statement of the educational potential of location-based games. Especially the socio-cultural understanding as well as the perspectives on location may be positively transformed.

Location-based experiences—here to be seen as a (reasonably) serious subform of location-based games—using augmented reality features are explored by [Merritt Davis et al.](#) They describe the development of the location-based app *AR Girls* following the four principles of stealth science, place-based education, non-hierarchical design, and learning through design. Emerging as an added strength of the app was its interdisciplinary approach, which linked technology, art, science, and communication and resulted in developing transdisciplinary skills among learners. Moreover, an outcome of the development process was a further iteration that led to a simplification of the app. Overall, the article paints a precise picture of the successful development of a location-based augmented reality app that may inspire and guide the development of different location-based experiences.

[Perry](#) presents two location-based augmented reality games developed for French as second language learners, similarly using a design-based research approach. Characteristic for the learning scenario is the distribution of points of interest for learners all over the campus: Learners interact collaboratively with characters in quests. These interactions provide learning experiences while adhering to the principles of self-directed learning. The extensive evaluations of the learning scenario highlight constructive key elements for developing serious location-based games, especially in collaborative learning contexts.

On the verge of learning experience to work support using location-based augmented reality comes the review on user acceptance of augmented reality for industrial use cases by [Quandt and Freitag](#). The basis of the review is the observation that despite multiple prototypes, the use of augmented reality tools in the industry falls short of expectations. A lack of user acceptance may be considered a significant cause. Especially in qualification measures for employees, user acceptance needs to be addressed. Game elements may also help to raise the level of user acceptance. Accordingly, a literature review examines the user acceptance of augmented reality and, in particular, the influencing factors. The review results will be integrated into future development processes for augmented reality applications in work contexts.

In closing this editorial, we would like to thank the authors for sharing the results of their compelling research within this article collection. We would also like to express our gratitude to the reviewers for their thoughtful and constructive suggestions. Finally, we truly hope that readers will experience inspiring insights and that this article collection will contribute to the further advancement of the promising field of serious location-based games.

## Author contributions

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

## Conflict of interest

Author JB was employed by BIBA—Bremer Institut für Produktion und Logistik GmbH, which is a research institute affiliated to the University of Bremen.

The remaining authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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