

Theory-informed Design of a Location-based Game for Language Learning

Donald Richardson

International Education and Lifelong Learning Institute (IELLI), University of St Andrews, UK

dr229@st-andrews.ac.uk

Abstract: Despite the considerable educational potential of location-based games for language learning, their design often lacks a robust theoretical framework. In the absence of such a basis, it is difficult to systematically determine the specific design elements that facilitate meaningful target-language use. This study explores the applicability of the Funnel Model, a grounded theory framework organised around four dimensions: affective engagement, spatial immersion, role-play, and collaboration. Originally developed through an inductive study, the model is applied here as a deductive framework to inform the design and structure the analysis of a new location-based game for learning English, *Gnomegress*. Twenty advanced learners participated in the game, using the *TaleBlazer* mobile app to trigger video-based tasks at local landmarks. Qualitative data, comprising their *written* and audio *reflections*, were analysed using deductive thematic analysis to examine the extent to which the model's dimensions influenced active language use. This is understood here as the unscripted, task-oriented use of the target language required to complete the activity. Furthermore, fifty student-produced videos were reviewed to contextualise and supplement the findings. The results indicate that learner engagement and perceived target-language production appear to be associated with the degree of alignment between the model's four dimensions. Higher levels of immersion and output were reported when tasks and the game narrative were coherently integrated with the physical location. Conversely, technical issues and weak spatial alignment occasionally interrupted the convergence of these dimensions, leading to a reduction in active language use. As a small-scale pilot study, the findings suggest that the Funnel Model offers a useful theoretical lens for the design and analysis of location-based games and activities for language learning. By using the model's four dimensions, designers may be able to refine future activities to better support target-language production in outdoor settings.

Keywords: Location-based games, EFL, Collaboration, Role-play, Theory-informed design, Mobile learning

1. Introduction

Location-based games are characterised by gameplay which evolves in response to players' locations (Avouris and Yiannoutsou 2012). A key feature of such games is that part of the activity takes place in physical space, such as finding clues, taking photographs or recording videos. Location-based games also typically make use of mobile, location-aware or augmented reality technologies to blur the boundaries between the game world and the real world (Ahlqvist 2016). This integration of physical space, movement and digital interaction makes them appealing for educational use (Squire 2009). In recent years, location-based language learning has emerged as a distinct sub-genre (Sykes 2022). Its early evolution saw a shift from an initial focus on functional navigation and technical feasibility (Ogata et al 2008) towards more narrative, augmented reality-supported interventions, as seen in projects such as *HELLO* (Liu 2009) and *Mentira* (Holden and Sykes 2011). The global impact of *Pokémon GO* in 2016 encouraged this development, and the ensuing years have seen a steady rise in the number of publications (e.g. Thorne and Hellermann 2017, Hsu and Liu 2021, Perry 2021) focusing specifically on language learning.

Despite its growth, many studies in the area are only loosely grounded in theory. A recent review by Richardson and Matthews (2025), for example, found that a substantial proportion of studies either did not explicitly draw on a theoretical framework or relied on models developed for broader educational contexts. As a result, the design of location-based games for language learning often depends on a combination of established practices and local experimentation. This makes it difficult to identify which factors are most influential in shaping learner experience and language use. The Funnel Model (Richardson 2026) represents an attempt to provide a framework for analysing and informing the design of location-based language learning activities. The current study builds on this work by exploring how the model operates in a new game context, *Gnomegress*, using it as a conceptual framework to guide the analysis of how its four dimensions are reflected in learners' accounts of their experience. This paper aims to contribute to a better understanding of how theoretically informed design principles can be applied in practice. The following research questions are explored:

RQ1: How are the four dimensions of the Funnel Model evidenced in learners' reflections?

RQ2: What contextual, technical or social factors shape how these dimensions interact during the Gnomegress activity?

2. Theoretical Framework: The Funnel Model

The Funnel Model (Figure 1) emerged from a constructivist grounded theory analysis of interviews with thirty-eight participants following the *Alien Anthropologists* activity (Richardson 2026). This iterative process identified the core components of effective location-based language learning and synthesised them into a framework conceptualised as a funnel. The model suggests that active language use, defined here as the unscripted, task-oriented production of the target language, emerges from the interplay of four dimensions: affective engagement, spatial immersion, role-play, and collaboration. These dimensions are closely interconnected in practice and frequently overlap. Visualised here as paint flowing from four separate pots, they blend within the funnel to drive the learning experience. This blending creates a functional necessity for situated language output. The intensity of the mix determines the extent to which active language use emerges. The model also incorporates a feedback loop, reflecting how active language use can reinforce each of the four dimensions as the activity progresses. In this study, the model is used as a framework to guide design and analysis rather than as a generalisable predictive theory.



Figure 1: The Funnel Model

2.1 Affective Engagement

The first dimension refers to the emotional and cognitive drivers that initiate and sustain engagement with the language. In the context of a location-based game, affective engagement is often triggered by curiosity and challenge (Malone and Lepper 2021). Because it is such an unconventional departure from traditional classroom norms, the novelty of going outside to play a game tends to grab learners' attention. Engagement is further sustained by game mechanics that require interaction, such as collecting objects or solving a mystery. These elements create a coherent experiential journey in which movement between locations is integrated with learning objectives. As a result, the game mechanics generate the clear goals and frequent feedback necessary for intrinsic motivation (Malone and Lepper 2021).

2.2 Spatial Immersion

In a location-based game, the physical environment functions as the game board. The alignment between place and the fictional narrative creates spatial immersion. Ideally, in a well-designed game, the real-world location and the game's story are an integrated experience. This concept is distinct from Slater's (2003) focus on hardware fidelity and the psychological illusion of being in a virtual space. Instead, spatial immersion in the Funnel Model describes the practical alignment of narrative and location. The environment effectively functions as a resource that helps to maintain the momentum for active language use.

2.3 Role-Play

Adopting a narrative persona acts like a protective layer for learners who might otherwise feel self-conscious using their L2 in public. In *Gnomegress*, for example, participants take on the role of “Boot Camp Protectorate” investigators. Adopting this persona provides a legitimate reason to interact and compels learners to experiment with specific registers and vocabulary relevant to their mission (Alvarez 2024). This shift in identity lowers learners’ affective filter (Krashen 1982), helping them focus less on the fear of making mistakes and more on the linguistic agility required to successfully complete the activity.

2.4 Collaboration

The collaborative nature of location-based games creates a communicative necessity for participants to negotiate shared routes and reach a consensus on collective decisions. As learners walk together, they engage in transactional communication regarding navigation and the frequent reading aloud of digital prompts (Thorne et al 2025). This environment allows them to draw on each other's linguistic strengths thereby creating a scaffolded environment where they work together to respond to emergent and unpredictable conditions in the physical environment. Such opportunities for sustained social interaction turn the target language into a functional tool for problem-solving (Sykes 2022). The collaborative process is therefore central to the Funnel Model as it maintains the momentum required for active language use even when technical or environmental challenges arise.

2.5 Active Language Use

Within the Funnel Model, the four dimensions of affective engagement, spatial immersion, role-play, and collaboration function as catalysts for active language use. The more a learner is emotionally engaged, physically immersed, playing a role or working with peers, the more likely they are to engage in meaningful language production within the game's narrative framework. The target language is thus transformed from an abstract subject of study into a functional tool. This transition creates what Thorne and Hellermann (2017 p. 727) describe as a “hypercontextualized” experience of place. Learners feel compelled to use specific vocabulary relevant to their roles as they engage in language in place to derive meaning from their surroundings and successfully complete the tasks associated with the game

3. Methodology and Context

Deductive thematic analysis (Braun and Clarke 2022) was used to examine how the dimensions of the Funnel Model could be seen in learners’ experiences during *Gnomegress*, a location-based game set in the centre of the city of Karlsruhe, Germany. The model was used as a pre-defined analytical framework to interpret the data rather than a hypothesis being formally tested for validity. A convenience sample of twenty university students from various disciplines was asked to provide written reflections in a journal. They were all participating in an intensive, pre-semester advanced English “Boot Camp” elective and the journal acted like a daily log. The reflective prompts aimed to explore how the theoretical dimensions of the Funnel Model, originally developed through the *Alien Anthropologists* study (Richardson 2026), were present in their post-game reflections.

3.1 Operation *Gnomegress*

Gnomegress was structured around three academic hours: a 15-minute technical briefing, 60 minutes of outdoor gameplay, 40 minutes for theory development, and 40 minutes for competitive presentations. To trigger affective engagement and facilitate the role-play dimension, the activity was framed as an official mission for the “Boot Camp Protectorate”, a fictional organisation tasked with investigating unusually high levels of gnome activity in the area. Groups used the TaleBlazer app to locate as many gnomes as they could in the time available (Figure 2). By recording videos related to the gnomes’ particular obsessions, students could persuade them to reveal information about why they had come to Karlsruhe. To “collect” Tristan the Traveller, for example, students made a one-minute recording describing a perfect day exploring Karlsruhe. As the gnome messages had to be “translated”, they only became available when each group returned to base (the classroom). Each group collected different gnomes with different information, so they developed competing theories. The activity culminated in a final presentation where each group tried to provide the most convincing explanation for the gnomes’ presence.

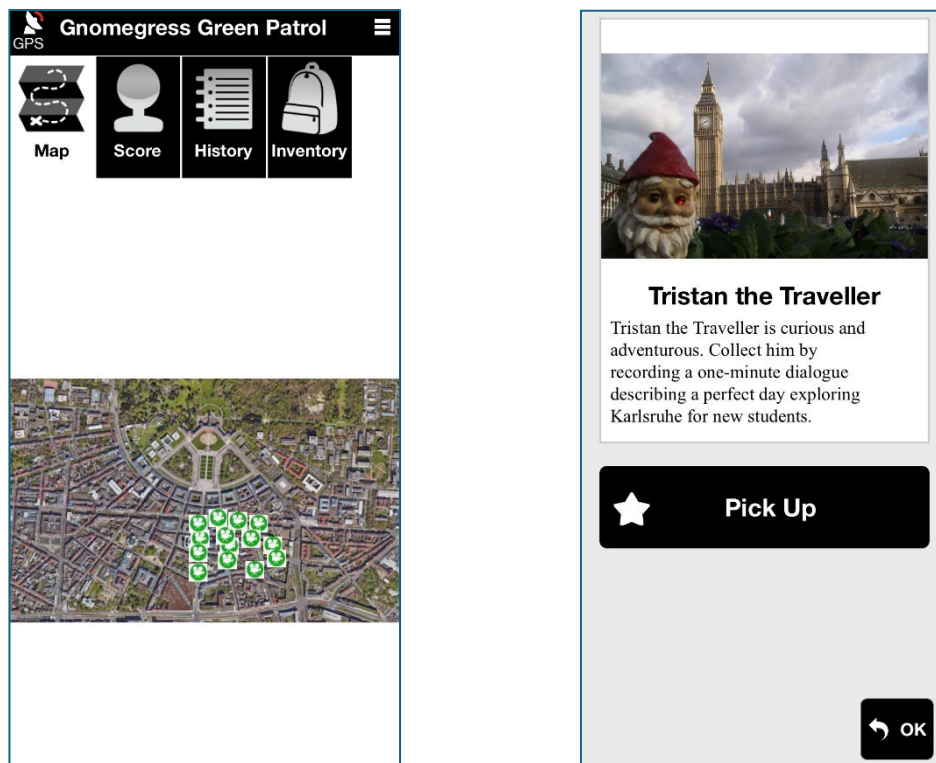


Figure 2: Gnomegress gameplay in the TaleBlazer app

3.2 Data Collection

The main source of data was the reflections students added to their personal learning journals on ILIAS, the university's Learning Management System. Following the activity, 19 of the 20 students responded to semi-structured prompts, providing either written entries ($n = 15$) or audio recordings ($n = 4$). Given the participants' advanced proficiency, reflections were produced directly in English, which reduced potential translation bias. The prompts were informed by McKim's (2023) approach to participant reflection, which views learners as experts in their own learning. They guided participants to reflect on (1) the cognitive and affective challenges of the tasks, (2) the influence of the physical setting on their communication, and (3) the extent to which the Funnel Model's dimensions aligned with their personal observations. The data were transcribed and imported into NVivo where they were analysed using the deductive thematic approach (Braun and Clarke 2022). The four dimensions of the Funnel Model functioned as the primary coding nodes. The data were first categorised according to these dimensions, followed by a second iterative cycle to identify specific patterns within each node. A colleague independently reviewed a sample of the data, and any differences were discussed and resolved to achieve standardisation in the coding process. Finally, 50 gameplay videos were reviewed as a secondary source. These recordings, ranging from improvised historical commentaries to group problem-solving, provided a practical record of how the participants applied the dimensions of the model during gameplay.

4. Findings

This section explores how learners' experiences can be understood in relation to the four dimensions of the Funnel Model (Figure 1), with findings organised accordingly. Reflective texts were anonymised and coded, and excerpts are attributed to students using identifiers (S1, S2, etc.) to ensure privacy and transparency in the analysis. The dimensions are presented in sequence, but it should be noted that students often experienced them in a more fluid way. Student reflections are supplemented by observations from the videos produced during the game.

4.1 Affective Engagement

Affective engagement was shaped by both narrative and environmental factors. Students noted positive aspects such as the "Easter egg hunt" (S2) and the "creative tasks" (S19), which "successfully managed to engage everybody" (S4). The outdoor setting was also well-received, with twelve students highlighting it as particularly motivating. It offered "a very good opportunity to get to know Karlsruhe and to discover new things" (S16). In

addition, moving away from the classroom (S3, S15) made using English feel “more natural” (S14). However, engagement was occasionally hindered by technical issues, most commonly with *TaleBlazer*, which some students described as “laggy” (S7) or “a bit outdated” (S14). Individual preferences also played a role. One participant was sceptical of games as a learning tool (S10), and another mentioned feeling uncomfortable being filmed (S15). To address this, S5 suggested using an audio-only option in future versions of the game.

Despite these limitations, the gnome narrative appeared to sustain involvement. S16 reflected that they “really liked the game - especially the overall storyline,” and S4 noted that their group “spent more time thinking about the prompts and what they could tell the gnomes” than worrying about trying to navigate the app. This investment was also reflected in several of the videos. For example, one group filmed an impromptu riddle-solving session, which involved two other groups, and another created a quick “How well do you know Karlsruhe?” quiz. To support engagement in future versions of *Gnomegress* and to strengthen the narrative structure of the activity, participants suggested introducing competitive elements (S3), further story development in the app (S13) and a common mystery to connect each group’s findings (S17).

4.2 Spatial Immersion

Student responses regarding spatial immersion were mixed. Some participants were clear that “spatial immersion definitely led to engagement and active use of English (S8)”. Walking around the city provided inspiration and ideas for what they could talk about in their videos. S7 noted that specific locations (e.g. a wine shop or a museum) forced them to “adapt” and “make up vocabularies for this certain situation”. In that sense, the game location encouraged a level of immersion a classroom cannot replicate (S10). For S3, being in this physical space acted as a trigger for “getting into the gnomes’ heads”. The effort of finding out why so many were in Karlsruhe created the emotional buy-in needed to actively use the language. In other words, the location made the story feel real and this was evident in many of the videos produced, such as one group who explained the history of a fountain, zooming in on key features as the speaker described them. In addition to this, S19 noted that the physical distance between tasks turned English into a tool for solving “real problems” like navigation, rather than just something used for “posed situations” like the video recordings. This suggests that the location encouraged more natural communication as students had to negotiate navigation and task completion.

As previously mentioned, *TaleBlazer* did not always work reliably for some groups. These technical failures prevented some students from becoming fully immersed in the game’s narrative. S3 noted that the app’s GPS settings meant that several tasks could be activated from the same place, so they “didn’t really end up using a location”. S13 added that that this was “counterintuitive to a location-based game” as it allowed groups to “reach one point and get 5 or 6 gnomes at once”. Internal inconsistencies between the narrative and the location was another aspect of *Gnomegress* that reduced spatial immersion. S6 reflected that it “would be more immersive if the different questions were about the specific locations where they were asked”. This mismatch of gnomes with locations was also commented on by S17, who described the situation of finding a travel gnome outside a sports shop: “by the time we walked to the metro to record a video, we could not collect the gnome anymore”.

4.3 Role-Play

Role-play influenced learners’ engagement and willingness to communicate. By adopting the role of “Boot Camp Protectorate” investigator, some participants felt more engaged (S17, S18). S4 noted that the role-play acted as a “gamification of sorts” that can lead to higher levels of interest and help students feel more confident even if they are naturally shy. Role-play also offered a way to participate without feeling anxious about making mistakes; S5 felt “less stressed about making mistakes” because they were “occupied doing a role-play”. Adopting a persona allowed those uncomfortable with being filmed (S9, S15) to participate by giving them a clear role to focus on. For S7, it meant they could avoid the “cringe” by “making something up” or saying “random things” to the camera. S15 pointed out that the role-play truly started with the backstory and the task of “convincing other teams that our story is the true one”. For some, like S12, the role-play was the “biggest influence” on their ability to talk about random topics, whilst S16 specifically highlighted the “overall storyline” as a key factor.

However, the role-play had clear limits when the narrative or the prompts failed. S13 felt the “role play and the emotional engagement was not so high” because the app lacked a consistent storyline, feedback, or “mysteries which we need to solve”. This had more to do with the mechanics of the game than any technical limitations with *TaleBlazer*. Furthermore, S5 noted that when tasks required too much specific knowledge, the activity “lost

this role-play character”, making it harder to stay in character. S2 reinforced this by adding: “You definitely need to be familiar with Karlsruhe to participate!”

4.4 Collaboration

Collaboration was central to how students engaged with *Gnomegress*. For S4 it was “essential” and for S12, it was a “big part”. The small-group format created a functional need for English (S18) and, for some, this extended beyond the game’s narrative. S19 observed that their group used English not only for formal tasks but also in between as they moved from one location to the next. S13’s group had to collaborate to decide “which gnome we accept and who represents which gnome”. The social dynamic of the groups also influenced the extent to which collaboration worked. S17 commented that success depends on “team members who also want to participate”, describing one peer as “prone to switching to German”. Similarly, S9 reported that their group began “talking German since we were not in a class environment anymore”. This highlights a tension between collaborative interaction and sustained target-language use, particularly in less structured moments of the activity. On the other hand, S7 described the atmosphere in their group as “relaxed” and S14 noted that “it pushed us to communicate in English without overthinking grammar or mistakes”. S4 remarked that without collaboration being part of the game, “we also wouldn’t have spoken as much”. Furthermore, S12 suggested that collaboration reinforced the effectiveness of role-play, stating that for the activity to be successful, the role-play “has to have some sort of collaboration with it”.

5. Discussion

The *Gnomegress* pilot provides an initial indication that the Funnel Model can be applied in a new game context and may offer a useful framework for the design of location-based language learning activities. The data suggest that affective engagement and role-play contribute to conditions that support active language use. The “Easter egg hunt” atmosphere (S2) and the novelty of the outdoor setting appear to have captured learners’ attention. Adopting the “Boot Camp Protectorate” investigator role provided a form of emotional distance that reduced the stress associated with public performance (S5, S14). In this sense, role-play can help create a space in which learners feel more comfortable to experiment with the target language. Spatial immersion and collaboration also appear to support language use when the environment creates a functional need for communication. Videos where students adapted their language to describe specific locations, such as outside a wine shop or in front of a fountain (S7), suggest that the physical environment can provide the raw material for interaction and make using English feel more necessary and less imposed. Collaboration played a key role in sustaining this process, particularly when learners used English to coordinate navigation and decision-making (S19). In these moments, the small-group dynamic appeared to create real-world communicative demands within the structure of the game. From this perspective, the game location functions as a key resource, offering affordances that can support opportunities for meaningful language use (van Lier 2004).

At the same time, the Funnel Model also provides a way of identifying where the design of the activity was less effective. The reported shift to German (L1) when students moved between locations (S9, S17) highlights that spatial immersion is not a constant state and depends on sustained task density and narrative continuity. When movement between locations was not supported by narrative prompts, the interaction between the model’s dimensions weakened and learners were more likely to revert to their L1. This suggests that the environment needs to be integrated more consistently into the narrative structure of the activity so that movement itself becomes part of the communicative task (Brenneman 2022).

Technical issues with the *TaleBlazer* app also affected the extent to which spatial immersion could be maintained. When problems with the app became the focus of attention for participants rather than the narrative, the “magic circle” (Huizinga 1949) was broken. However, these factors did not appear to dominate the overall experience. In fact, the data suggest that learners tended to prioritise the narrative and the task of producing videos over technical frustrations. This indicates that whilst reliable technology is important, it may not be the main driver of engagement in small-scale implementations. As Godwin-Jones (2017 p. 4) points out, “it is by no means the case that because a project involves use of a mobile app, that in itself improves its effectiveness”. Indeed, Pitura and Terlecka (2018) designed an effective game using analogue maps and volunteer agents rather than relying on augmented reality or mobile apps. It is therefore possible that, for small-scale location-based games for language learning, narrative coherence and meaningful task design may play a more central role than digital tools.

The interdependence of the four dimensions suggests that the Funnel Model is more than just a checklist of design features. It provides a way of examining how different elements of a location-based game work together

in practice. In this study, strengths in one dimension appeared, in some cases, to offset limitations in another. For example, although technical issues constrained spatial immersion for some groups, engagement with the narrative and the need to collaborate seemed to sustain participation. This indicates that the dimensions do not operate in isolation and that their effects depend on the specific conditions of the activity. The model is therefore best understood as a way of analysing and guiding design rather than as a predictive account of language learning.

6. Limitations

This study was limited by a short development timeframe and was conducted with a single cohort of twenty students. As the Funnel Model informed both the design of *Gnomegress* and its analysis, there is a risk that the deductive framework shaped the interpretation of the data towards confirming the model's relevance. Further research could explore how the framework operates in different contexts, including schools and alternative locations. In addition to this, much of the data is based on participant reflections, so it is possible that students framed their responses in ways they perceived as appropriate within a research setting. The researcher's dual role as both game designer and teacher could also have influenced how participants reported their experiences. The technical frustrations noted by some participants indicate the need for more iterative testing. *TaleBlazer* may not have been optimal for this context, and future work could explore more reliable and accessible tools, or even low-tech alternatives.

7. Conclusion

The *Gnomegress* study suggests that location-based games for language learning can benefit from a clearly articulated theoretical framework. The Funnel Model provided a useful way of examining how different elements of game design relate to opportunities for language use. The four dimensions of affective engagement, spatial immersion, role-play, and collaboration appear to have interacted in ways that shaped learners' willingness to use the target language during the activity. The findings indicate that narrative coherence and meaningful task design play an important role in sustaining engagement, particularly in situations where technical limitations are present. At the same time, the study highlights the importance of integrating the physical environment into the structure of the activity to maintain spatial immersion and support ongoing communication. Further research with larger, more diverse groups of learners is needed to explore the Funnel Model's applicability in different contexts. However, the results of this study suggest it can inform the design and analysis of activities which support language use that is tied to movement, place and interaction.

Ethics Review: This study received ethical approval from the University of St Andrews Teaching and Research Ethics Committee. Participants provided informed consent with the right to withdraw. All data were fully anonymised to ensure confidentiality.

AI Declaration: Generative AI tools were not used in the creation of the paper.

References

- Ahlqvist, O. (2016) "Location-Based Games", in Richardson, D., et al, (eds.) *International Encyclopedia of Geography: People, the Earth, Environment and Technology*, John Wiley & Sons, Ltd, Oxford.
- Alvarez, C. (2024) "The Impact of Role-Playing Exercises on Conversational English Proficiency among University Students: A Study in Linguistic Confidence and Fluency Enhancement", *Research Studies in English Language Teaching and Learning*, Vol 2, No. 2, pp. 66-74.
- Avouris, N. & Yiannoutsou, N. (2012) "A Review of Mobile Location-based Games for Learning across Physical and Virtual Spaces", *Journal of Universal Computer Science, Special issue on Technology for learning across physical and virtual spaces*, Vol 18, No. 15, pp. 2120-2142.
- Braun, V. & Clarke, V. (2022) *Thematic analysis: a practical guide* SAGE, London.
- Brenneman, J. (2022) "Aligning Game Narrative and Learning Outcomes", *International Conference on Meaningful Play*, pp 1-27.
- Godwin-Jones, R. (2017) "Smartphones and language learning", *Language Learning & Technology*, Vol 21, No. 2, pp. 3-17.
- Holden, C. L. & Sykes, J. M. (2011) "Leveraging mobile games for place-based language learning", *International Journal of Game-Based Learning* Vol 1, No. 2, pp. 1-18.
- Hsu, K.-C. & Liu, G.-Z. (2021) "Investigating effects and learners' perceptions of a student-led, AR-based learning design for developing students' English speaking proficiency", *International Journal of Mobile Learning and Organisation*, Vol 15, No. 3, pp. 306-331.
- Huizinga, J. (1949) *Homo Ludens: A Study of the Play-Element in Culture*, Routledge & Kegan Paul, London.
- Krashen, S. D. (1982) "Principles and practice", *Learning*, Vol 46, No. 2, pp. 327-69.

- Liu, T. Y. (2009) "A context-aware ubiquitous learning environment for language listening and speaking", *Journal of Computer Assisted Learning*, Vol 25, No. 6, pp. 515-527.
- Malone, T. W. & Lepper, M. R. (2021) "Making learning fun: A taxonomy of intrinsic motivations for learning", in Snow, R. E., et al, (eds.) *Aptitude, learning, and instruction*, Routledge, New York.
- McKim, C. (2023) "Meaningful member-checking: A structured approach to member-checking", *American Journal of Qualitative Research*, Vol 7, No. 2, pp. 41-52.
- Ogata, H., Hui, G., Yin, C., Ueda, T., Oishi, Y. & Yano, Y. (2008) "LOCH: Supporting mobile language learning outside classrooms", *International Journal of Mobile Learning and Organisation*, Vol 2, No. 3, pp. 271-282.
- Perry, B. (2021) "Gamified Mobile Collaborative Location-Based Language Learning", *Frontiers in Education*, Vol 6, No. 689599, pp. 1-15.
- Pitura, J. & Terlecka-Pacut, E. (2018) "Action research on the application of technology assisted urban gaming in language education in a Polish upper-secondary school", *Computer Assisted Language Learning* Vol 31, No. 7, pp. 734-763.
- Richardson, D. (2026). *Alien Anthropologists: A Constructivist Grounded Theory Study of Learner Experiences in Location-Based Language Learning*. Manuscript under review.
- Richardson, D. & Matthews, B. (2025) "Location-based games for language learning: A scoping review", *Research Synthesis in Applied Linguistics*, Vol 1, No. 2, pp. 1-32.
- Slater, M. (2003) "A Note on Presence Terminology", *Presence Connect*, Vol 3, No. 3, pp. 1-5.
- Squire, K. (2009) "Mobile media learning: multiplicities of place", *On the Horizon: The International Journal of Learning Futures*, Vol 17, No. 1, pp. 70-80.
- Sykes, J. M. (2022) "Digital place-based learning", in Ziegler, N., et al, (eds.) *The Routledge handbook of second language acquisition and technology*, Routledge, New York.
- Thorne, S. & Hellermann, J. (2017) "Mobile Augmented Reality: Hyper Contextualization and Situated Language Usage Events", *XVIII International CALL Conference*, pp 721-730.
- Thorne, S. L., Sykes, J. & Holden, C. (2025) "Mobile Augmented Reality (AR) for Language Learning", in Mccallum, L., et al, (eds.) *The Palgrave Encyclopedia of Computer-Assisted Language Learning*, Springer Nature Switzerland, Cham.
- van Lier, L. (2004) *The ecology and semiotics of language learning: A sociocultural perspective*, Springer, New York.