

# Playful and Gameful Learning in a Hybrid Space

Sylvester Arnab<sup>(✉)</sup>

Disruptive Media Learning Lab, Coventry University, Coventry, UK  
s.arnab@coventry.ac.uk

**Abstract.** There is a need to harness the potential of a hybrid space in teaching and learning as digital and physical experiences are merging and it is essential that the experience empowers the minds and practices, bridges formal and informal contexts and deepens the learning process. This paper elaborates on the playful nature of the use of games and gamification in creating contexts to a pervasive learning process including the Horizon 2020 Beaconing project as an example.

**Keywords:** Serious games · Gamification · Playful learning · Pervasive learning

## 1 Introduction

Key to reducing the barriers of time and physical space in learning is to open up education in such a way that formal and informal learning contexts, and digital and physical experiences are blended – a hybrid learning space. Exploiting current advances in digital technologies allow for learning processes to be better situated in a learner’s context, needs and surroundings, where many different forms of learning experience can be combined in working toward the desired learning outcomes. Learning should be pervasive in order to exploit the values different learning preferences, environments and contexts can collectively bring into the experience.

This paper touches on the need to support learning in a hybrid space, specifically the initiative within the Beaconing project funded by the European Horizon 2020 programme. The pervasive nature of anytime-anywhere learning investigated in the project aims to provide an avenue for self-regulated learning to be nurtured, where the role of learners will be amplified in the process of knowledge curation, application and sharing framed under investigative, collaborative and exploratory scenarios.

## 2 Learning Experience in a Hybrid Space

Recognition of informal learning as an extension to formal methods is an important means for promoting anytime anywhere and lifelong learning and, subsequently, for reshaping learning to better match the needs of the 21st century knowledge economies and open societies. To support this extension, it is important for educational institutions to evaluate and possibly re-design how formal spaces are being used in teaching and

learning and how digital platforms can help facilitate delivery, application and assessment of learning in informal context.

Through the years, digital platforms ranging from e-learning and simulation platforms to game-based learning and mobile applications have provided alternative means for the way learning contents are being delivered. The inclusion of digital tools in learning has to be holistic as the learning experience may focus too much on digital and virtual activities, which could lead to disparities between virtual/digital and real capabilities [1, 2], confidence and self-awareness.

Therefore, there is a need to harness the potential of a hybrid space in teaching and learning. Digital and physical experiences are merging, and it is essential that the experience empowers the minds and practices, and deepens the learning process. With the advancement of Internet of Things (IoT), wearable technologies, mobile and mixed reality, a more hybrid and connected experience and space can be designed and developed. Moreover, as the discipline of seamless learning merges the technological and human challenges faced by the emerging new technologies of the last decade, it is becoming clear that the ultimate learning environment will have to provide a smooth learner experience, with options to both consume and create content [3] in both formal and informal setting. A more sustained and seamless engagement is a key challenge that needs to be addressed in the design of such an environment.

### 3 Playful and Gameful Learning

Play is key to intrinsically expanding and broadening our embodied experience with our surroundings, fostering autonomy and freedom. It is an exploratory and experiential means for incrementally, iteratively and continuously updating our understanding and interpretation of the various concepts, objects, people, emotions and the mapping between these variables [4, 5]. It is a complex process that is difficult to decode and measure. We are however in the world where almost everything is measured and within the context of education, measures and assessments are key to ensuring that the learning process leads to the desired learning outcomes and some forms of certification.

With these perspectives, for play to be included in learning to increase motivation intrinsically, it will have to be more structured and “formal”, adhering to the play-learn rules and associated measures. How do we design this playful and gameful experience without making it too restricting and to allow the feedback cycle to be as natural as possible so that it may add to the “play” experience? *“This shouldn’t be construed as a claim that “everything is a game.” Games are a particular manifestation of play, not its totality. They happen to be a good starting point for an investigation of play because the formality of their rules makes the machinery of play easier to observe and analyse”* [6]. Hence, games are a means by which play can be observed in a more objective way, which will lead to purposeful and meaningful engagement.

The increasing use of games in non-entertainment contexts, also known as Serious Games (SG) is transforming everyday lives and most importantly injecting more fun in everyday contexts [7]. The power of games to immerse and motivate [8, 9] and the capabilities of games to foster and facilitate cognitive gain, awareness, and behavioral change have encouraged more games of this nature to be developed within a research

context as well as to be deployed in real application settings. There is also an increasing use of games techniques in non-game contexts known as Gamification [10], which demonstrated potential impact in improving engagement, nurturing attitude and behaviour, and facilitating learning in a wide range of subjects [11].

## 4 Pervasive Games and Gamification

The diminishing boundaries between physical and digital spaces provide great opportunities for game-based learning approaches (serious games and/or gamification) to be applied in everyday contexts. Game mechanics are becoming more pervasive as real and virtual interactions and events are merged within the context of game-play.

Advances in ubiquitous computing, mobile and location-based technologies open up opportunities for digitally-enabled learning to be facilitated in everyday spaces, increasing flexibility for learning experience to be made more engaging, contextualized and seamless. With game-based learning in mind, potentials include educational games taking place in the physical world, concurrently with the normal activities of learners' everyday lives, where virtual actions may be the trigger for physical actions in the real world and vice versa [12]. Ubiquity is expanded by context awareness, a term that *“describes the ability of the computer to sense and act upon information about its environment, such as location, time, temperature or user identity”* [13]. This information can be used to enable selective responses such as triggering events or retrieving and prompting information relevant to the task at hand. This affords virtualisation, which provides a more seamless means to link formal and informal learning approaches, and blend digital and physical learning mechanics. Example games adopting such a pervasive approach, which can be used as inspirations for a more playful and pervasive learning process include Zombies Run<sup>1</sup> - an adventure location-based mobile game that advocates running and Ingress<sup>2</sup> and PokemonGo – pervasive games that transform local landmarks into game objects in a viral and global gaming.

## 5 Exploring Pervasive and Gamified Learning via Beaconing

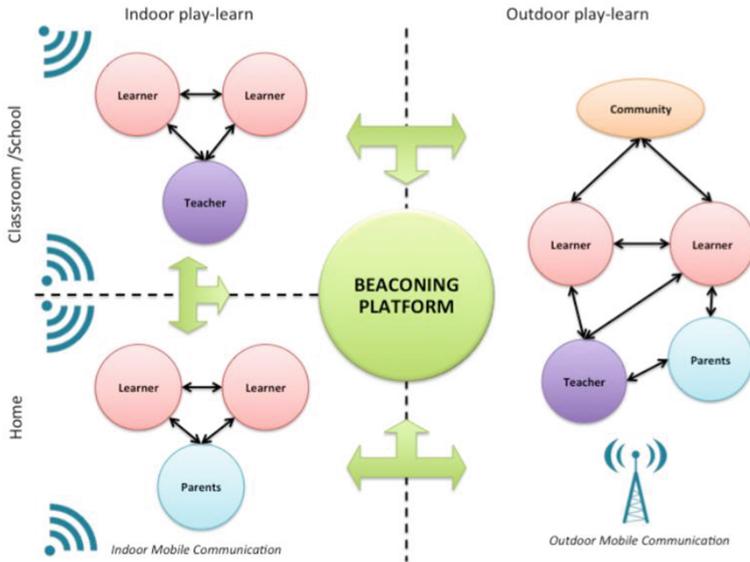
By further investigating how learners use the different spaces for learning, how to exploit learners' preferences for enhancing the use of digital platforms and the potential of gamification, pervasive gaming and context-aware technologies in enhancing a blended learning process, the expected benefits of blended spaces and contexts can be optimised.

The Beaconing project (beaconing.eu) funded by the European Commission Horizon 2020 programme investigates playful approaches for digitally enabling play-learn in everyday spaces fostering cross-subject learning. Figure 1 illustrates the pervasive learning concept that will be supported by the play-lesson plan.

---

<sup>1</sup> <https://www.zombiesrungame.com/>.

<sup>2</sup> <https://www.ingress.com/>.



**Fig. 1.** Beaconing conceptual ecosystem

Learning with a classroom setting is expanded into the outdoor including personal spaces at home, which will provide support from the seamless transition from formal to informal contexts and vice versa. The key challenge for this approach is the feasibility of tracking meaningful measures and indicators for performance of informal learning activities. One of the mitigation strategies is to apply the Beaconing approach as part of the “homework” to complement the formative and summative assessment approach already implemented by the participating schools in Europe.

The holistic approach focuses on the pedagogy of Problem-Based Learning [14] in structuring learning and the relevant measures based on the mechanics of levelling up missions with associated quests. Figure 2 illustrates the taxonomy of a mission within the play-lesson plan. There will more than one mission per lesson plan, which will connect learning carried out in the different contexts and spaces.

The approach aims to increase flexibility for learners aligning with CEDEFOP’s recommendations - “*the importance to Europe of a skilled and knowledgeable citizenry extends beyond formal education to learning acquired in non-formal or informal ways*”<sup>3</sup>. Beaconing will implement and evaluate the mechanism for proactive discovery and learning in large-scale pilots, offering real benefits for teaching, where they have the potential to enable active pedagogy through physical and contextual immersion of learners, “in situ” information while practicing within authentic context.

<sup>3</sup> <http://www.cedefop.europa.eu/en/events-and-projects/projects/validation-non-formal-and-informal-learning>.

<p><b>Mission A (Title)</b></p> <p>Basic introduction to the core issues of the Learning Path, followed by indoor activities (e.g. in school grounds).</p> <p><i>Background</i></p> <p>Specify here the background knowledge needed to meaningfully engage students with this mission.</p> <p><i>Skills</i></p> <p>Specify here the skills that students will gain.</p>	<p><b>Quest 1</b></p> <p>Aims</p>	<p><i>Brief overview of Quest 1 activities. At this starting level, the aim is to provide basic links between real world contexts and subject theory, while consolidating them into a shared ground.</i></p>					
		<p><b>Time Frame</b></p> <p>Specify the time frame for this quest.</p>	<p><b>Participants</b></p> <p>Specify the participants for this quest.</p>	<p><b>Location(s)</b></p> <p>Specify the location for this quest.</p>	<p><b>Resources</b></p> <p>Specify the available resources for this quest.</p>	<p><b>Evidence</b></p> <p>Specify the required evidence for this quest.</p>	<p><b>Rewards</b></p> <p>Specify the rewards for this quest.</p>
	<p><i>Brief overview of Quest 2 activities. At this level, the aim is to move outside the classroom, providing a first spatial expansion of learning activities while still keeping students in a controlled environment.</i></p>						
	<p><b>Quest 2</b></p> <p>Aims</p>	<p><b>Time Frame</b></p> <p>Specify the time frame for this quest.</p>	<p><b>Participants</b></p> <p>Specify the participants for this quest.</p>	<p><b>Location(s)</b></p> <p>Specify the location for this quest.</p>	<p><b>Resources</b></p> <p>Specify the available resources for this quest.</p>	<p><b>Evidence</b></p> <p>Specify the required evidence for this quest.</p>	<p><b>Rewards</b></p> <p>Specify the rewards for this quest.</p>

Fig. 2. Beaconing Play-Lesson Path Taxonomy

## 6 Conclusions

There are still studies and investigations that need to be carried out on the mapping between the autonomy of play, the formality of games, the desired serious outcomes and the individual needs of the target audience, which could transform ordinary activities into extraordinary experiences. Motivated by the need to merge formal/informal and digital/physical contexts and spaces, there is a potential impact that can be achieved through pervasive play-learning in everyday spaces. The hybrid-ness of space and contexts afforded by the advancement of technologies, such as the IoT will supersize the playful and gameful experience. Games and gamification are the instruments that can help to formalise and structure the experience to create context, narrative, process and assessment for the experience and the Beaconing project amongst other initiatives within the domain are investigating the potential to support anytime anywhere learning in real operational environments aiming to provide a blueprint and tools for pervasive learning to be facilitated in an engaging, seamless and sustainable manner.

**Acknowledgement.** This work has been co-funded by the EU under the H2020 Beaconing project, Grant Agreement nr. 687676.

## References

1. Warburton, S.: Second life in higher education: assessing the potential for and the barriers to deploying virtual worlds in learning and teaching. Br. J. Educ. Technol. **40**(3), 414–426 (2009)

2. Arnab, S., Petridis, P., Dunwell, I., de Freitas, S.: Enhancing learning in distributed virtual worlds through touch: a browser-based architecture for haptic interaction. In: Ma, M., Oikonomou, A., Jain, L.C. (eds.) *Serious Games and Edutainment Applications*, pp. 149–167. Springer, London (2011). ISBN: 978-1-4471-2160-2
3. E-Learning Guild, *Seamless Learning: Forget MOOCs, Mobile Learning, and Ubiquitous Access*. Learning Solutions Magazine (2014)
4. Pramling Samuelsson, I., Johansson, E.: Play and learning—inseparable dimensions in preschool practice. *Early Child Dev. Care* **176**(1), 47–65 (2006)
5. Broadhead, P., Howard, J., Wood, E. (eds.): *Play and Learning in the Early Years: From Research to Practice*. Sage, Thousand Oaks (2010)
6. Upton, B.: *The Aesthetic of Play*. MIT Press, Cambridge (2015)
7. McGonigal, J.: *Reality Is Broken: Why Games Make us Better and How They Can Change the World*. Jonathan Cape, London (2011)
8. Rooney, P.: A theoretical framework for serious game design: exploring pedagogy, play and fidelity and their implications for the design process. *Int. J. Game Based Learn.* **2**(4), 41–60 (2012)
9. Arnab, S., Brown, K., Clarke, S., Dunwell, I., Lim, T., Suttie, N., Louchart, S., Hendrix, M., de Freitas, S.: The development approach of a pedagogically-driven serious game to support relationship and sex education (RSE) within a classroom setting. *Comput. Educ.* **69**, 15–30 (2013). Elsevier
10. Deterding, S., Khaled, R., Nacke, L., Dixon, D.: Gamification: toward a definition. Presented at the Computer Human Interaction, CHI 2011, Vancouver, British Columbia, Canada. ACM (2011)
11. Hamari, J., Koivisto, J., Sarsa, H.: Does gamification work? – A literature review of empirical studies on gamification. In: *Proceedings of the 47th Hawaii International Conference on System Sciences*, Hawaii, USA (2014)
12. Jantke, K.P., Spundflasch, S.: Understanding pervasive games for purposes of learning. In: *5th International Conference on Computer Supported Education, CSEDU 2013*, pp. 696–701 (2013)
13. Schmidt, A.: Context-aware computing: context-awareness, context-aware user interfaces, and implicit interaction. In: Soegaard, M., Dam, R.F. (eds.) *The Encyclopedia of Human-Computer Interaction*, 2nd edn. The Interaction Design Foundation, Aarhus (2014)
14. Savin-Baden, M.: *Facilitating Problem-Based Learning*. OUP, Buckingham (2003)



<http://www.springer.com/978-3-319-51054-5>

Serious Games, Interaction and Simulation  
6th International Conference, SGAMES 2016, Porto,  
Portugal, June 16-17, 2016, Revised Selected Papers  
Vaz de Carvalho, C.; Escudeiro, P.; Coelho, A. (Eds.)  
2017, XIV, 157 p. 54 illus., Softcover  
ISBN: 978-3-319-51054-5