Work-in-Progress: Assessing the Feasibility of Playtesting Video Games Using Immersive Technologies as a Learning Method

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Abstract. This paper assesses the feasibility of playtesting video games using immersive technologies as a method to support learning games development. It presents a study where university students and professional game developers collaborated in playtesting video games under development as part of the learning outcomes of their course. Data was collected investigating students' perceptions of the effectiveness of playtesting as a learning method, the immersiveness of the experience, its value to learning, and to their professional awareness. The results of this research indicate that using video games and immersive technologies to support learning has promising potentials when utilised meaningfully and structured accordingly to meet specific learning objectives.

Keywords: Immersive Technologies, Immersive Learning, Playtesting, Games Development, Virtual Reality, Mobile Games.

1   Introduction

The use of immersive technologies to produce high-fidelity visual experiences that blur the line between real and digital spaces has been widely used in a plethora of domains recently [1]. Especially during the Covid-19 pandemic where the reliance on technology introduced a new norm in everyone's life, which was then followed by the introduction of the Metaverse concept of a digital life in a persistent virtual universe that facilitates interactions between real and virtual worlds, humans, and artefacts [2]. This sudden and unguided shift to a digital-dependent lifestyle has greatly accelerated the digital transformation of society, with the widespread adoption of XR and other digital interactive technologies i.e. VR, AR, MR mobile and 3D virtual worlds, and 360 videos among others [3]. The field of education is one of the areas of applicability that drew significant interest over the past few years, where teachers and academics have been leveraging the affordances of XR to offer opportunities for engaging students in immersive learning experiences [4]. The efficacy and impact of XR in education are well researched and documented in the literature, enabling to experience learning in engaging and interactive ways [5].

However, a particular area that requires more studying is gaming using immersive technologies for educational purposes.

2   Background and Context

The use of video games to support education is one of the many digital teaching methods on the educators' toolkit that can be used to create alternative interactive educational experiences to engage students in the learning process.

However, this is an area that lacks empirical evidence, as research on the effects of video games for learning are still understudied and require further investigation [6]. The most commonly used method to support gamified educational approaches is through serious games, where the learner/player builds knowledge, practice skills through various tasks during the gaming process, and obtains rewards [7]. The impact of serious games in educational context have been the focus of extensive research for the past 20 years, as an alternative learning method to engage students [6]. However, while serious games have been integrated in multiple disciplines with great success over the years, these do not generate the same level of interest as entertainment video games, which are extremely popular among young audiences [6]. There are multiple ongoing discussions around the impact of

playing games for entertainment and for education, with several studies identifying positive and negative effects (see review in [6]), and it is beyond the focus of this paper to discuss them in further detail. The acceptance of video games as an educational tool largely relies on the perspectives and opinions of the involved parties and towards the educational value of the games [8]. Several studies indicate that entertainment video games can be as effective as serious games and have the potential to be effective educational tools [6]. Building on this argument, this paper aims to investigate the use of gaming using immersive technologies through targeted implementation to meet specific learning objectives. In particular, the study is using video games to teach important game development concepts to university students, by embedding the gaming element as part of playtesting video games under development.

Playtesting is an important stage in the game development lifecycle, and a popular evaluation method employed for testing games against their mechanics, rules and design among many other factors before the game's public release [9]. Along the lines of playing games to learn and using immersive technologies in education, this study aims to initially assess and investigate the extent to which playtesting video games using immersive technologies can be an effective method to support learning games development.

3   Research Methodology

As part of a collaboration framework on knowledge transfer between the University of Central Lancashire, Cyprus (UCLan Cyprus) and Wargaming (wargaming.net), undergraduate game development students and professional game developers collaborated in playtesting two video games under development for technical feedback. Wargaming is an award-winning online game developer and publisher, and one of the leaders in the free-to-play Massively Multiplayer Online game (MMO) market delivering authentic gaming experiences and services across multiple gaming platforms.

The focus of the playtesting was for students to learn the importance of playtesting in the process of games development, understand the value of players' feedback during development, be exposed to methods of data collection used by a professional game studio, review and critically evaluate games under development, increase their professional awareness and connect them with the industry. To conduct this study, two playtesting sessions have been organized focusing on: 1) students to provide feedback to developers to aid the design and development of the specific games; 2) students to understand the mechanics of the games, reinforcing the learning that is taking place as part of their course learning outcomes. During playtesting, students were tasked by the course tutors to investigate game balance, pace, challenge, artificial intelligence (AI) and Non-Playing Characters (NPC) behaviour.

3.1   Data Collection Instruments

To collect data for this study, quantitative and qualitative data collection instruments have been developed by the authoring team. A post-playtest questionnaire evaluating students' learning experience has been developed (Table 1), comprising of 18 items and organized into 4 main categories namely: Playtesting (PT), Learning Experience (LE), Professional Awareness (PA), and Collaboration (COL). The questionnaire aimed at investigating the overall experience of both playtesting activities, focusing on students understanding of playtesting in the process of games development (PT), their learning experience during the activities (LE), the impact of these activities on their professional awareness (PA), and the collaboration between students and the developers (COL). The questionnaire used the Likert scale format ranging from 1 (strongly disagree) to 7 (strongly agree) and was administered after both playtesting activities were completed.

Focus group interviews to collect students' opinions on the experience and the value of these activities to their overall immersive learning experience were also prepared. The focus was on 1) students' perceptions of playtesting as a learning method, 2) the use of immersive technologies during playtesting and the degree of added value to their learning, 3) and their overall learning experience. The focus group sessions took place after the end of the playtesting activities. Similarly, the questionnaires were administered at the end of the second playtesting activity. Prior to interacting with any of the study materials and the games, students had to review participation information sheets and consent to their data being collected by the game studio and from the authors of this study, as well as to review and sign individual Non-Disclosure Agreement (NDA) with the game studio. This is a standard practice of commercial game studios to safeguard their intellectual property.

4 Learning Through Playtesting

4.1 Mobile Videogame Playtesting

For the first activity, students playtested a mobile game under development and provided feedback to the developers on specific elements of the prototype. The learning aim of this session was to understand the game mechanics and study the behaviour of the in-game AI and NPC, matching the learning outcomes the modules students are undertaking. The session took place at the premises of UCLan Cyprus. Researchers from Wargaming were paired with 10 students in two sessions, that lasted 90 minutes each. At the beginning of each session, each student was allocated a mobile device with the game preinstalled. Students completed a series of tasks and tested several game functionalities, and at the end they were asked to play the game without interruptions for 15 minutes. The game studio experts were collecting data throughout the playtesting.

4.2 Virtual Reality Videogame Playtesting

The second playtesting activity was a VR video game under development, but without the presence of the development team, as it was remotely located. The activity included playtesting the game, and students to read specifically designed educational materials produced for them by the developers. The playtesting took place at the premises of UCLan Cyprus, and in the physical absence of the team, it took place under the supervision of the authors of this paper after coordinating the procedures with the developers. As part of the learning aim of this session, students were tasked to identify and critically evaluate gameplay mechanics, resources management, the visual components of the game, and NPC behaviour. This activity included the total participation of 13 students (the same 10 students who participated in the mobile playtest and 3 new students). Students were administered a VR headset, and playtested the game for 45 minutes. Upon completion of the playtest, educational documents produced by the development team were given to students to educate them about the data collection methods, the value of playtesting during the game development stage, and the rationale behind the questionnaire development.

At the end of this activity, students were administered the post play questionnaire reported in Table 1. Two focus group sessions were then organized on a different day.

5 Results and Discussion

The post-playtesting questionnaire results were analyzed using descriptive statistics and are presented in Table 1, from the overall participation of 13 students (12 male, 1 female, between 19-25 years old). The results of each individual item have been investigated first, followed by grouping and reporting the average for each related category. The results revealed that students understood the value and importance of playtesting in the development process (PT, M=6.26, SD=.54), and positively evaluated the playtesting method to support their learning experience (LE, M=6, SD =.61). Collaborating with professionals was positively perceived (COL, M=5.94, SD=.29), and participating in these activities contributed to their professional and awareness (M=5.85, SD=.99).

Table 1. Playtesting Experience Questionnaire Results

	M	*SD*
I understood the value of the playtesting method in the process of games development [PT].	6.15	.69
I can relate this playtesting activity to learning outcomes on my course [LE].	6.38	.77
Playing a game under development reinforces what I am being taught [LE].	6.00	.91
I found the playtesting method as a very important step in the game development process [PT].	6.62	.77
I have learned a lot from this activity [LE].	5.92	.64
I feel I can critically evaluate multiple aspects of the game [LE].	5.38	.77
The evaluation questions issued by the development team were very interesting [LE].	5.77	1.23
I feel that playtesting a real game helps my learning [LE][PT].	5.92	.76
Playtesting a real game as a learning activity makes teaching more interesting [LE][PT].	6.38	.77
I could not see the relevance of this playtesting with what I am learning on my course [LE].*reversed	6.46	.78
My awareness of professional games development was increased [PA].	5.69	.85
Being part of this playtesting session made me feel more involved with the professional domain [PA].	5.85	.99

Going through the post-playtest questionnaire helped me identify issues I didn't think about before [LE].	5.92	1.11
The questionnaire enabled me to get a good idea of what to look for when developing a game [LE].	5.77	1.36
I have learned a lot by reading the playtesting justification rationale from the lead developer [COL].	6.15	.69
Working with the creative research team was a useful experience [COL].	5.89	.33
I had good communication with the creative research team [COL].	5.89	.33
I was able to express my feedback easily to the creative research team [COL].	5.67	.71

The data collected during the post-playtest interviews was then examined through thematic analysis for identifying themes of common occurrence. The data was collected through two focus group sessions with the overall participation on 8 students (1 female and 7 male). Students' perceptions of playtesting as a learning method were perceived very positively indicating that the activities were engaging and perceived them as an enjoyable alternative method to support their learning experience, applying theory in practice. Students appreciated the importance of playtesting during development, and positively commented on the ability to interact and learn how targeted playtesting can be used to collect feedback to improve the game.

"I found it [playtesting] very helpful since it made me understand how important playtesting is when you are developing a game. It's not just playing the game, its targeted on what you as the developer want to find out"

Engaging in playtesting activities in collaboration with a game studio was found helpful to learn professional practices, connect with the industry, develop an understanding on processes involved in commercial games development, and get a feeling of how development teams' work.

"It was great to see how professional game developers are collecting feedback and what they focus on during development… it helped undestanding the process by seeing the people who were actually developing the game, get to ask them questions and give them feedback directly"

The on-site physical collaboration with the developers was perceived more positively and meaningful compared with the remote team due to the in-person interaction. However, students appreciated that remote playtesting is a viable method for reaching playetesters by minimizing geographical barriers.

"Working together with the developers was a great experience… see how they work, what they look for, and it was more interactive. But I can understand how remote development works, and it was a great experience to get to give detailed feedback through questionnaires, and also reading about the development decisions justifications by the developers"

The use of immersive technologies and the meaningfulness of the experience were then discussed. Students positively commented on the use of mobile and VR, identifying them as immersive, engaging and interesting methods to support their learning experience. Students suggested that the playtesting sessions contributed towards their overall learning, and that such a method is effectively supporting the learning outcomes of the course.

"We got to identify things we talk about in class, and see them in practice, and on the actual devices, instead of using emulator software."

Students expressed positive perceptions towards their overall learning experience both through engaging in the playtesting activity and also by using VR and mobile technologies. Students appreciated that gaming with the intention to learn is a very engaging way to support their learning activities, identifying it as fun and engaging.

"I feel like I learned a lot from this experience… you hear about it [playtesting] and now you have a good idea of how it works, also how to structure a questionnaire, and how it feels when you are under NDA... It was very engaging, gaming to learn was so much fun!"

6   Conclusion and Future Work

This study was set out to initially assess the feasibility of playtesting video games using immersive technologies as a method to support learning games development. The results indicate that playtesting video games as part of educational activities has the potential to be an effective way to support immersive learning. Playtesting using VR and smartphone mobile devices was found engaging and interesting, helping students to focus on the tasks at hand,

and experience alternative learning methods that are complementing their learning experience. Organizing playtesting activities together with a professional game studio was perceived as an exciting way to connect students with the industry, enabling them to collaborate with professionals in meaningful activities, helping to raise students' professional awareness, understanding the importance of playtesting and to experience professional practices. Employing immersive technologies and playtesting video games as part of the learning activities can further help to create non-traditional interactive experiences for students, through enjoyable and meaningful engagement with both the technology and software under development. This can offer opportunities for building creative and interactive social activities around gaming during learning, for example, students to engage in collaborative playtesting, participate in collaborative educational challenges through video games, and other activities.

The work presented in this paper, while at its early exploratory stages, is contributing to existing efforts of implementing video games to support academic learning as identified in [6], adding value to a pool of already identified promising results, and exploring the applicability of such learning method to the domain of games development education. It also contributes towards efforts of connecting academic with professional organizations for utilizing video game technologies for research, teaching and learning purposes, as demonstrated by [10], as additional example of an effective and beneficial collaboration between an academic institution and a professional game studio.

This study was conducted with a small sample and data collection instruments that their reliability and validity must be tested, therefore the results are not claiming any generalization at this stage. However, the results can serve as initial indication of how playtesting using immersive technologies can be an effective learning method when utilised meaningfully and structured accordingly to serve pedagogical requirements. Practitioners, educators and researchers can follow similar approaches to enable students to experience a key technique in the game development life cycle, reinforcing their learning by gaming through immersive and interactive activities. Future work to evaluate the effectiveness of this method though engaging students in additional immersive playtesting learning activities using XR technologies is under way, investigating learning outcomes and engagement during the activities using several subjective measures.

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