

Understanding the Success of Pokémon Go: Impact of Immersion on Players' Continuance Intention

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Abstract. Pokémon Go (PG) is one of the most successful mobile games in recent history. The uniqueness of PG appears to be its combination of augmented reality (AR) and location-based gaming. In the game, players use a mobile device's positioning capability to locate, capture, and battle the in-game creatures (called Pokémon), which are blended into the real environment and visible there through the mobile screen. The game accrued over 550 million installs in its first 80 days since launch, but player interest faded fast. PG had lost at least a third of its daily users by the middle of August 2016. So far, little is known why players continue or discontinue play. Understanding this will be vital to the future success of PG. Extant explanations of player participation in games focus predominantly on the impact of immersion. It appears that PG offers possibilities for creating various immersive experiences, which sustain players' continuance intention. However, the construct of immersion has yet to be well established and the role of immersion in the AR context remains unclear. To fill these gaps in research, this study seeks to investigate different immersive experiences and their impacts on a player's continuance intention. The paper reports on the result of a qualitative survey with 92 Pokémon players, and affirms that sensory immersion, spatial immersion, tactical immersion, strategic immersion, narrative immersion, and social immersion are key determinants of players' continuance intention. Theoretical and practical implications are discussed.

Keywords: Pokémon Go · Sensory immersion · Spatial immersion · Tactical immersion · Strategic immersion · Narrative immersion · Social immersion · Continuance intention

1 Introduction

Pokémon Go (PG), a location-based augmented reality (AR) mobile game, has become one of the most successful games in recent history. The user appeal of PG became visible immediately after launch. For example, it gained over 20 million active daily users (who use it for longer periods than Facebook, Twitter, and Snapchat combined) within two weeks [9]. Besides, PG accrued more than 550 million installs in its first 80 days [13]. Interestingly enough, many components of PG are not new. Foursquares and

Geocaching, for instance, introduced the element of location-based gaming, while AR games have been around for more than a decade [12]. The uniqueness of PG appears to be its combination of Augmented Reality (AR) with location-based gaming. In the game, players use a mobile device's positioning capability to locate, capture, and battle the in-game creatures (called Pokémon), which are blended into the real environment and visible there through the mobile screen.

PG requires players to be physically active in order to play the game, by navigating in real world settings [4]. Prior studies indicate that sustained and regular play of PG positively affects human well-being. More specifically, regular players of PG may make significant adjustments to their daily routines and to the amount of time spent outside, which improves their physical and cognitive well-being [2], mental health [11], and social interactions with other players [17]. However, players' interest in PG fades fast. PG had lost at least a third of its daily users by the middle of August 2016 [9]. Nevertheless, millions were still playing the game and making in-app purchases four months after the game was released [5]. In order to maintain the long-term success of PG, it is crucial to understand why players continue playing PG. Yet little is known about the determinants of players' continuance intention after early experiences.

Extant explanations of player participation in games focus predominantly on the impact of immersion. Combining AR and location-based gaming, PG appears to define a new genre in games, which offers possibilities for creating various immersive experiences that retain players' continuance intention. However, the construct of immersion has yet to be well established and the role of immersion in the AR context remains unclear. The purpose of this research is, therefore, to investigate different immersive experiences players have perceived, and their impacts on players' continuance intention. In light of prior studies on game immersion, we first elaborated on the construct of immersion by identifying its six sub-dimensions: sensory immersion, spatial immersion, tactical immersion, strategic immersion, narrative immersion, and social immersion [1, 3, 7, 10]. Next, we conducted a qualitative study to verify the existence of the above-mentioned six immersive experiences and their impact on players' continuance intention. This study contributes to the theoretical understanding on the immersive experiences occurring in AR games. The findings may also aid developers in their efforts to sustain AR games or other AR applications through enhanced immersive experiences.

This paper consists of six sections. In next section, we explore PG as a game, describing its features. We then discuss the theoretical background, the categorization and definitions of immersive experiences, followed by methods, results, theoretical and practical implications, and finally limitations and future research are discussed.

2 Background

2.1 Pokémon Go

Pokémon Go is a free-to-pay, location-based AR mobile game that encourages players to play and travel simultaneously between real world and virtual environments [15]. It uses real-world locations for users to navigate and explore in order to play the game. PG is a casual game, with low barriers to entry and the ability to play meaningfully

within minutes. In the game, players search for virtual characters called ‘Pokémon’, typically in outside public places. PG is collaborative. Players can help each other to become more successful, both in identifying Pokémon and in luring them to be caught. PG has a complete set of gamification elements, including points, levels, badges, a market for resources, and the ability to purchase resources with real or virtual currency. In order to level up, the players need to visit as many places as possible to capture more virtual monsters and earn more game points.

While virtual collecting and battling games have existed for around 30 years, PG is the first mobile game that largely involves players’ physical movement. The player’s gameplay in the real world is as important as virtual game activity. Players need to use real-world locations displayed by the game to search information about the locations of Pokémon. Players also need to navigate throughout their physical environment (i.e., their hometown), explore new areas, and visit specific sites to play successfully. This differentiates PG from traditional video and online games, which were typically screen-bound. PG is the first mobile game that represents a new integrative genre, where the virtual, the spatial, the social, and the physical are fully transcended [8]. However, the novelty effect of PG has not sustained player attention, leading to a significant drop in participation levels over time. This phenomenon raises interesting and challenging questions for how to maintain players’ continuance participation in PG.

2.2 Immersive Experiences

The use of AR in games has repeatedly been proven to increase users’ immersive experiences [e.g., 14, 19]. Although immersion is commonly described as the overall cognitive experience that players have while playing a digital game (Brown and Cairns), there have been attempts to define immersion as a multi-dimensional construct. Given that distinct designs of games generate different types of immersion, researchers have recognized the need to elaborate on the construct of immersion by characterizing its dimensional attributes. Through the extensive literature review, we identify six different immersion dimensions: sensory, spatial, tactical, strategic, narrative, and social [1, 3, 7, 10]. PG offers the opportunities for all of these types of immersive experiences to occur. For example, players of PG have a first-person perspective on the displayed virtual world and real world. Therefore, PG offers the opportunity for sensory immersion, and arguably also a high degree of spatial immersion. PG, as a massively multi-player online game, promotes face-to-face interaction among players thus providing a considerable level of social immersion. Players appear to experience these different types of immersion while playing PG. However, little research has systematically examined how different types of immersion influence players’ continuance intention. Therefore, more nuanced understanding on immersive experiences in game playing becomes vital. The categorization and definitions of immersive are discussed as follows.

Sensory immersion relates to the audio/visual execution of games [10]. This dimension of immersion is easily recognizable as it can be intensified through intensifying its components, such as creating more compelling graphics or interacting on a larger screen or with a directional sound system. For example, large screens close to users’ faces combined with strong, directional sounds easily overpower the sensory

information from the real world, leading the user to focus entirely on the augmented reality supported environment and its stimuli.

Spatial immersion occurs when a user feels the synthetic world is perceptually convincing, that he or she is really “there (in the game world)”, and that the game world looks and feels “real” (Arsenault).

Tactical immersion is the moment-by-moment immersion in the act of playing the game [1, 10]. It corresponds in part to the challenge factor and wholly to the control factor of the game system. Tactical immersion is experienced for instance when performing tactile operations that involve skill. When players want to continue the experience to become more skilled in using input devices to achieve better results, they are tactically immersed.

Strategic immersion is experienced in the encounter of mental challenges, or the need to think carefully and act intelligently [1, 10]. The strategic immersion can be caused by intellectual engagement in mental skills such as strategic thinking or logical problem solving. Tactical immersion and strategic immersion are highly correlated and can be summarized as challenge-based immersion. This is the feeling of immersion that is at its most powerful when a player is able to achieve a satisfying balance of challenges and abilities. Challenges can be related to motor skills or mental skills, but usually involve both to some degree.

Narrative immersion occurs when players become invested in the story of the game world [1]. It is similar to what is experienced while reading a book or watching a movie. The desire to know how the story will unfold may create curiosity, suspense and excitement, and thus makes the player want to continue the activity, which thus results in narrative immersion. Using a range of narrative tools such as cues, exciting characters, interesting events, or developing story-arc, can make a player want to continue and thus cause this form of immersion.

Social immersion causes are correlated with interaction with others, both in the virtual world and the real world. Social immersion occurs as an outcome when a player desires to keep playing the game with others and returns to the game world in order to feel connected with them. Examples of PG attributes that induce social immersion can include collaborative quests, challenges and puzzles, which may only be solvable together with others.

Best practices of designing a successful and sustainable game may not depend on producing a single immersion but rather a blending of different immersions. Alternatively, the lack of one immersive dimension may lead to an overall inferior experience that undermines enjoyment and thus hampers continuance participation. The research will therefore aim to provide empirical evidence to inform theory plus a set of instructional patterns and design principles for game designers.

3 Methodology

This study followed a qualitative approach. The data was collect on Feb 23, 2017 by using an online survey on Amazon Mechanical Turk. The survey was in English language and meant for international audience. Before the survey was launched, it was pre-tested with five long-terms players (who have played PG for at least one month),

based on which few modifications were made. This study intended to investigate the impact of immersion on players’ continuance intention to participate in PG over time, thus only those players who had played PG for relatively long time were selected as valid respondents. After making basic inquiries as to demographics, the survey contained a series of open-ended questions targeted at affirming the existence of different immersive experiences and their impacts on players’ continuance intention to participate in PG. More specifically, we asked six open-ended questions regarding the sensory, spatial, tactical, strategic, narrative, and social immersions respectively.

1. Sensory immersion: Please tell us whether you kept playing PG because you like the visual/audio design. (Yes/No, please add explanations for your answer)
2. Spatial immersion: Please tell us whether you kept playing PG because the world in the game looks and feels “real”, and you could feel that you are really part of the game world. (Yes/No, please add explanations for your answer)
3. Tactical immersion: Please tell us whether you kept playing PG because you like to develop your gaming skills. (Yes/No, please add explanations for your answer)
4. Strategic immersion: Please tell us whether you kept playing PG because you like the mental challenges you encountered, challenges that require you to think carefully and act intelligently. (Yes/No, please add explanations for your answer)
5. Narrative immersion: Please tell us whether you kept playing PG because you like the storyline (e.g., the story of training/evolving Pokémon) within the game. (Yes/No, please add explanations for your answer)
6. Social immersion: Please tell us whether you kept playing PG because you like the interaction with other players. (Yes/No, please add explanations for your answer)

The qualitative method is helpful to obtain in-depth information concerning the formulation of immersive experiences and their perceived relatedness, hence suitable to be adopted at the preliminary stage of a research topic [18]. All participants had self-reported long-term experiences in playing PG. In total, the survey received 92 valid responses. The detailed demographic information is presented in Table 1.

Table 1. Participants’ demographic information

Category		Number	Percentage
Gender	Male	57	61.96%
	Female	35	38.04%
Age	18–20 years old	3	3.26%
	21–25 years old	35	38.04%
	26–30 years old	30	32.61%
	31–35 years old	13	14.13%
	36–40 years old	4	4.35%
	41–50 years old	5	5.43%
	Over 50 years old	2	2.17%
Education	High school or below	15	16.30%
	College	37	40.22%
	University	24	26.09%
	Graduate school or above	16	17.39%

4 Results

We summarized the nomination frequencies and explanations (quotations from respondents) for each immersive experience in Table 2. Respondents reported immersive experiences at differing frequencies. Taking sensory immersion as an example, 81 out of 92 respondents (88%) reported that they had perceived sensory immersion, which was the reason that kept them continue playing PG. Reasons for their confirmation on sensory immersion included: “The splash screen and map are attractively put together and the sounds are decent”; “The Pokémon were adorable”; and “Everything was well designed and visually pleasing”. On the contrary, 11 players (12%) reported that they had not perceived sensory immersion. Explanations for their disconfirmation on sensory immersion contained: “I didn’t care about those; I just wanted to catch Pokémon”; “I always turned off the AR”; and “I had it mute”.

Table 2. Summary of confirmations and explanations for each immersive experience

Immersive experiences	Number of yes	Percentage of yes	Reasons for confirmations	Number of no	Percentage of no	Reasons for confirmations
Sensory immersion	81	88.04%	“The splash screen and map are attractively put together and the sounds are decent.” “The Pokémon were adorable!” “Everything was well designed and visually pleasing”	11	11.96%	“I didn’t care about those; I just wanted to catch Pokémon.” “I always turned off the AR.” “I had it mute”
Spatial immersion	66	71.74%	“It felt real and like the Pokémon were in front of me.” “I found it hard to discern items in the game from the real world. For instance upon finding a pikachu he appeared to be on a chair, almost perfectly aligned.” “The location based aspect really brought it to life”	26	28.26%	“You were still looking through your phone.” “It does not feel real to me”
Tactical immersion	39	42.39%	“It made me better at throwing curve balls.” “I enjoyed fighting in the local gyms and trying to hold onto the top spot”	53	57.61%	“I don’t see how that would develop gaming skills. It is not hard to play, a few swipes and that’s that.” “Does not take skill to play it at all.” “I didn’t care much about development of skills; I just enjoyed catching them all”

(continued)

Table 2. (continued)

Immersive experiences	Number of yes	Percentage of yes	Reasons for confirmations	Number of no	Percentage of no	Reasons for confirmations
Strategic immersion	34	36.96%	“Planning how to catch and where gets me thinking and wondering.” “There’s a lot of thought to type advantages and the balance of types to put in your primary fighting team.” “In Gyms you need to use type advantages in order to ensure victory.” “Hunting for different Pokémon with different strategies”	58	63.04%	“The game was too easy.” “It didn’t really trigger any mental challenges.” “It’s not challenging”
Narrative immersion	47	51.09%	“Catching and leveling them up was the best part.” “The story is quite interesting.” “That’s what’s drawn me to the series in general.” “I liked the storyline; it improves the fun part”	45	48.91%	“There wasn’t really a story line in the game.” “There is no storyline. Just repetitive capture and challenging gyms.” “What storyline? I would not count catching and evolving Pokémon a storyline. More like a mechanic”
Social immersion	64	69.57%	“I could play with friends.” “I enjoyed going to new places and talking to people I normally would have ignored.” “I liked the interaction with many players because it made me feel part of a community.” “Group playing is interestin”	28	30.43%	“I barely interacted. Play alone mostly.” “I was in a sparsely populated area and there were not that many other players to interact with.” “There was not much interaction with others. The only thing you could do is battle a gym”

Figure 1 displayed the nomination frequencies for various combinations of immersive experiences. For example, 15 out of 92 players (16.30%) confirmed that they had perceived two immersive experiences, while 13 out of 92 players (14.13%) had perceived five immersive experiences. Besides, 14 participants reported that they had experienced all the six immersions (sensory, spatial, tactical, strategic, narrative, and social), while surprisingly one player suggested that he/she had not perceived any immersive experience at all.

The non-zero responses for all immersion types provide justification for the six immersive experiences we identified from literature. They also suggest that different types of immersion were operating at different levels. Overall we observed one type of

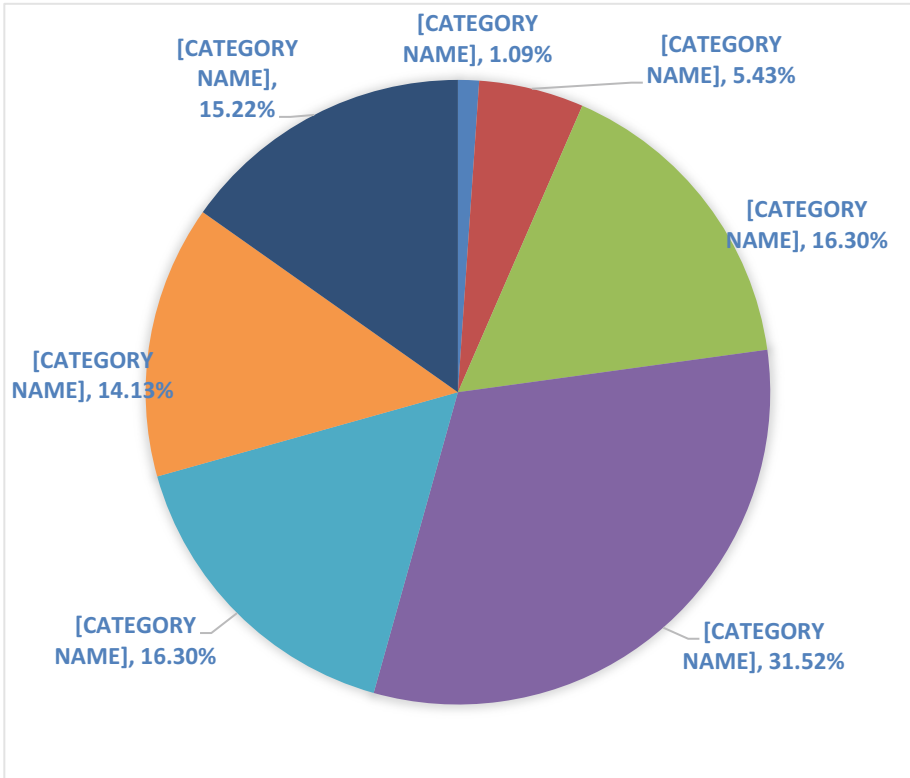


Fig. 1. Summary of nomination frequencies for various combinations

very strong immersion (sensory), two types of strong immersion (spatial, social), and three types of weak immersion (tactical, strategic, narrative). Sensory immersion was strongest, whereas narrative, tactical, and strategic immersion were weakest. The differences between the different levels of immersion were statistically significant based on Chi-square tests ($\chi = 7.61, p = .01$; $\chi = 6.56, p = .01$). Our findings further indicate that majority of respondents (93.48%) have experienced multiple immersions rather than a single immersion, which supported our statement that different immersions are not isolated from each other. Therefore, in order to design a successful game, practitioners should make effort to produce a blending of different immersions.

5 Discussion

The purpose of this study was to provide insights into the sustainability of PG, with special focus on the impact of immersion on players' continuance intention. In doing so, we firstly elaborate on the construct of immersion by identifying its sub-dimensions, and then verify the categorization and impact of different type of immersion on players' continuance intention to play PG based on a qualitative study. Our preliminary results

suggest that PG users are affected by immersive experiences during game play, but not at equal levels. Sensory immersion dominated the immersive experiences, whereas the game story and the tasks were considered less immersive. The different immersion levels, put in relation to PG's popularity development raise the question whether sensory immersion is the factor that arouses user interest to initiate game play, with game realism and social experience sustaining game play for a while. However that a lack of meaningful story elements with challenging tasks will relatively soon lead to a decline in user interest.

The present study provides valuable first insights into the immersive experiences in location-based AR game (e.g., PG), and thus, extends our knowledge on immersion in game studies. We introduce six sub-dimensions of immersion, including sensory, spatial, tactical, strategic, narrative, and social immersion. This study also adds useful knowledge that assist the developers and managers of AR games in their efforts to provide the players with meaningful and positive immersions, which facilitates players' continuance participation. The recent changes to PG, with the introduction of more character movements, and more elaborate scoring mechanisms, seem to suggest that PG developers try to extend the tactical and strategic immersion experience within PG, thus trying to sustain player interest longer than before.

This study has few notable limitations. For example, although providing important insights regarding the sustainability of PG, the study did not investigate the actual effects of sensory, spatial, tactical, strategic, narrative, and social immersion on players' continuance intention. A more detailed empirical study will be useful to reveal the nuanced impact of above-mentioned six immersive experiences on players' continuance intention. Furthermore, this study has only scratched the surface of investigating immersion as a multi-dimensional construct, yet laid the groundwork for the possibility to design for immersion. Future study may generate better understanding of immersive experiences by manipulating them in an experiment.

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