Sezgin, S. (2020). Digital player typologies in gamification and game-based learning approaches: a meta-synthesis. *Bartın University Journal of Faculty of Education*, 9(1), 49-68.

Bartın University Journal of Faculty of Education, 9(1), 49-68

buefad.bartin.edu.tr

Digital Player Typologies in Gamification and Game-Based Learning Approaches: A Meta-Synthesis

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Article Info

DOI: 10.14686/buefad.610524

Article History:
Received: 26.08.2019
Accepted: 18.11.2019
Published: 01.02.2020

Keywords:
Gamification,
Player types,
Gamer typology

Article Type:
Research Article

Abstract

Educational practices based on individual differences have become more significant as a result of technological advances. Learners today, demand learning processes which contain visual stimuli, ease of use, fast thinking and movement and playful activities. The two of such learning approaches are gamification and game-based learning. This research is a concept-centric meta-synthesis study examining player types as an individual difference in playful learning environments. In this research, the studies which analysed the typology of players, are examined in terms of methods used, game environments and contextual aspects Content analysis revealed the common points and 9 different thematic components in relation to general player typology were identified. According to study, it is concluded that, player typologies can be used as an individual difference criterion in the game-based educational processes. It is also recognized that player typologies identified by different researchers may not be eligible for all settings and practices. Given that game-based approaches are highly affected from cultural context, cultural characteristics of community of learners should be taken into consideration if these approaches to be employed in learning environments.

Oyunlaştırma ve Oyun Tabanlı Öğrenme Yaklaşımlarında Dijital Oyuncu Tipolojileri: Bir Meta-Sentez

Makale Bilgisi

DOI: 10.14686/buefad.610524

Makale Geçmişi:
Geliş: 26.08.2019
Kabul: 18.11.2019
Yayın: 01.02.2020

Anahtar Kelimeler:
Oyunlaştırma,
Oyuncu türleri
Oyuncu tipolojisi

Makale Türü:
Araştırma Makalesi

Öz

Teknolojik ilerlemelerin etkisiyle eğitim sistemlerinde bireysel farklılıklara göre eğitim uygulamaları önemli hale gelmektedir. Öğrenenler çevrelerini saran teknoloji yapılarıyla büyümekte, bunun sonucunda görsellik, kullanım kolaylığı, oyunsallık, hızlı düşünme ve hareket etme becerilerine dayalı öğrenme süreçleri talep etmektedir. Bu taleplere uygun öğrenme yaklaşımlarından ikisi oyunlaştırma ve oyun tabanlı öğrenmedir. Bu çalışma, oyun odaklı yaklaşımlarda, bir bireysel farklılık olarak, oyuncu tiplerini inceleyen kavram odaklı bir meta-sentez çalışmasıdır. Oyuncu tipolojilerini inceleyen çalışmalar, kullandıkları yöntem, oyun ortamları ve içeriksel bakış açıları bağlamlarında incelenmiştir. İçerik analizi sonucunda oyuncu tipolojilerine ait 9 farklı tematik bileşene ulaşılmıştır. Çalışma sonucunda, oyun temelli eğitsel süreçlerde oyuncu tipolojilerinin öğrenmede yeni bir bireysel farklılık ölçütü olarak kullanılabileceğine ulaşılmıştır. Bununla beraber, diğer araştırmacıların belirlediği oyuncu tipolojilerinin, her ortam ve uygulama için uygun olmayabileceği düşüncesi öne çıkmıştır. Çalışma sonunda, kültürel bağlamlardan yüksek oranda etkilenebilen oyun merkezli yaklaşımların, öğrenme ortamlarında kullanılabilmesi için öğrenme topluluğuna ilişkin kültürel özelliklerin de dikkate alınması gerektiği sonucuna ulaşılmıştır.

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Introduction

Human lives has become more and more digitalized which may differentiate learning experiences. Internet of things (IoT) age and forthcoming post-humanist period have made information sources substantially increased. In addition, the range of external stimulus that individuals come across have also increased. As a result of extreme numbers of stimulus and information sources, it is required that individually tailored learning content should be covered in the process of learning and teaching. Therefore, in these processes individual differences have become significant. With the introduction of "one size does not fit for everyone" concept, educational settings have been designed based on individual differences (i.e., age, gender, learning styles, cognitive styles, etc.). With the advent of the IoT, it may be natural that novice educational approaches are searched for, based on the changing individual or massive learning environments. In the new learning settings, requirements, in order to avoid negative experience in relation to learners' relevance, attention, and continuity became gradually difficult and new strategies are adopted to encourage learner engagement and motivation in the learning and teaching processes (Sezgin, Bozkurt, Yılmaz, & van der Linden, 2018).

New generations of learners live in a setting where internet and web technologies are very dominant. These learners are commonly described as "G generation, Net generation, millennium children or alpha generation". These learners' mental development and learning tendency are largely based on visuality, ease of use, quick thinking and acting skills. However, one of the most important characteristics of these individuals is that they are very close to the game environments (Annetta, Folta, & Klesath, 2010). These individuals may adopt different learning approaches for their own learning processes in line with their learning characteristics (Moller & Huett, 2012). Game-based approaches cover the diversified elements of games (Sezgin & Yuzer, 2017) and provide learners appropriate learning experiences in line with their characteristics and tendency. Gamification and other game-based strategies could integrated to educational processes to deal with major learning problems, including motivation, engagement and sustainability. Furthermore, these approaches also employ the power of "play" which is one of the basic learning instincts of humans (Huizinga, 1955) for instructional purposes. In this context, gamification and game-based learning approaches are frequently used in learning environments. Gamification is generally defined as the use of gameful thinking, sensation and visual experience (aesthetics) and other game components (game mechanics & dynamics) in a non-game situation to support individuals' motivation, engagement and learning (Kapp, 2012), thus creating gameful experiences (Koivisto & Hamari, 2014) for learning environments. On the other hand, in game-based learning-teaching, learning and teaching practices are carried out through a game (Kirriemuir & McFarlane, 2004). The positive educational effects of gamification and game based learning approaches are indicated in various researches in the related literature. In these researches, positive effects of dependent learning variables as learning performance (Wang, Hsu, Yeh, Lin & Lai, 2016), motivation, engagement (Buckley & Doyle, 2016; Hamari, 2017), or learning satisfaction (Fleischmann & Ariel, 2016) are defined. Nevertheless, there are also some negative effects of gamification and game based learning approaches screened in the literature (Hanus & Fox, 2015).

This study focuses on the differences in the play behaviour of learners (players) involved in the process, especially for approaches centered on gameful thinking, and thus on the player types as an effective individual difference for learning environments. The aim of the study is to review studies on player typologies to "to provide a new perspective by placing it in a viewpoint and to allow for new comprehensive research on the subject" (McMillan & Schumacher, 1984; cited in Balcı, 2011) as well as "to provide a background information for future studies"(Erkuş, 2011).

Player Types

Although playing games is one of the basic instincts of people, each individual has its own way to play games which produces different player characteristics together individual differences. This causes players to differentiate with a player-type distinction associated with personality. Although there is limited information about the role of player types on learning in different player typology studies, it is a known fact that people have various expectations and react differently towards different game-like features (Monterrat, Desmarais, Lavoué & George, 2015). Individualised learning is an important phenemenon in todays' world of education but most of the game centered learning / teaching programs are structuring the game environment under a "one size fits all" approach. Player typologies aim to classify the skills and characteristics of individuals that affect their gaming experiences (Cowley, Charles, Black, & Hickey, 2013). Gaming experiences mean also learning experiences when it is taken

into account in educational settings. In this section, different types of players are given based on the definition of the term by different researchers.

Bartle (1996)

One the earliest player typologies was developed by Bartle (1996). In this classification players are grouped into four categories, namely achievers, explorers, socialisers and killers. During the game process the ultimate aim of *achievers* is to get scores as fast as possible or to pass the levels to achieve their goal to be successful. These players use the discovery action, other players and enemies within the game as a step for success in the game. *Explorers* try to understand how processes in the game world work and spend time searching for places or features that might not have been recognized in the game world. These players aim to collect points for unlocking different places, objects or features in the game or to kill their enemies in the game so that they do not have difficulty in the parts to be examined. Explorers live the entertainment element in the game by discovering the game world, game features, the mechanics and dynamics of the game and the flow of the script. These players have longer playing times than other player types. *Socializers* are intended to interact with other individuals in the game as players. Interaction among players is the major source of fun for them. Such interactions include chat, jokes, fun and experience exchange. In addition, observation of other players and their progress may be a source of rewards in some games. These players may prefer those games with multi-players and with a social network integration. *Killers* aim to kill other players and enemies in a fast and violent way as the game progress. These actions in the game's own virtual world are a source of pleasure for players. These players can use in-game socialization to learn the tactics and movements of other players. In-game discovery and progress is made to successfully deal with new rivals and enemies. Bartle's first classification about gamer types is shown in Figure 1.

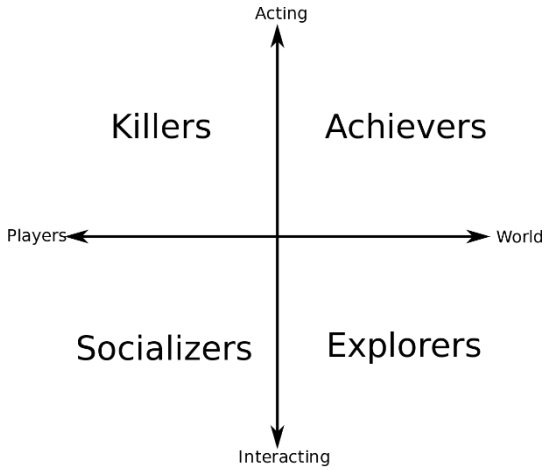

Figure 1. Bartle's First Classification of Gamers

Bartle analysed the players in the context of Multi-User Dungeons (MUD) which are a kind of text-based multi-player virtual world games. MUD are player to player games which are based on role-playing, interactive fiction and conversation. The data of the study were collected between 1989 and 1990 through interviews with experienced players and discussion forums. The participants were asked to answer the following question: "what do people want from games?" through this question the data were collected about what they like and dislike about game situations. Bartle's taxonomy of players is limited to Multi-User Dungeons. MUDs were later replaced with virtual worlds (i.e., second life, open sim, etc.). As a result of such changes Bartle's taxonomy was revised and a third dimension was added. In Bartle's new taxonomy (2003), there are eight different player types as shown in Figure 2.

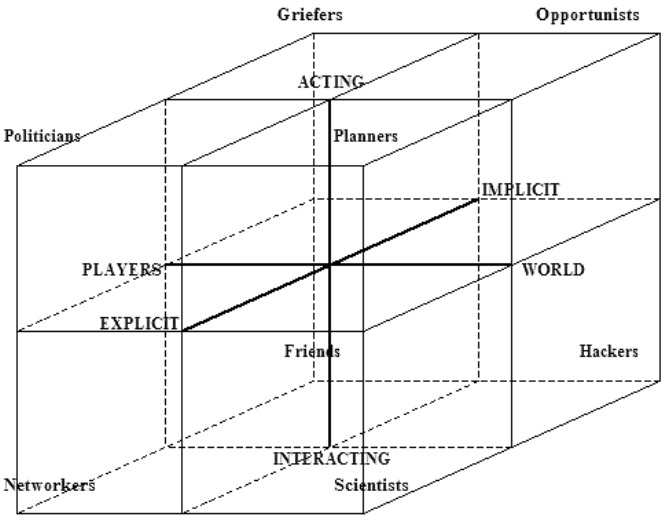

Figure 2. Bartle's Second Classification of Gamers

Park Associate (2006)

Parks Associates which is a firm in the field of marketing, analysed 2002 US online players who were 13 years-old or older. According to research online players were defined as players who play digital games at least one hour per a day. In the analysis period, the monthly median of game durations were found as a beginning. It was found that this duration was nearly 20 hours. With the help of this measure participants were fallen into two tiers according to play duration. Player typology was developed based on 17 attitude items. The answers given by the participants were investigated through the clustering analysis. The analysis of the data produced six different player types (Figure 3) in two separate tiers.

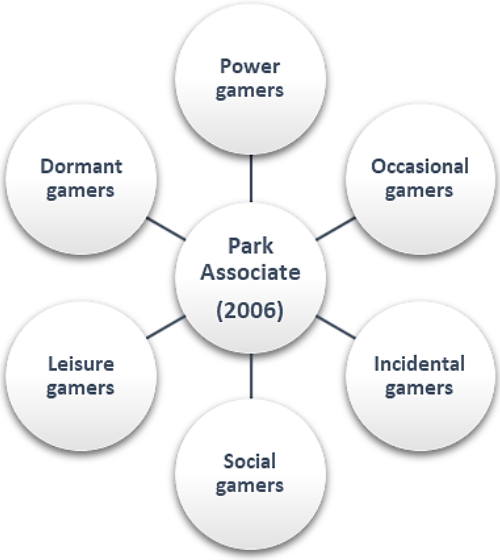

Figure 3. Park Associate (2006) Player Types

Power gamers are players who live online games and breathe through the game climate. *Occasional gamers* mostly prefer puzzles and board games and they do not spend so much money and effort to play games. *Incidental gamers* often play games when they get bored and during incidental times. *Social gamers* use games as a way of communicating with other people. *Leisure gamers* considers games a serious hobbies. It was found that they may

spend 58 hours of leisure time for games. *Dormant gamers* cannot find the enough opportunity to play games even if they are willing to play because of reasons like family, work or school. The number of such players increases among older players (Klopfer, Osterwell, & Salen, 2009; Hanlon, 2006).

Schuurman, De Moor, De Marez, and Van Looy (2008)

Schuurman et. al. (2008) also developed a categorization of players. The study based the categorization on the different motivations of players during a video game. The data of the study were collected through an online survey on a sample of 2985 Flemish players. The analysis produced four different player types based on eleven motivations. The player types are given as follows: Overall convinced gamers, convinced competitive gamer, escapist gamers and passtime gamers. Of them *overall convinced gamers* had higher mean scores in eight motivation types out of eleven pre-determined motivation types. Although they did not have a certain motivation to play games, it seems that playing games was part of their identity (Schuurman et. al., 2008). *Convinced competitive gamers* are reported to have motivation related to competition rather than discovery or socialization-related motivations. The mean scores of the *escapist gamers* are reported to be not high for various motivations to play games. Those motivations which such players had relatively higher mean scores included freedom, acting as if they were another people and new world. *Passtime gamers* had no a certain motivation to play games, but they played games just to spend their time. They may or may not describe themselves as players.

The data of the study Schuurman et. al. (2008) were collected through an online survey questionnaire. It was posted at various game websites and forums. However, the players were specifically invited to join the study. As a result 2895 survey questionnaires were completed by Flemish players. The study aimed to access those people who described themselves as "gamers". The number of casual gamers in the study is relatively low. In the data collection tool eleven basic game motivation were included. The responses were given on a five-point likert type scale. The survey questionnaire also included items regarding game behaviours, game context and socio-demographical characteristics. The motivation types included in the survey questionnaire were selected based on a review of literature. The questionnaire was used in a pilot study with a sample which included experienced players. The data were analysed using the K-means clustering and the analysis produced four different and significant clusters.

Fullerton (2008)

In the study by Fullerton (2008), namely "A Playcentric Approach to Creating Innovative Games", several gamer types were suggested based on the satisfaction of the participants from their point of view. This classification as mentioned by the author is not a very detailed taxonomy of players and therefore, cannot cover the digital games which are dominant in the current period. In addition, Fullerton's classification (2008) is not based on experimental data. The types of players in this classification are given as follows: *Competitors* attempt to be the best irrespective of the game played. They may have perfectionist personality traits. *Explorers* have a high level of curiosity about the game world. Explorers may have adventurous personalities in general. The limits of the game world are physically and mentally tested by these players. *Collectors* aim to collect all items, including awards, points or information in the game scenario. These players are sensitive about the topics of arrangements and organization. *Achievers* aim to reach different levels of success and to pass all possible steps in the game. *Jokers* do not take the game and playing the game seriously. For them the significant point is not success, but fun. Their play behaviour may make serious gamers angry. However, their presence in the play setting may make it much more social. *Artists* may have some dominant characteristics of design and creativity. Unlike other types of players they aim to produce a different outcome and solution or to develop a different strategy. *Directors* attempt to guide the flow of games and to have a word in the game process. They may act as a play maker, process initiator and a guide for other players. *Storytellers* create a world based on fantasy or imagination in the game process or in the playful environment. They live in the world they formed and tell the characteristics of this world to other players. *Performers* aim to present their game-related skills, information and characteristics to other players.

Götzenbrucker and Köhl (2009)

Götzenbrucker and Köhl (2009) examined the game experiences that can be differentiated according to changing living conditions of online players in ther study. Their study lasted for more than 10 years and the participants were fifteen online players. The study allowed for the players to share their game-related experiences and dealt with the analysis of the effects of their life styles, habits and media on their game behaviour. In the study

a total of fifteen individual interviews was carried out on a sample of the players who participated in their earlier study. The age of the participants was between 30 and 52 whose educational level was higher than their country (Austria) mean. Most of the participants were working in the fields related to technology. The authors employed some of the data collection tools that were also used in their earlier study. However, in the second study they added in-depth qualitative interviews to obtain much more complete perspectives on the attitudes of players. These qualitative data were analysed using the grounded theory. The results of the analysis showed eight fields to be analysed as follows in Table 1:

Table 1. Götzenbrucker and Köhl's (2009) Domains of Inquiry

Gamers' behaviour, game preferences	Private/professional consequences
Motivation	Game quitting scenarios
Gamers' personal career	Friendships
Positive/negative gaming experiences	Social networks

In the taxonomy developed by Götzenbrucker and Köhl (2009) there are several types of players as follows: *Communicative role-players* like to play a role by covering their own characteristics in different scenarios. Communication and the development of the network of friends are the main achievement for these players. These players believe that the communicative links that they established with others will have reflections in real life. *Anarchists* consider themselves as different from other player types, and are usually in an action against other players. These players love the risk, insecure situations, adventure and evil behaviours (cheating, killing, playing, etc.). *Steady gamers* are regular players who make games part of their lives. These players can experience things that are considered unimaginable in their real life through games. They extensively employ media and have curiosity about new technological devices. These players integrate games into their lives using different adaptation techniques in regard to the changes in different stages or milestones of their lives. Steady gamers are much more achievement-oriented than the first two types of gamers. *Designers* deal with mechanics of games, game settings and technical background of games. They aim to create their own game world and also, attempt to redesign the games. Designers who like to fight against different components and try new things in the game world consider the game as "a creative design site". The findings of the study indicated that there are correlations between game behaviours, motivation to play and life styles. Significant defining moments of the players are found to be important parameters. More specifically, it was found that significant events such as new employment or having a baby decrease the duration of playing game time. This finding suggests that in classifying the types of players it is very significant to take into account these significant events in players' life.

Drachen, Canossa, and Yannakakis (2009)

Drachen et al. (2009) carried out a study on a sample of players who completed or were still playing an adventure game, Tomb Raider: Underworld. The data used to determine player types were collected through the game metrics registration system called EIDOS Metrics Suite. The participants were 1365 gamers. They were classified based on different variables (the frequency of losing a game, duration to complete the game, etc.). The data analysis produced four types of players as follows: *Veterans* are experienced gamers who complete the game fast and less lose it. *Solvers* mostly use their time in the game to solve puzzles covered in the game. *Pacifists* are usually killed by in-game enemies (as a result of falling, etc.), but they can still complete the game quickly. *Runners* refer to those players who try to complete the game as soon as possible.

Nacke, Bateman, and Mandryk (2011)

Nacke et al. (2011) developed BrainHex model which is based on neurobiological findings considering the levelling of player satisfaction. However, in the model neurobiological techniques are not employed. Instead, only theoretical information from the previous studies is used as basis. The BrainHex model provides references from the DGD1 (Demographic Game Design Model) and DGD2 models developed by the authors previously. The DGD1 and DGD2 models were created by adapting the psychometric Myers-Briggs personality test to the player characteristics. Although these models are significant in presenting very important perspectives on the types of players, they have a shortcoming in that the Myers-Briggs test was not specifically developed to measure neither games not gamers.

The BrainHex model includes seven different gamer categories as archetypes. Each category is not considered as a psychometric type with definite boundaries, but as a classification category related to various experiences of gamers. These categories may include more than one psychometric characteristics. The data of the study were collected through an online survey questionnaire which was distributed from the BrainHex website. The number of the participants who completed this questionnaire was 50.423. A php code was developed to contribute to identify the participants' game preferences on the website. The first section of the questionnaire included demographical information (i.e., age, gender, geographical regions, etc). In addition, it covered the statements based on the Myers-Briggs-Type personality test. In the second section there were statements about the player archetypes. More specifically, there were three statements for each type (for instance, in relation to the archetype of seeker one of three statements was as follows: these players just walk around to enjoy the script). The responses of the participants were evaluated on a five-point Likert type scale. In the third section for each BrainHex archetype there were seven specific statements. The participants were asked to evaluate these items using the scores ranging 1 to 7. The PHP code immediately calculate the scores for the responses of the participants and indicate the related BrainHex archetype. Most of the participants took part in the study were male (88,6 %). The survey questionnaire was written in English, and the participants were from North America (49,8%), West Europe and UK (27.9%), East Europe and Russia (8,2%) and South and Central America (4,3%). The classification of players is made up of seven types as follows:

- ***Seeker:*** It has been observed that such players are motivated by the mechanisms of interest related to sensory information and memory sections in the brain. They are curious about game world and enjoy browsing exciting features. It is known that finding the parts which can be interpreted later causes endomorphin secretion and hence, creates a feeling of satisfaction.
- ***Survivors:*** Such players improve their performance through fear and tension. This situation is achieved by the effect of dopamine on the effect of epinephrine neurotransmitter in the case of excitement caused by tension (Nacke et al., 2011). They prefer those games containing fear and tension.
- ***Daredevils:*** They look for excitement taking risks and enjoy stabbing actions. The interests of these players are platform games with dizziness or sudden changes of direction at high speeds.
- ***Masterminds:*** They satisfy with the games which require a certain solution strategy. They enjoy master minds which require the decision-making for the most productive solution and puzzles.
- ***Conquerors:*** They aim to tackle distressed situations, complete very difficult tasks, and beat other players while achieving success. They like to endeavour to achieve victory. Easy achievement does not satisfy them. They are open to challenges and may channel their anger to achievement. Both epinephrine (adrenaline) and norepinephrine secretions as well as testosterone may shape their game behaviour.
- ***Socialisers:*** For such players other people are the source of excitement and satisfaction. They like to talk with others, help them and make observations together and the sense of trust is a very significant variable for them. The use of the social center of oxytocin, which is important in establishing a trust-based relationship, is at the forefront of these players.
- ***Achievers:*** These players are target-oriented individuals. They are motivated with the aim of long-term success. The other characteristic of them is to complete tasks to achieve the goal. Their major characteristics is to complete tasks in order to achieve their goals. Conquerors are struggle-oriented and tend to win through struggle, while achievers satisfy with the completion of the game. Another goal of them is to have a success-oriented game process.

Xu, Poole, Miller, Eiriksdottir, Kestranek, Catrambone, and Mynatt (2012)

Xu et. al. (2012) used the American Horsepower Challenge (AHPC) which is a multi-player health-related game as game setting. This game includes a competition structure involving the recording and evaluation of physical activities at or outside of the school and students from different schools may participate in such activities. The participants of the study were 1743 students. The data were collected using focus group interviews. A total of 18 focus groups was formed, and each group consisted of 4-10 students. In addition, interviews were conducted with samples of 17 teachers and of 56 students. The field notes of the researchers were obtained by the logs obtained from the step counters attached to the students' shoes. An inductive iterative process is used in the analysis

of qualitative data. In the process of data analysis, the data were examined in terms of motivation (what the player thinks about the game), behaviour (what the player does during the game) and effect (what the social impact of the player on the rest of the player group).

As a result of the analysis they developed five different types of players. Of them *achievers* have regular goals throughout the gaming process that are focused on improving their individual progress and personal performance. *Active buddies* like to create small groups of close friends and to make fun physical activities with their group members. *Social experience seekers* like to socialize and make changes to their external representations in the game environment (for instance, they frequently change the elements and avatars in the games) and to talk about them. *Team players* are motivated to belong to a group, group achievement, group rankings and improve the performance of the group members. *Freeloaders* have a great deal of interest at the beginning of the game process, but over time their interest is rapidly reduced. Although they are not very active in the game process, they do not leave it. Instead, they are in the pursuit of things they think that they can benefit from (i.e., free t-shirts, etc.). The other player types do not like freeloaders in that for them freeloaders have negative effects on team work.

Ferro, Walz, and Greuter (2013)

Ferro et al. (2013) examined the relationship between personality types, game elements / mechanics and player types used in previous studies. Based on these analyses they developed five player types. This classification is a theoretical model based on the findings of the previous studies. Their player categories are as follows:

- ***Dominant players:*** Dominant players like to be visible in game environments. They mostly achieve it through sociability, assertiveness and aggressiveness. They are reported to be reliable and egoist and to have self-directed acts.
- ***Objectivist players:*** These players are less selfish than dominant players. However, they still think themselves during the game process. Their actions are based on their own knowledge and skills while achieving their goals such as rewards, bonuses etc.
- ***Humanists:*** They have social acts and commit themselves to various game-related tasks to develop social commitment. These players care about the needs of others as much as their own needs. They do not attempt to develop individual solutions. Instead, they tend to solve the problems with other players.
- ***Inquisitives:*** Such players like to make research and to discover new things. Instead of being explained what to do about a variety of tasks, they prefer to find the solution and to understand the tasks by discovery. More natural game environments are more interesting for this player type.
- ***Creatives:*** Such players like to develop and experience new things. They prefer guidance instead of direct instruction.

Tondello, Wehbe, Diamond, Busch, Marczewski, and Nacke (2016) - Marczewski (2015)

Marczewski developed the Gamification User Types Hexad framework which include motivation research, player types and applied design experience. The first framework which was based on observation and experience was later translated into a consistent measurement tool. At the stage of development of the scale, a workshop was held with a group of six experts, and then, the framework was introduced to these experts. Experience-based Hexad Framework covers a distinct item pool for each player category. The experts verified the validity of the items created and provided the appearance validity. In addition, the experts listed the defining features of user categories and the suitability of each category in relation to specific game mechanics. At the second level the items about player categories were again examined, and those items which were misleading, extremely general, extremely context-dependent and unnecessary excluded from the item pool. The final ranking scale was consisted of 74 items. Then the experts were asked to answer the items in the form using a 6-point Likert type scale. The aim was to analyse the prediction power of the items in regard to player types. The results of the analysis produced a form with 30 items. The analysis was carried out in three components: scale reliability, correlation of personality traits with scale items and correlation of game design elements and scale items. The determination of personality traits was carried out using the Big Five test (five factor model). In the correlation analyses the Kendall's τ was employed. At the later stages the potential of the measurement tool as a model to be used in gamified systems was investigated. The correlations between 32 design elements that are frequently used in game environments and

player categories were analysed. The results showed that there is a positive correlation between these 32 design elements and player categories. The player classification by Marczewski which was empirically tested is as follows:

- ***Socialisers:*** Such players are motivated with the relational connections among players. They want to develop social connections and interactions with other players.
- ***Free spirits:*** They tend to exhibit an autonomous endeavour. They want to produce something in line with their desire and to discover.
- ***Achievers:*** Achievers attempt to be masters of the game. Their major characteristics include learning new things and improving themselves to have better qualities.
- ***Philanthropists:*** These players focus on the goal and meaning of the game. They want to help others and to make positive contributions to others' life without expecting anything.
- ***Players:*** The motivation for them is rewards. These players do everything to win prizes from a game or a gameful setting. They play the games for the sake of rewards.
- ***Disruptors:*** These players are individuals who live and adopt a strong sense of change. They try to create changes by disrupting the game system or influencing other players.

Vahlo, Kaakinen, Holm, and Koponen (2017)

Vahlo et al. (2017) examined the digital game preferences by identifying game dynamics of 700 digital games, and also players' desire to play games with specific types of dynamics. The authors define their study as "a complementary approach for motivations to play and player behavior studies". The participants of the study were 1717 adult participants. The data was collected using a web-based survey which includes the game dynamics preference questionnaire with 33 items. As a result of the study, 5 game dynamics preference categories and 7 player types.

- ***The Mercenary:*** These players are most favored with sneaking, shooting enemies, killing, and executing battle tactics. Also other highly favored in game for this type of players are; acting as the main character, developing its skills and abilities, and exploring the gameworld.
- ***The Companion:*** These players reported relatively high preference scores for befriending with in-game characters, creating an avatar, developing its skills and abilities, and developing a city or village. They revealed a strong dislike for killing, waging war, shooting enemies, and exploding
- ***The Commander:*** These respondents were highly attracted to strategizing, building, and developing a city or a base, defending their own territory, and managing cities and their citizens. They disliked the dynamics of Care but also stealing and breaking the law, hiding and running for your life, and staying in rhythm
- ***The Adventurer:*** They showed very high preferences in creating a character, developing its skills and abilities, acting as the protagonist, exploring the gameworld and uncovering its secrets, and befriending amongst in-game characters. They did not prefer racing and competing in sports, matching tiles, playing instruments and dancing, or taking care of pets
- ***The Patterner:*** They showed the highest preference score for matching tiles or other elements together as well as a moderate preference for jumping between platforms and collecting rare items but disliked many other game dynamics, especially killing, stealing, destroying, and waging war
- ***The Daredevil:*** They favored racing more than other player types, and also moderately exploding, sneaking, and shooting. They did not show strong dislike for any of the 33 game dynamics.
- ***The Explorer:*** The player type revealed the highest preference of all the player types for collecting rare items and treasures. They enjoyed also exploring the gameworld, developing a character's skills and abilities, and matching tiles together, but disapproved stealing, exploding, and running for your life more than any other player clusterses were revealed.

Method

This research is a concept-centric meta-synthesis study examining player classifications as an individual difference in playful learning environments. In this research, the studies which analysed the typology of players are examined chronologically in terms of methods used, game environment and contextual aspects. Meta-synthesis is a research approach that brings together the results of different studies which analyse a similar subject (Walsh & Downe, 2005). Although some of the studies reviewed in the research used completely quantitative methods, the player classifications in their findings analysed in terms of their content. In the study, in order to find the related studies the following key terms were used: "player types", "player typologies", "player classification", "gamer types", "gamer typologies", "gamer classification". The studies reviewed in this study were found and listed via Google Scholar. Before conducting the search, other databases such as SCOPUS and Web of Science were checked. However, Google Scholar provided the most extensive results. In the screening process, a total of 141 studies were identified. After removing duplicates, filtering studies that were irrelevant to the purposes of this study and a set of inclusion criteria were implemented, 14 publications identified for the double review.

Inclusion Criteria

In finding out the studies for synthesis, the snowball sample technique was employed in that references used in the studies were also benefited. In the selection of the studies to be reviewed only two criteria were used to provide scope extend. These criteria are as follows: "being published in a scientific journal, book or research report" and "providing a specific taxonomy of players". No date range was set for the data screening process of this study for not to narrow down the scope of research. Among the studies included, 8 of them were scientific journal articles, 2 of them were book chapters and 1 of them was a research report. As a limitation of this study research report and book chapters may be seen as a validity/reliability threat for this current study. Nevertheless, the research report was published by an internationally recognized market research and consulting company with serious scientific methodology (https://www.parksassociates.com/page/company), and book chapter were published by well known international scientific book publishers. Table 2 shows the references found.

Table 2. Studies Included into Research Synthesis According to Literature Review

Name of the Study	Authors	Date
Hearts, clubs, diamonds, spades: Players who suit MUDs	Bartle	1996
Park Associate's Marketing Survey about Online Gamers	Park Associate	2006
Fanboys, Competers, Escapists and Time-killers: a Typology based on Gamers' Motivations for Playing Video	Schuurman et al.	2008
A Playcentric Approach to Creating Innovative Games	Fullerton	2008
Ten years later. Towards the careers of long-term gamers in Austria	Götzenbrucker and Köhl	2009
Player Modeling using Self-Organization in Tomb Raider:Underworld	Drachen et al.	2009
BrainHex: Preliminary Results from a Neurobiological Gamer Typology Survey	Nacke et al.	2011
This is Not a One-Horse Race: Understanding Player Types in Multiplayer Pervasive Health Games for Youth	Xu et al.	2012
Towards personalised, gamified systems: an investigation into game design, personality and player typologies	Ferro et al.	2013
Even Ninja Monkeys Like to Play: Gamification, Game Thinking and Motivational Design	Tondello et al.-Marczewski	2016-2015
Digital Game Dynamics Preferences and Player Types	Vahlo et al.	2017

The study by Yee (2006) is frequently referenced in the studies about player classifications and games. In his study Yee (2006) analysed the motivations of players in online games. The study concluded that there are three groups of motivation which include ten different motivations for online players. However, it did not attempt to classify players. Instead, it analysed the motivations of players which can be used in these classifications. Therefore, it was not included in the current study. In addition, the study by Whang and Chang (2004) players were classified only in terms of social behaviours, namely single-oriented, community-oriented and off-real world players. Given that it took into consideration only one dimension, it was also excluded from the current study. In

addition to ten different player classifications given, Bartle's (1996) revision of the original classification can also be added. However, the revised player typology of Bartle is not based on empirical findings and it was not published in a scientific article. Therefore, it is also excluded from the study.

Data Analysis

The analysis consisted of two steps: 1) initial reading of all 14 articles, without predefined criteria, to get an impression of the authors' presentations of the stated typological approach and of the choices the authors made regarding research design; and (b) a careful and thoughtful reading of a selected group of articles using a guide developed for this second step of the analysis.

In the second part of analysis included studies according to pre-defined criteria were analysed comparatively based on the following points: 1) participant groups and origins of the paper 2) game settings/environments, 3) methodologies (sample characteristics, data collection tools, variables used in the categorization of players, data analysis methods employed). The content analysis was carried out using the NVivo 12 program. The player types collected were examined in terms of their content definitions. The content analysis was carried out by both the author and a field expert on game-based learning/gamification twice with a thirty-day interval. The intrarater and interrater reliability were calculated due to provide thematic consistency. The intrarater reliability was found to be .852, whereas the interrater reliability was found to be .819. Although the quantification of content analysis does not seem to be very meaningful for qualitative research in general, this may be regarded as important in the studies which aim at creating proposal models on specific issues. The Cohen Kappa (Cohen, 1960; as cited in Stemler, 2001) was employed, and the values ranging between 0.81 and 1.00 indicate a perfect consistency (Landis & Koch, 1977). The labels of the themes were identified together with four field specialists.

Findings and Discussion

In this study, the studies conducted by different researchers about player typologies were examined in terms of participants, game environments, methods and findings. In some of these studies, psychometric tests related to personality types were used in the process of developing player typologies (Ferro et al., 2013; Marczewski, 2015; Nacke et al., 2011). In the other studies the dominant way to develop player typologies is the use of researcher experiences, player experiences and various game motivations as the basis for these typologies. Also, in the study of Vahlo et al. (2017), a player classification was made based on the interaction between player and game dynamics. The study by Parks Associates (2006) is in fact a market research to describe their current customer profiles. Classifications developed by Fullerton (2008) and by Ferro et al. (2013) are mostly based on researcher experiences or the previous classifications. There is also no empirical evidence used in these studies. Therefore, it is safe to argue that although these classifications provide significant information for the researchers in the field of games, they are not scientifically well accepted classifications of players. Player types formed by different researchers are shown in Table 3.

Table 3. Player Types Formed by Different Researchers

Bartle (1996)	**Park Associate (2006**)	**Schuurman et al. (2008)**	**Fullerton (2008)**
Achievers	Power gamers	Fanboys	Competitor
Socializers	Social gamers	Competers	Explorer
Explorers	Leisure gamers	The Escapist	Collector
Killers	Dormant gamers	Time Killers	Achiever
	Incidental gamers		Joker
	Occasional gamers		Artist
			Director
			Storyteller
			Performer
Götzenbrucker and Köhl (2009)	**Drachen et al. (2009)**	**Nacke et al. (2011)**	**Xu et al. (2012**)
Communicative role-players	Veterans	Seeker	Achievers
Anarchists	Solvers	Survivor	Active buddies
Steady gamers	Pacifists	Daredevil	Social experience
Designers	Runners	Mastermind	seekers
		Conqueror	Team players
		Socialiser	Freeloaders
		Achiever	
Ferro et al. (2013)	**Tondello et al. (2016) - Marczewski (2015)**	**Vahlo et al. (2017)**	
Dominants	Socialisers	Mercenary	
Objectivists	Free spirits	Companion	
Humanist	Achievers	Commander	
Inquisitives	Philanthropists	Adventurer,	
Creatives	Players	Patterner	
	Disruptors	Daredevil	
		Explorer	

One of the notable primary findings of this research is that some of the typologies were developed cumulatively. It causes us to think that different player typologies have common characteristics, but may involve context-specific diversified characteristics (Figure 4).

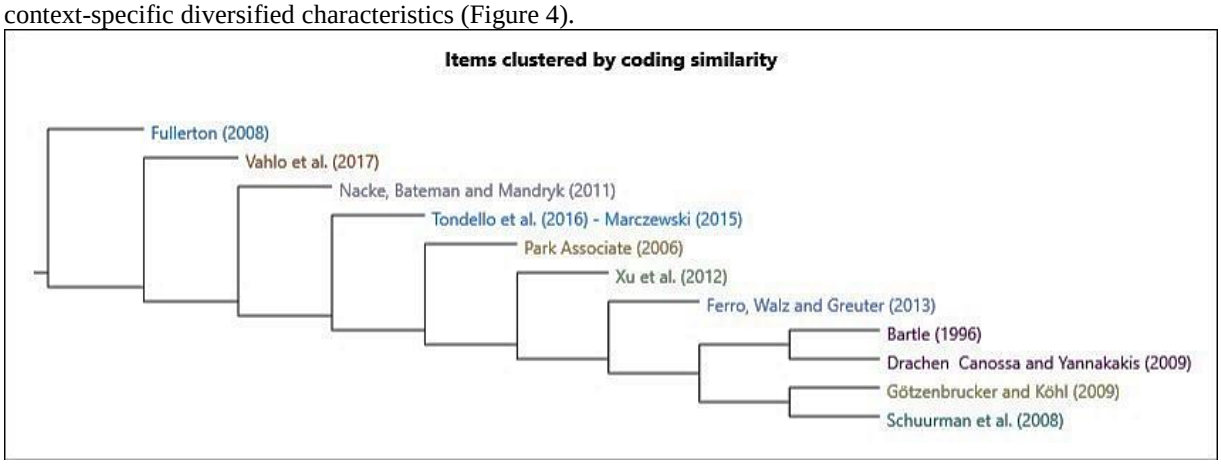

Figure 4. General coding similarity in content analysis

If individuals are to be classified according to any of their behaviour, the context in which this behaviour occur should be taken into consideration. In player typology studies which attempt to classify players based on their specific game behaviours, examining the game environment with priority will be informative for both researchers and designers in terms of the scope and generalization of the results. One of the earliest player classification was developed by Bartle (1996). This classification is frequently used in the studies on games and game-based learning. However, Bartles' classification were specifically developed for MUDs. Therefore, it can be argued that this model cannot be used and generalized to every type of games or gamification approaches. However, Bartle (2003) revised his taxonomy given that the original version of the taxonomy was based on a static game setting. The player typology developed by Schuurman et. al. (2008) was based on video games without focusing on a specific type of such games. The classification by Götzenbrucker and Köhl (2009) was developed on a sample of online players who participated in the MMORPGs (Massively multiplayer online role-playing games). The MMORPGs are in fact a developed version of the MUDs employed in the taxonomy of Bartle (1996). In the study by Drachen et. al. (2009) "Tomb Raider: Underworld" which is an adventure game was employed. The study carried out by Xu et. al. (2012) employed the "American Horsepower Challenge" which is a multi-player online health-related game. In the other play typologies the player characteristics are not based on a specific experience of a game.

When gamer typology studies included in the current study were reviewed, it was seen that survey studies were dominant among them. Also samples of the studies were generally formed with high number of participants. Two studies were non-empirical and one study was carried out to develop a scale (e.g. Tondello et al., 2016). In some studies the data were collected using in-depth interviews. For instance, the participants of the study carried out by Götzenbrucker and Köhl (2009) were fifteen adults. It is observed that the player typologies were not developed taking into account a specific range of participant ages. However, the participants are mostly young adults and adults in the studies reviewed. There is no sufficient information about the gender of the participants. The studies were carried out in different countries. Given that games are highly affected from cultural settings, it is reasonable to expect that such studies were implemented in various countries. Participants, age ranges and regional contexts of the studies reviewed are shown in Table 4.

Table 4. Participants in Gamer Classification Studies

Research	Number of Participants	Age range	Country
Bartle (1996)	30	N/A	UK
Park Associate (2006)	2002	-	US
Schuurman et al. (2008)	2985	N/A	Belgium
Fullerton (2008)	N/A	N/A	N/A
Götzenbrucker and Köhl (2009)	15	15-23	Austria
Drachen et al. (2009)	1365	N/A	N/A
Nacke et al. (2011)	50423	N/A	Mostly North America
Xu et al. (2012)	1743	middle school children	US
Ferro et al. (2013)	N/A	N/A	Australia
Tondello et al. (2016) - Marczewski (2015)	133	graduate/undergraduate level	Canada
Vahlo et al. (2017)	1717	adults	Finland-Denmark

The studies reviewed were analysed in terms of data collection tools, the variables employed in developing the player typology and data analysis techniques. Of 6 quantitative studies the data of 5 studies were collected through online surveys. The other quantitative study used a game metrics logging system which keeps the numerical game data. 4 studies were descriptive while one of them was a correlational study which attempted to develop a scale. The other study was an inferential research. There were also three studies which employed a qualitative method. The data of these studies were collected through interviews, focus group interviews, online discussions and field notes. In terms of the fundamental variables that were used to develop player typologies it is found that such

variables included game experience, game habits, motivation to play games, satisfaction from playing games, specific reactions to game components, interest towards games, personality types, acts about personal reporting and effects. It can be argued that other than these variables motivation, experience during the game and attitudes towards games can be used to develop new player typologies.

Methodological components of reviewed studies are shown in Table 5. In terms of data analysis methods, it was seen that the most frequent used methods are found to be clustering analysis and content analysis. In the studies which employed relational analyses, the types of players were developed comparing them with psychometric personality types.

Table 5. Methodological Components

Research	Data Gathering Tool	Classification Variable	Analysis
Bartle (1996)	Open-ended online discussions	Game experience	Content analysis
Park Associate (2006)	Online survey	Playing habits, attitudes	Cluster analysis
Schuurman et al. (2008)	Online survey	Basic game motivations	Cluster analysis
Fullerton (2008)	N/A	Pleasures of play from the point of view of the player	N/A
Götzenbrucker and Köhl (2009)	in-depth interviews	Gamers' attitudes	Content analysis related to the concept of grounded theory with 8 domains of inquiry
Drachen et al. (2009)	a game metrics logging system	Playing characteristics across different gameplay features	Cluster analysis
Nacke et al. (2011)	Online survey	Theoretical motivations, interest in digital games, Myers-Briggs Psychometric Types	Inferential analysis – Factor analysis (for DGD1)
Xu et al. (2012)	focus groups, individual interviews, field notes	self-reported data (motivation, behavior, influence)	Content analysis
Ferro et al. (2013)	Review of the literature	player typologies, personality types and related game elements	Theoretical analysis
Tondello et al. (2016) – Marczewski (2015)	Online survey	Motivation, Big Five Psychometric Types	Factor analysis, Correlation analysis
Vahlo et al. (2017)	Online survey	Game dynamics	Cluster analysis

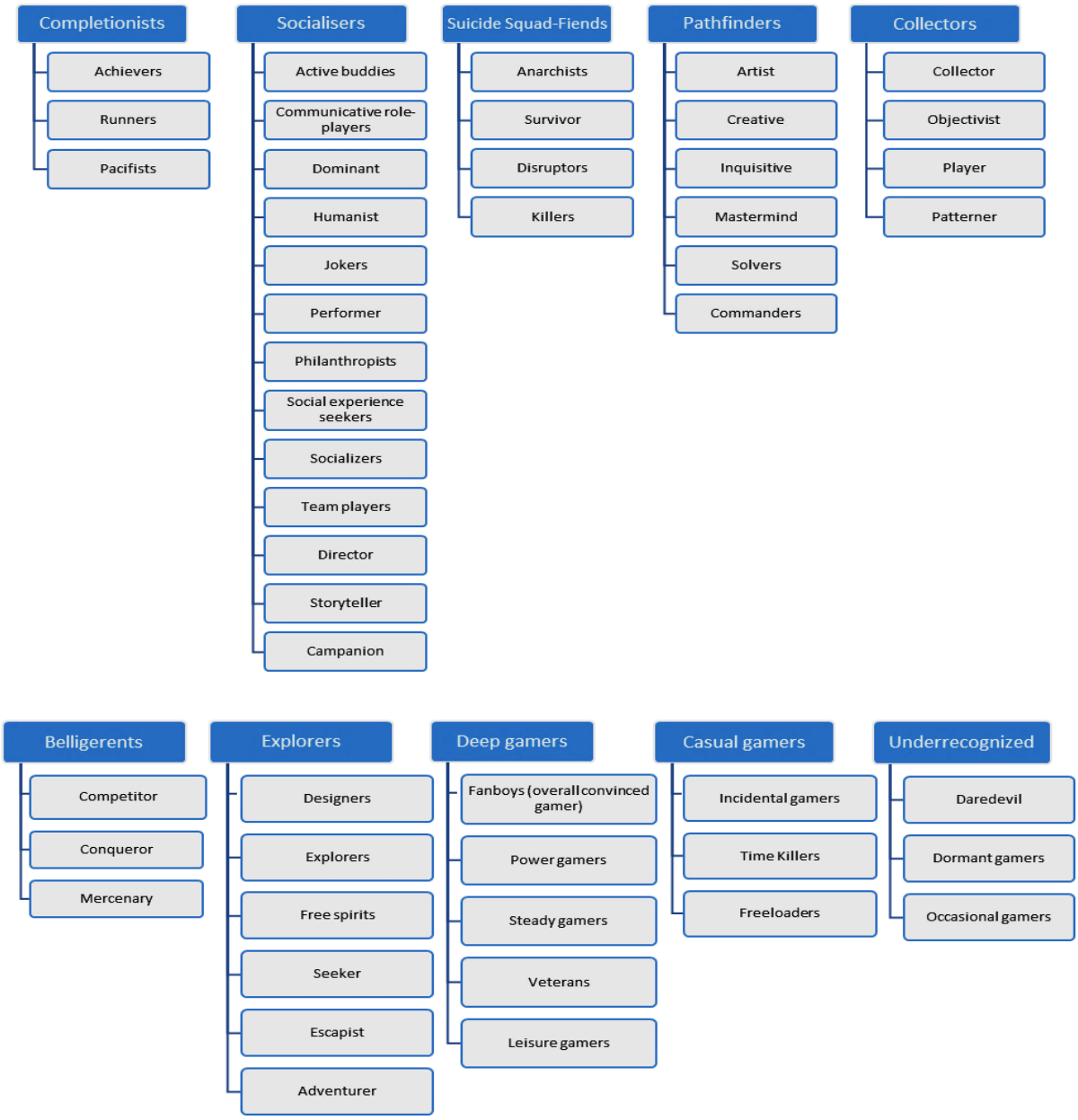

Figure 5. Themes Revelaled from Content Analysis of Player Typologies Research.

Conclusion

In this study, 9 common themes emerged from the meta-synthesis of previous player typologies research: *Completionists, Socialisers, Suicide Squad-Fiends, Pathfinders, Collectors, Belligerents, Explorers, Deep-gamers and Casual gamers.* The study by Hamari and Tuunanen (2014) which also reviewed the player types dealt with 12 such categories. Based on this review they suggested five different dimensions: Achievement, Exploration, Sociability, Domination, and Immersion. Of the studies reviewed by Hamari and Tuunanen (2014) only two studies were also included in this study. This difference was due to the inclusion criteria employed. In the current research only those studies which contained specific player typology are reviewed. In this current study 9 different themes with code categories were developed. These themes can also be evaluated as generic digital player types.

The number of studies which investigate player types are quite limited in the literature, however there are several studies that uses player types as an individual difference (dos Santos, Bittencourt, & Vassileva, 2018; Gelder, & Kovenock, 2017; Gil, Cantador, & Marczewski, 2015; Kuo & Chen, 2019; Park & Kim, 2017). The common deficiency of these studies is ignoring the contextual and cultural suitability of generic player typologies and using clear-cut player types in their research processes. Any significant trend was observed during the literature review. Testing former player typologies in gamified environments, evaluating different performance indicators or investigating effects of different player types on motivation and engegament variables.

The themes revealed in this research are also generic player types based on the synthesis of the research findings. These codes suggest that player types refer to differences that are dependent on more than one variable. It seems that in developing player typologies instead of clear-cut categories, archetype categories which may include various attributes at the same time should be identified and the dominant tendency should be made clear.

The player typologies covered in the study are mostly based on digital game settings and definitions. On the other hand, in developing such typologies the game setting is very significant. Therefore, these player typologies were developed based on the game setting or context. For instance, if a player typology was developed without considering social dimension it means that that typology was developed based on other variables (i.e., game speed, motivation for the game, attitudes, etc.). In order to develop a player typology that may be mutually agreed the players should be offered many opportunites irrespective of context/setting/the type of play. On the other hand, the variety of codes that make up the themes and theme codes indicates the fact that there are important variables such as personality trait, perception, attitude, motivation that all direct the behavior of the player types. Player typologies as an ingredient of individual differences can be useful for designers of learning-teaching settings, researchers and teachers to be much more informed about learning characteristics and to better guide learning processes. For player typologies to be effective in learning environments as an ingredient of individual differences, one needs to explain how certain games feed interests of particular play styles. On the other hand, these player models can be expected to provide descriptive and predictive power to game designers (Stewart, 2011).

The core context that can be reasoned based on the findings of this current study is the usage of individual differences in teaching-learning processes. Gamification and the other game based learning processes are the powerful approaches which can provide solutions for problematic issues in learning/teaching as motivation (Buckley & Doyle, 2016), engegament (Looyestyn, Kernot, Boshoff, Ryan, Edney, & Maher, 2017), problem solving (de la Peña Esteban, Torralbo, Casas, & García, 2019), or critical thinking (Kingsley & Grabner-Hagen, 2015). These game centered approaches get their educational strength from one of the basic instincts of humankind, "playing". In this respect using gamification or other game centered approaches can be resulted with effective and permanent learning. But at this point, it is important to comprehend that every individual has its own attributes and every individual may react differently in different game based approaches. In line with these estimations, the findings of this current study reveal that gamer typologies can be formed based on different variables however these formations may also be influenced by methodologies used or the characteristics of the participants especially culture as well. This study introduces the necessity of investigating gamer types as an individual difference, suitable with cultural context, and with a proper scientific approach. Creating a national gamer typology with a proper scientific approach will be an important move and supporter for using gamer types in individualised learning scenarios by teachers, teacher mentors or educational researchers. According to this perspective, this current research may provide clues about adapting the instructional content to learning processes.

It has been found out that some of the studies employed only quantitative methods while the others only qualitative methods. However, in some studies the player typologies were developed using the data from the scales which did not cover the measurement or observation of game experience in real game settings. It is one of the weak points about the content and reliability of player typologies developed up to now. Particularly it is significant to collect data through quantitative data through clustering analysis of the in-depth interviews to develop player typologies which are used as an ingredient of individual differences in the technology-based education settings. In addition, the key factor in the study was the selection of the studies which involved the observation of the players in multi-player game situations to produce player typologies. It is found that the research processes in the studies reviewed were not tested using the complementary factors and verification methods. Although there is no common point in the studies reviewed in terms of game types, as stated earlier those studies which focused on multi-player game settings were selected which makes it possible to generalize the findings of the study on player types (Hamari & Tuunanen, 2014). The study also analysed the age range of the participants in the studies reviewed. The

participants of the studies which produced a classification of digital game players were mostly young adults or adults. The reactions of the individuals from different age groups to similar game elements may be analysed in future studies.

The findings of the study suggest that if educational processes which are based on games are to take into account individual differences the player types should first be identifies and the educational process should be designed based on this classification. Player typologies have cognitive, social, behavioural and psychological dimensions. In this context individual behaviors can be observed by establishing a relational structure related to player typologies, by creating new player typologies suitable for different platforms or educational processes and appropriate process or platform. The variety of player types allows for the observation of the behavior of these player types in various social networks. Therefore, in the semi-experimental studies the player characterics should be analysed through face-to-face interviews or in online settings.

Playing games is one of the basic instincts that is closely related to learning and is also one of the significant cultural facts. Therefore, changes in culture and language that involve the game can also change the tendencies and motivations related to the game. In other words, although the player classification developed in a specific culture is meaningful in similar cultures, it does not provide a useful explanation in different cultures. Hence culture-specific player typologies are needed to provide scientific explanation for individual differences in educational settings.

Acknowledgments

A short abstract of this study was presented at 5th International Eurasian Educational Research Congress 2018.

References

Annetta, L. A., Folta, E., & Klesath, M. (2010). *V-Learning: Distance education in the 21st century through 3D virtual learning environments*. Springer Science & Business Media.

Balcı, A. (2011). *Sosyal bilimlerde araştırma: Yöntem, teknik ve ilkeler [Research in social sciences: Methods, techniques and principles]*. Ankara: Pegem A Publishing

Bartle, R. (1996). Hearts, clubs, diamonds, spades: Players who suit MUDs. *J. MUD Res.* ***1***(1), 19

Bartle, R. (2003). A self of sense. Retrieved 01 December 2018 from http://www.mud.co.uk/richard/selfware.htm / Last Accessed.

Buckley, P., & Doyle, E. (2016). Gamification and student motivation. *Interactive learning environments*, *24*(6), 1162-1175.

Cowley, B., Charles, D., Black, M., & Hickey, R. (2013). Real-time rule-based classification of player types in computer games. *User Modeling and User-Adapted Interaction*, *23*(5), 489-526.

de la Peña Esteban, F. D., Torralbo, J. A. L., Casas, D. L., & García, M. C. B. (2019). Web gamification with problem simulators for teaching engineering. *Journal of Computing in Higher Education*, 1-27.

dos Santos, W. O., Bittencourt, I. I., & Vassileva, J. (2018). Design of tailored gamified educational systems based on gamer types. In *Anais dos Workshops do Congresso Brasileiro de Informática na Educação* (Vol. 7, No. 1, p. 42).

Drachen, A., Canossa, A., & Yannakakis, G. N. (2009). Player modeling using self-organization in Tomb Raider: Underworld. In *Computational Intelligence and Games, 2009. CIG 2009. IEEE Symposium on* (pp. 1-8). IEEE.

Erkuş, A. (2011). *Davranış bilimleri için bilimsel araştırma süreci [Scientific research in behaviourial sciences]*. Ankara: Seçkin Publishing

Ferro, L. S., Walz, S. P., & Greuter, S. (2013). Towards personalised, gamified systems: an investigation into game design, personality and player typologies. In *Proceedings of The 9th Australasian Conference on Interactive Entertainment: Matters of Life and Death* (p. 7). ACM.

Fleischmann, K., & Ariel, E. (2016). Gamification in Science Education: Gamifying Learning of Microscopic Processes in the Laboratory. *Contemporary Educational Technology, 7(*2), 138-159.

Fullerton, T. (2008). Working with Dramatic Elements. In *Game Design Workshop. A playcentric approach to creating innovative games.* Morgan Kaufmann, Burlington, MA

Gelder, A., & Kovenock, D. (2017). Dynamic behavior and player types in majoritarian multi-battle contests. *Games and Economic Behavior*, *104*, 444-455.

Gil, B., Cantador, I., & Marczewski, A. (2015). Validating gamification mechanics and player types in an e-learning environment. In *Design for Teaching and Learning in a Networked World* (pp. 568-572). Springer, Cham.

Götzenbrucker, G., & Köhl, M. (2009). Ten years later. *Eludamos. Journal for Computer Game Culture*, *3*(2), 309-324.

Hamari, J. (2017). Do badges increase user activity? A field experiment on the effects of gamification. *Computers in human behavior*, *71*, 469-478.

Hamari, J., & Tuunanen, J. (2014). Player types: A meta-synthesis. Retrieved 15 November 2018 from https://tampub.uta.fi/bitstream/handle/10024/99064/player_types_a_meta_synthesis.pdf?sequence=1

Hanlon, M. (2006). Survey reveals U.S. gamer market is diversifying. Retrieved 09 November 2018 from https://newatlas.com/go/6097/

Hanus, M. D., & Fox, J. (2015). Assessing the effects of gamification in the classroom: A longitudinal study on intrinsic motivation, social comparison, satisfaction, effort, and academic performance. *Computers & education*, *80*, 152-161.

Huizinga, J. (1955) *Homo Ludens: A Study of the Play Element in Culture*. Boston: The Beacon Press.

Kapp, K. M. (2012). *The gamification of learning and instruction: game-based methods and strategies for training and education.* John Wiley & Sons.

Kingsley, T. L., & Grabner-Hagen, M. M. (2015). Gamification: Questing to Integrate Content Knowledge, Literacy, and 21st-Century Learning. *Journal of Adolescent & Adult literacy*, *59*(1), 51-61.

Kirriemuir, J., & McFarlane, A. (2004). Literature review in games and learning. A NESTA Futurelab Research report - report 8. 2004. Retrieved 02 December 2018 from http://www.savie.ca/SAGE/Articles/1236-KIRRIEMUR-2004.pdf

Klopfer, E., Osterweil, S., & Salen, K. (2009). *Moving learning games forward*. Cambridge, MA: The Education Arcade.

Koivisto, J., & Hamari, J. (2014). Demographic differences in perceived benefits from gamification. *Computers in Human Behavior*, *35*, 179-188.

Kuo, C. M., & Chen, H. J. (2019). The Gamer Types of Seniors and Gamification Strategies Toward Physical Activity. In *International Conference on Human-Computer Interaction* (pp. 177-188). Springer, Cham.

Landis, J. R., & Koch, G. G. (1977). The measurement of observer agreement for categorical data. *Biometrics*, 159-174.

Looyestyn, J., Kernot, J., Boshoff, K., Ryan, J., Edney, S., & Maher, C. (2017). Does gamification increase engagement with online programs? A systematic review. *PloS one*, *12*(3), 1-19.

Marczewski, A. (2015). *User Types. In Even Ninja Monkeys Like to Play: Gamification, Game Thinking and Motivational Design* (1st ed., pp. 65-80). CreateSpace Independent Publishing Platform.

McMillan, J. H., & Schumacher, S. (1984). *Research in education: A conceptual introduction*. Little, Brown.

Moller, L., & Huett, J. B. (2012). *The Next Generation of distance education*. Springer.

Monterrat, B., Desmarais, M., Lavoué, E., & George, S. (2015). A player model for adaptive gamification in learning environments. In *International conference on artificial intelligence in education* (pp. 297-306). Springer, Cham.

Nacke, L. E., Bateman, C., & Mandryk, R. L. (2011). BrainHex: preliminary results from a neurobiological gamer typology survey. In *International Conference on Entertainment Computing* (pp. 288-293). Springer, Berlin, Heidelberg.

Park, S., & Kim, S. (2017). A Validation of Differences in Academical Achievement among Bartle's Player Types in Educational Gamification Environments. *Journal of Korea Game Society*, *17*(4), 25-36.

Schuurman, D., De Moor, K., De Marez, L., & Van Looy, J. (2008). Fanboys, competers, escapists and time-killers: a typology based on gamers' motivations for playing video games. In *Proceedings of the 3rd international conference on Digital Interactive Media in Entertainment and Arts* (pp. 46-50). ACM.

Sezgin, S., Bozkurt, A., Yılmaz, E. A., & van der Linden, N. (2018). Oyunlaştırma, Eğitim ve Kuramsal Yaklaşımlar: Öğrenme Süreçlerinde Motivasyon, Adanmışlık ve Sürdürebilirlik [Gamification, education and theoretical approaches: motivation, engagement and sustainability in learning processes]. *Mehmet Akif Ersoy University Journal of Education Faculty*, (45), 169-189.

Sezgin, S., & Yuzer, T. V. (2017). Games As Futuristic Tools: Looking For An Advanced Definition. In *Conference Proceedings of the 10th International Conference of Education, Research and Innovation ICERI* (pp. 8512-8521).

Stemler, S. (2001). An overview of content analysis. *Practical Assessment, Research & Evaluation*, *7*(17), 137-146.

Stewart, B. (2011). "Personality And Play Styles: A Unified Model." Retrieved 02 December 2018 from: http://www.gamasutra.com/view/feature/6474/personality_and_play_styles_a_.php.

Tondello, G. F., Wehbe, R. R., Diamond, L., Busch, M., Marczewski, A., & Nacke, L. E. (2016). The gamification user types hexad scale. In *Proceedings of the 2016 annual symposium on computer-human interaction in play* (pp. 229-243). ACM.

Vahlo, J., Kaakinen, J. K., Holm, S. K., & Koponen, A. (2017). Digital game dynamics preferences and player types. *Journal of Computer-Mediated Communication*, *22*(2), 88-103.

Walsh, D., & Downe, S. (2005). Meta-synthesis method for qualitative research: a literature review. *Journal of Advanced Nursing*, *50*(2), 204-211.

Wang, C. H., Hsu, Y. C., Yeh, P. C., Lin, C. Y., & Lai, I. W. (2016). Edventure: Gamification for collaborative problem design and solving. *In Information Technology Based Higher Education and Training (ITHET)*, 2016 15th International Conference on (pp. 1-5). IEEE.

Whang, L. S., & Chang, G. (2004).Lifestyles of virtual world residents: Living in the on-line game 'lineage'. *CyberPsychology & Behavior*, *7*(5). 592-600.

Xu, Y., Poole, E. S., Miller, A. D., Eiriksdottir, E., Kestranek, D., Catrambone, R., & Mynatt, E. D. (2012). This is not a one-horse race: understanding player types in multiplayer pervasive health games for youth. In *Proceedings of the ACM 2012 conference on computer supported cooperative work* (pp. 843-852). ACM.

Yee, N. (2006). Motivations for play in online games. *CyberPsychology & Behavior*, *9*(6), 772-775.