

Future Instructional Design in Game-based Learning and Gamified Learning: The Construction and Incorporation of Player Typology Family Tree in the Educational Context

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ABSTRACT

Games are not merely for entertainment purposes but rather a powerful tool to be used in the education sector, its use in teaching can be traced back all the way to ancient civilizations. On the other hand, the concept of gamification that is gaining prominence over the past decade holds the idea of harvesting the core of games by the extraction of its elements and applying it in everyday mundane activities. With the rising usage of games and gamification in the educational context, the familiarity of educators and instructional designers to comprehend player types is more crucial than ever before. Thus, the authors of this study conducted a systematic review with the collection of player typology works from 62 authors and restructured it into a family tree with the hope to shed light and bring new insight to fellow educators. The authors successfully identified four main branches of player typology namely the equipment branch, synthesis branch, psychoanalysis branch and demeanor branch which could then be incorporated within an educational context via instructional design.

Keywords: player types; player traits; player typology; game-based learning; gamification



INTRODUCTION

According to Clement (2021), there is an estimate of 3.24 billion gamers across the globe in 2021. By achieving 178.73 billion dollars of revenue in the gaming industry in 2021, the numbers are expected to achieve steady growth, reaching 268 billion dollars by the year 2025 (Video game industry statistics, trends and data in 2022, 2022). And followed by the trend of this, is the emergence of a new literacy- game literacy, which is the competency of reading, writing and designing video games (Caperton 2009). Or as Zimmerman (2021) put it, the capability to comprehend and generate precise meanings. Games are challenging and life-enhancing which is analogous to what learning is (Selfe et al., 2016). Not only are games complicated, strenuous and time-consuming; yet they hold the potential to create a relaxed and motivating environment which is ideal for learning to occur (Prensky, 2001; Squire 2021). Information seeking, information selection, strategy development, conflict settlement and problem-solving are all aspects that could be found in games which urge students to learn actively, collaborate with others, associate themselves with the games and understand better (Ahmad & Jaafar 2012).

Thus, the endless possibility of the incorporation of games within the educational context hold prompted the birth of various educational games, serious games, simulation games etc. Consequently, it is important for educators to identify the types of players learners are to compose a suitable strategy, instill the right game mechanisms and develop relevant materials. Whether it is gamified learning (use game elements to gamify the learning process) or game-based learning (use games in educating learners), without a doubt there is a raising need for educators to discern the knowledge of player classification. Thus, the authors aim to structure previous player typology studies into a family tree for three purposes which include i) to identify the possible trends that might evoke in the future, ii) to understand the relationship between various player typology studies and iii) to incorporate it within the educational context. The authors hope that the current study could shed light and provide new insight for teachers, instructional designers, and other educators by categorizing players (or learners) in an integrated manner to better accommodate their needs.

LITERATURE REVIEW

Player Categorization

Researchers employ many categories of psychological variables to characterize an individual's behavioral inclinations across time and across settings as "personality" which include needs, motives, encoding strategies, characteristics, and other constructs (Canossa et al., 2015). With its own pros and cons, personality (player) types and personality (player) traits exemplify two distinctive approaches toward personality (Quenk, 1993). Type theory which origin could be traced back to humourism is a system theory that follows a stringent class division structure, trait theory on the other hand is referred to as the static view of individuals' inclination towards a particular human behavior (Ferro et al, 2013; Geyer & Myers, 2014 & Singh, 2020). The work done by Canossa et al. (2015) and Zammitto (2010)



successfully highlighted the significant connection between personality and players' behavior in games which could be deduced that the idea of player types and player traits coincide with the important place that personality theory holds.

Additionally, segmentation can be understood as the separation of individuals into groups based on certain characteristics. The concept of segmentation is believed to be originated from marketing which is the separation of consumers while grouping them together based on their distinct demands and desires, Decker and Goyat (2011) define it as the process of subdividing the market into a homologous group. Similarly, in games, players could be segregated based on their gaming needs or their attraction to a particular game mechanism. Hamari and Tuunanen (2014) mentioned that there are four types of segmentation and putting them in the context of games namely:

Table 1		
Types of Segme	entation (Source: Hamari & Tuuna	anen, 2014)
Types of	Definition	Implications in the game context
segmentation		
Geographical segmentation	The categorization of players based on their location	Game etiquette and game culture may vary in different countries.
Demographic segmentation	The categorization of players based on their descriptive features	Game preferences may differ according to players' gender, age etc.
Psychographic segmentation	The categorization of players based on their psychological aspects	Players' personality, attitude, interests and values.
Behavioral segmentation	The categorization of players based on their behavior pattern	Players' playing patterns and in- game performance.

Player Motivation

According to Graham and Weiner (2011), the study of motivation examines the factors that initiate, direct, energize, sustain, and ultimately terminate behavior in people or other species. Motivation is the process of starting, maintaining, and guiding goal-oriented behaviors that involves multiple dimensions including emotions, social, cognitive and biological level (Cherry 2022). There are several views on how researchers perceived the concept of motivation. Ryan and Deci (2000a) proposed that motivation is concerned with energy, direction, and perseverance and all components of activation and intention are equal. While other researchers like Murray (1988) and Maslow (1943) explained the emergence of motivation from the satisfaction of goal-oriented human needs. Moreover, the Octalysis Gamification Framework designed by Yu Kai (2019) mentioned that there are eight core drives with a ninth hidden core drive known as sensation that motivates users which consists of epic calling and meaning, development and accomplishment, empowerment of creativity and feedback, ownership and possession, social influence and relatedness, scarcity and impatience, unpredictability, and curiosity, and lastly loss and avoidance. In addition, Martin et al. (2021) proposed the sphere of motivation typology after analyzing and synthesizing 30 studies related to player types which comprise two motivational factors namely internal



scope and external scope. Internal scope which encompasses of mastery and experience which are asserted to be motivations that could be regulated by game developers with game mechanisms while external scope that includes social and benefit are motivations that could only be facilitated and is beyond the control of game developers.

Self-determination Theory

In self-determination theory, motivation occurs when the needs of autonomy, competence and relatedness are fulfilled (Ryan & Deci, 2000a). Motivation could be categorized based on the various motives or objectives that motivate action, the basic classification of motivation would be intrinsic motivation- the act towards a particular behavior due to the fundamental of fascination and pleasure; and extrinsic motivation- a driven action by cause of producing a distinct result (Ryan & Deci, 2000b). Yet, it should be noted that extrinsic and intrinsic motivation are not necessarily opposed to each other (Dahlstrøm, 2012). A good design should always direct extrinsic motivation towards intrinsic motivation (Zichermann & Cunningham, 2011). And the study of Razali et al. (2020) did show a significant relationship between gamification and intrinsic and extrinsic motivation.

Need Theory

Murray (1988) view needs as intellectual and perceptual abilities that are organized and directed by a physicochemical force in the brain. Needs are dynamic that constitute three stagesemergence, existence and erosion (Xu et al., 2020). Murray (1988) listed 20 needs that could be separated into four types namely primary and secondary needs, reactive and proactive needs. However, Bostan and Kaplancali (2010) later categorized the needs into six groups within the context of games namely materialistic needs, power needs, affiliation needs, achievement needs, information needs and sensual needs. On the other hand, Maslow (1943) claimed that all humans succumb to the state of being motivated and motivating in the pursuit of a hierarchy of needs. The basic needs which start out from the base of the pyramid and move upwards consist of physiological needs, security needs, belongingness needs, esteem needs, and selfactualization needs. Pink (2010) argued that the basic levels of needs are mostly fulfilled in modern society and proposed that the achievement of self-actualization required three extra motivational factors namely purpose, autonomy, and mastery. Graham (2014) suggests that the ownership of games, social elements of games, players' development and accomplishment, the belief, exploration desire and mastery of players all are conformed to Maslow's hierarchical needs at each level.

METHODOLOGY

To construct the family tree of player typology, the identification of related studies is needed. Porritt et al. (2014) mentioned that according to Joanna Briggs Institute (JBI), a review requires the following steps including i) formulate a review objective and question, ii) define inclusion and exclusion criteria, iii) perform a comprehensive search of the literature, iv) select studies for critical appraisal, v) appraise the quality of the selected studies using one or more standardized tools, vi) extract data according to template, vii) analyze, synthesize and summarize data, viii) write up findings and draw conclusion. Moreover, Aromataris and Pearson (2014) proposed four steps in reviewing consisting of i) review questions and inclusion criteria, ii) study selection and critical appraisal, iii) data extraction and synthesis and lastly iv) interpretation of findings and recommendations. However, regardless of the number of steps, the characteristics are mostly similar and are accepted globally. Thus, the authors decided to



adopt five steps when it comes to constructing a review study as suggested by Khan et al. (2003) as it is more suitable for the current study. The steps are summarized and shown below:

Stage 1: Framing the question.

The authors are curious about the connection between each type of player types proposed by different researchers. Thus, forming the research question below. Research question 1: What is the trend in player typology studies? Research question 2: How are different player types connected to one another? Research question 3: How should the player types be applied in various phases of education?

Stage 2: Identifying relevant publications.

The aim of a systematic review is to be as extensive as possible. The authors carried out targeted research on various research articles and resources relevant to the key term's player types, player traits, player typology and player segmentation. The search was done on published and unpublished works on different platforms including reference lists from previous researchers, electronic databases such as Google Scholar, Research Gate and even researchers' blogs. The articles and studies are chosen based on the following inclusion and exclusion criteria as shown in Table 2 below:

Table 2

Inclusion and exclusion criteria

Inclusion Criteria	Exclusion Criteria
-Written in English	-Not written in English
-Player types, player traits, player persona and player typology are relevant to research articles for games, gamification, game-based learning	-Playing styles, sports players, types of play, types of game characters
and gamified learning.	-personality types, personality traits relevant research articles.
- Original studies of authors in books/ book	
chapters, blogs, online sources, journal articles	-Classification of games, and game
- Extensions of the original work of authors	Semest
	-Duplicated publication
- Works that are published from 1996-2022	
	- Studies that:
	i. reused the player types/ traits of the original work ii. non-accessible
	iii. contains degrading elements/ content

Stage 3: Assessing study quality.

After the collection phase was completed, it resulted in the amass of irrelevant studies. The authors would also have to seclude repetitive studies and work that is being reused by other researchers. Having read the articles in full, a total of 62 proposed player types were selected and included in the review.



Stage 4: Summarizing the evidence.

Information on each selected literature is then recorded in a table. The information of the studies includes the author(s), publication, research method, number of participants, the field of study, name of the games used for the study and the implications of the study.

Stage 5: Interpreting the findings.

The findings were first recorded in graph form to identify the trends of player types over the years. It will then be remodeled into a family tree structure based on each player type's features on different level.

FINDINGS



Figure 1: The Trend of Player Typology Studies

Based on the data obtained, without a doubt, the authors found out that the categorization of players is mainly done in the field of entertainment (n= 40) as shown in Figure 1 throughout the years. And most of the player types feature the genre of Massive Multiplayer Online Role-Playing games (MMORPG) as it is assumed that the observation of the interaction with other players could be done. However, in comparison with the entertainment field, it seems that there is still a lack of research studies on player typology that address the context within other fields. The player types that are specifically constructed for gamification (n= 8) have only started between the years 2011-2015. Player types identified for game-based learning and gamified learning (n=10) are all categorized under the education field by the authors in this article for easier classification. the formulation of player types/ traits specifically for educational purposes resides with a total of 10 studies, consisting of 1 synthesis study, 6 studies on game-based learning, 1 study on gamified learning and 2 studies which are not specified. The subjects used for player types studies found include Social Sciences, Marketing, and Pure Sciences. Although player types in the marketing fields (n=3) had been done between the year 2001-2010 to identify consumers' behaviors, it ceases to exist in recent years. However, with the increase in the incorporation of games and gamification in business use, it is speculated that more player typologies in the business field will emerge in coming years as the emergence of new trends in the investment field (n=1) is noticed.

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Figure 2. The Family Tree of Player Typology Studies





Based on the literature works that were found, an analysis of the works of previous researchers was done and the information of each study was summarized and listed in appendices section below. The authors view the constructed family tree as shown in Figure 2 from two dimensions which are game and gamification even though there are arguments regarding the relationship between the two terms on whether gamification is the total separation from games (Deterding et al., 2011) or as the subset of games (Stanley, 2015). It is presumed that the player types are interchangeable within these two dimensions. Dark lines are used to highlight the branches each work belongs to while dotted lines are used to show the derivation or modification from certain work. Four main branches of the player typology family tree were successfully identified. The branches of player typology include i) Equipment branch- player types that were separated based on the devices they use for gaming. ii) Synthesis branch- player types that were categorized based on the synthesizing of various research work. iii) Psychoanalysis branch- player types that were segmented based on the examination of players' personalities and motivation. And lastly iv) Demeanor branch- player types that were divided based on how players react and behave to/in games.

Although only four main branches were included, a notable mention of the Bartle branch (boxes in red color) based on the derivation of Bartle's (1996) work that includes all the works derived and influenced by the author, exhibits the prominent position it holds as the antecedent player typology study. The authors concluded that the work of player types is mostly done within the Demeanor branch (N=34). Upon closer inspection, the Demeanor branch can be further separated into the subbranches of habit, performance, mechanisms, strategy, and time. Even though the subbranches of habit and performance sound the same, they can be distinguished through the methods of identifying player types. The habit subbranch group players based on the behavioral pattern or attitudes of individuals. While on the opposite, the performance subbranch categorizes players through measurable scores and scales, or how well they achieve. Moreover, the mechanism subbranch divides individuals based on the features, game elements or game mechanics that players are interested in. As the name suggested, the strategy subbranch and time subbranch identified player types through the playing strategy/ approach of players and the length of time players spent in games respectively. Anyhow, the occurrence of combination between multiple subbranches is possible such as in the work by Kallio et al. (2011) and Jacobs (2005). On the other hand, the psychoanalysis branch consists of 16 studies, ranking the second highest branch in player typology studies. Out of the 5 studies within the synthesis branch, the works of Ferro et al. (2013), Sezgin (2020) and Cömert and Samur (2021) are presumably able to be used in both dimensions due to the combinations of both player types. Moreover, the equipment branch contains 2 studies whilst the mixed branch consists of 5 studies that entail both the test on the behavior and motivation of players. Furthermore, most of the player types of studies were conducted by using games and merely 5 player types studies were constructed entirely within the gamified dimension.

Though the practicality of other player types for games should not be entirely excluded for educational use, the common types that appear in most of the player typology studies within the educational field include achievers/ challenge seeker and challenge avoider type, which was supported by the findings of Sanmugam (2021) which stated competitive learning environment is responsible for fostering such traits. To apply the player types of branches in



education, the authors proposed the implementation along with ASSURE model as shown in Figure 3 below that is intended to develop more efficient learning that suited the context of today the wide use of digital games/gamification that caters for learners using multimedia and technology (Al-Kattatl et al., 2019). ASSURE model contains six stages, namely i) analyze learners, ii) state standards and objectives, iii) select methods and media, iv) utilize media and technology, v) require learner participation and vi) lastly evaluate and revise. As proclaimed by Santos et al. (2021), player types are unstable and gradual change occurs over time; constant monitoring of students' player types is required and thus the different branches can be applied in different stages of instructional design. It is advised that the synthesis branch could be used prior to the stage of analyzing learners as the instructional designer can first familiarize with the existing player types or for referencing purposes choose the appropriate player types for the lesson designed. Next, the psychoanalysis branch could be implemented in the stages of analyzing learners and stating standards and objectives to first understand the needs and motivation of learners. After that, the use of equipment branches in select methods and media and utilize media and technology to ensure the suitable platform and devices used for students. Lastly, the demeanor branch can be used in the final two stages of ASSURE model to observe the behavior of students within the game-based learning/ gamified learning environment which can later be used for modification purposes.



Figure 3. Implementing Player Types Branches in ASSURE Model

LIMITATIONS

The limitation of this study includes the unavailability of the authors to gather all existing player typology studies due to restriction of access to certain materials. Besides, it is certainly challenging as well for the authors to determine which of the player types is the best and identify the suitability of each player type in separate fields. Furthermore, the interchangeability of all player types between two dimensions is yet to be confirmed although theoretically, players should be able to anticipate gamification and game-like activities as games.

CONCLUSION AND RECOMMENDATIONS

In short, previous studies on player typology can be primarily divided into four branches namely the equipment branch, synthesis branch, psychoanalysis branch, and demeanor branch. To entail it within the educational context, the equipment branch may be employed by instructional designers to identify the suitable platform or device for students, the synthesis branch, however, is suggested to be used to identify players who are involved in both dimensions. Nevertheless, the psychoanalysis branch could be used prior to the game study to



determine the motive of students for the construction and gathering of instructional materials and lastly, the demeanor branch should be used for the post-game study to understand the behavior of students and the modification of content could be done based on the result.

The author recommended that player typology studies could be done on a variety of game genres or newly emerged game technology such as virtual reality games and mixed reality games to analyze how players behave in these new gaming environments. The authors also suggested that the family tree of player typology would need the inclusion of more works from other researchers, and it could be analyzed in different views such as game genre, types of play, types of fun and more to provide readers with a more complete picture.

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Appendices

Authors	Player types/ traits	Methods/ Analysis	Sample	Field/ Game(s)	Implications
(R. Bartle, 1996)	Killers, Achievers, Socialisers, Explorers	Open-ended online discussion	N=30	Multi-User Dungeon (MUD)	Presented dynamics of player model.
(Laws, 2001)	The power gamer, the but kicker, the tactician, the specialist, the method actor, the storyteller, the casual gamer	-	-	RPG	Derived from the work of Glen Blacow.
(R. A. Bartle, 2004)	Politicians, Griefers, Opportunists, Planners, Hackers, Scientists, Networkers, Friends	-	-	MUD2's elder game	Incorporate implicit an explicit dimensions int player types.
(Whang & Chang 2004)	Single oriented player, Community-oriented player, off-real world player	Survey	N= 4786	Internet-based game: Lineage	Real-life lifestyles wer compared with their values and attitudes in the real world.
(Jacobs, 2005)	Hardcore gamers, casual gamers	Survey, Factor & cluster analysis	N=100	Game development, marketing	Attitude/experience segmentation should be seriously considered by game makers.
(Lee et al., 2005)	Performance only, super achiever, non-achiever, mastery only	Survey	N= 432	Education, Psychology	Approaching player types that are based on mastery and performance gaming achievement goals.
(Pokerprofessor, 2005)	Loose passive, tight passive, Loose-aggressive Tight-aggressive,	-	-	Poker	The work summarizes players based on their working strategy.
(Yee, 2006)	Achievers, Socializers, Immersionalist	Survey	N= 3000	MMORPG	Relating player motivation with usage patterns, in-game behaviours and demographic variables
(Williams et al., 2006)	High centrality players, Low centrality players	Quantitative & Qualitative	-	MMORPG: World of Warcra	It was discovered that players used games as platform to form social relationships at differen levels.
(You et al., 2007	Socializer, Moderator, Fighter	Game database Cluster & payment analysis	N= 3712	MMORPG: "Zh: Guo"	Proposed a player taxonomy model for mobile MMORPG.
(Jackson & Steemers, 2008)	Explorer, Self-stampers, social climbers, fighters, collector, power users, lif system builders, nurturers	Quantitative and Qualitative	N= 90	Games: Adventure Rock Immersive game	Suggested 13 principle for a successful virtual world for kids.
(Magerko et al., 2008)	Explorer, achiever, winne	Quantitative	N=30	Education, Mini game: S.C.U.R.B.	Educating ways of preventing the spread of pathogens.
(Schuurman et al 2008)	Fanboys, competers, escapists, time killers	Online survey K-means clustering	N= 2985	Games	Presented 11 basic gan motivations.
(Fullerton, 2008)	The Competitor, The Explorer, The Collector, The achiever, The joker The artist, The director, The storyteller, The performer, The craftsman	-	-	Game design	Explain the pleasure of play from the players' point of view.
(Heeter et al., 2008)	Achievers, Impression Managers, Explorers	Individual game analyses	N=8	Games MMO,	The work discusses about challenge



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				0	
				Educational games	avoiders in several games and also dwell with player motivation
(Drachen et al., 2009)	Veterans, Solvers, Pacifists, Runners	Gameplay data Kohonen map	N= 1365	Tomb Raider: Underworld	The visualization of the ESOM map showed based on 6 statistical features.
(Gerit Götzenbrucker & Köhl, 2009)	Communicative role players, Anarchists, stead gamers, designers	Mixed method	N= 15	MMORPG	Long term study towards gamers.
(Hamari & Lehdonvirta, 2010)	Avatar level and classes	-	-	Marketing	Vertical segmentation of players based on players' avatar level.
(Zackariasson et al., 2010)	Thinkers, Believers, Achievers, Strivers, Experiencers, Makers	Qualitative	-	Marketing MMOG: World Warcraft	Proposed there is a connection between buying behaviour in th virtual and real world.
(Bateman et al., 2011)	Logistical, tactical, strategic, diplomatic	Questionnaire	N= 1040	Games	DGD2 model that coul be transferred to Myers Briggs typology easily
(Tseng, 2011)	Inactive gamers, social gamers, aggressive gamer	Questionnaire (EFA)	N= 228	700 contemporar digital games	Two factors that affect the motive of players are the need for exploration and the nee for conquering.
(Stewart, 2011)	Artisan, Guardian, Rational, Idealist	Combination of Keirsey Temperaments	-	-	Providing Bartle's player types from a psychoanalysis perspective.
(Kallio et al., 2011)	Committed gamers, casua gamers, gaming companions.	Quantitative & Qualitative	P1: N= 4000 P2: N= 73	Games The Sims	InSoGa model was presented featuring 9 ways of play.
(McMahon et al., 2012)	Conqueror, Manager, Wanderer, Participant	Online survey	N= 113	Fallout New Vegas	Successfully established a relationship between player types and personality.
(Xu et al., 2012)	Achievers, active buddies social experience seekers team players, freeloaders	Pedometer for step data collection	N= 1743	Multi-user health game: American Horsepower Challenge (AHPC)	The deployment of group-based competition does not lead to cooperative behaviour.
(Ferro et al., 201	Dominant, Objectivist, Humanist, Inquisitive, Creative	Synthesis of previous works	N= 8	Games & Gamification	The author synthesises five class of players by associating them with personality and relating it to game elements and mechanics that suits th players.
(Marczewski, 2013)	Socializers, Free Spirits, Achievers, Philanthropist Networkers, Exploiters, Consumers, Self-seeker	Further work on Bartle's player types	-	Gamification	Categorizing players based on their intrinsic and extrinsic motivation.
(Manrique, 2013	Socialisers, goal-seekers, achievers, networkers, sel seekers, farmers, enjoyers	Extended work of combined model of gamification user types and Well-being theories	-	Gamification	The segmentation of players are based on time engagement pyramid.
(Hamari & Tuunanen, 2014)	Achievement, Exploration Sociability, Domination, Immersion	Synthesis of previous work	N=12	Games	The uniformity of five key dimensions is four in previous work.



(Nacke et al	Seeker Survivor	Online survey	N = 50423	Games	Provide a
(1 (ache of all,))	Daredevil Mastermind	omme survey	11- 50125	Guines	neurobiological insight
2014)	Conqueror Socialiser				on player typology wit
	A chiever				the Proin Hay model
(IZ' 2014)	Achievel	Manala			the Brannex model.
$(K_{1}m, 2014)$	Competitors,	Mapping	-	Casual, Social,	The author wish to
	Collaborators, Expressers	personality		Educational	describe the
	Explorers	system and playe		games	motivational patterns
		motivation			that occur in casual
					games, deriving from
					Bartle's work.
(Dyon 'Laugh'	Brain Heart Body	Interviewing F		Fighting Games	The categorization of
(Ryan Laugh Abn 2015)	Drain, ficart, Dody	sport playors	-	Fighting Games	players were done have
Allii 2013)		sport players			players were done base
					on now the players
					strategize their play in
		-			fighting games.
(Foundry, 2015)	Acrobat, Garderner,	Gamer	N=500000	Quantic	The author suggested
	Slayer, Skirmisher,	Motivation		Card games	that there are 81
	Gladiator, Ninja, Bounty	Profile analysis			possible combination of
	hunter, Architect, Bard				player types based on
	· · ·				each individual's
					dominant and secondar
					gamer types
(Kahn et al. 201	Socializars	Server side dete	N-27446	MORA & MMO	The authors greated on
(Kallif et al., 201.	Completionists	Server-side data	N=37440	League of	validated the motivation
	Completionists,	& Survey data		League of	valuated the motivatio
	competitors, Escapists,			Legends &	scale in two genres of
	Story-driven, smarty-pant			Chevalier's	online games.
				Romance Online	
				3	
(Vahlo et al.,	The mercenary, The	Survey	N=1717	Games	The author presented a
2017)	companion, The	Factor analysis			core game dynamic
	commander, The				preference scale (CGD
	adventurer. The explorer.				scale)
	The daredevil The				
	natterner				
(Slater et al	Achievers Explorers	Latent Class	N-138	Education	The author presented
(0.00000000000000000000000000000000000	Disengaged players	Analysis (I CA)	11-150	Physics	the manifestation of
2017)	Discligaged players	Allarysis (LCA)		Disconound	Dortlo's traclosuria o
				Playground	Bartie's typology in a
(T. 1.11 . 1		G	N. 100	a	single-player game.
(Tondello et al.,	Philanthropist, Socializer.	Survey	N=133	Gamification	The authors proposed
2018)	Free spirit, Achiever,				five traits namely
	Disruptor, Player				aesthetic orientation,
					narrative orientation,
					goal orientation, social
					orientation and
					challenge orientation
(Bontchev et al	Competitor dreamer	Quantitative	N- 315	Education	The authors relate
(Domenev et al., 2018)	logicion stratagist	Eastor crolusia	11-313	Luucation	nle autions felate
2010)	iogician, strategist	ractor analysis			player types with
				TTT 1 0 1	learning styles.
(W1ki 2018 A)	Psychographic Profile:	-	-	W1zards of the	The separation of
	Timmy/Tammy (power			Coast	players based on their
	gamers, social gamers,				motivations behind
	diversity gamers.				gaming enjoyment.
	adrenaline gamers.				
	griefers), Johnny/Jenny				
	(combo players offbeat				
	designers deck artists				
	uber Johnny) Spiles				
	(Innevetore Transm				
	(innovators, Tuners,				
	Analysts, Nuts& Bolts)				
(W1ki 2018 B)	Aesthetic Profile:	-	-	Wizards of the	The categorization of
	Mel/Melvin/Melanie			Coast	players based on the
	(Mechanic Player),				aspects in the game that
	Vorthos (The gamer, the				they love.



	artist, the writer, the oracle, the dreamer), The metagamer				
(Savolainen, 2019)	Social, Challenge, Freedom, Immersion	Synthesis of previous work	-	Games	The author created a player type model deriving from Brainhe: and Quantic Foundry's motivation model.
(Deloitte, 2019)	PC-dominant, Mobile dominant, Console dominant, Multiplatform players	Quantitative Survey	-	Games	The author investigates the shift of consumers in the video game market.
(Partners 2019A)	Hardcore Mobile Gamer, Hardcore PC gamer, Casual Gamer, Casual Demolitionist, Super Consumer, Core Gamer	Survey	-	E-Sports	The author examines the players based on their preferences on differences.
(Partners 2019B)	Story Socializer, Casual Challenger, Skill master, strategist, arena gamer, fantasy arena gamer, competitive arena gamer	Survey	-	E-sports	The division of players based on their motivation and preferences towards game mechanics.
(Holm, 2019)	Non-players, light players regular gamers, heavy gamers, active gamers, non-gamers	Survey	N=2257	Games: Call of Duty	Segmentation of player based on their playing time.
(Schimanke et al 2019)	Learners, confirmers, Leisure players, sporadic players	Leitner spaced repetition system Cluster analysis	N=24000	Games Education	Players are separated based on their playing habits and clustered by patterns used in mobile learning games.
(Lorei et al., 201	Achievers, Explorers, Grasshoppers, Grazers, Passant collectors	Cluster and Archetype analysis	N=40	Gamification: StreetComplete	The segmentation of players is done based of the geo data collected suggesting that geographic space is an important factor to be considered.
(Shen et al., 2020	Knowledge collectors, reward seeker, explorer, curiosity seeker, sensation seeker, flow experiencers	-	N= 178	Tourism, Gamification	Classification of player types based on gamification trips.
(Sezgin, 2020)	Completionists, Socialisers, Suicide Squa Fiends, Pathfinders, Collectors, Belligerents, Explorers, Deep gamers, Casual gamers, Underrecognized	Synthesis of previous work	N= 11	Gamification, game-based learning	The findings suggested that the identification of player types is essentia when games are involved in the educational process.
(WORLD, 2020)	Achievers, gurus, explorers, socializers	-	-	Gaming habit	Matching player type t Myers-Brigg Type Indicator (MBTI)
(Julkunen, 2020)	Expressionist, King of the hill, Networker, Skill master, Strategist, Thinke Thrill Seeker, Treasure Hunter	Mapping motivational driver profiles	N= 600	Mobile games	The division of players based on their motivational driver on 130000 mobile games.
(Hedlund, 2021)	Competitive, Casual, Casual-social, Casual-fun Casual Competitive	Hierarchical & Clustering techniques	N=1165	E-sport, Games	A large international empirical study was done and able to identify casual players in detail.





(Pamboris, 2021)	The ultimate gamer, the	-	-	Games	The segmentation of
	all-round enthusiast, the				players was done
	community gamer, the				through observing
	bargain buyer, the				players' activity in
	hardware enthusiast, the				playing, viewing,
	popcorn gamer, the time				owning games and
	filler, the backseat driver,				social interacting with
(0) (0)	the lapsed gamer	G .1	N. OC	C	others.
(Comert & Samu	Strategic, tester,	Synthesis of	N=26	Games,	The authors provide
2021)	researcher, artistic,	academic		gamification	valuable insight to the
	socializer, leader	Interature			field by suggesting the
(C 1 1		0	N 100	C	player nead model.
(Gaalen et al., 2021)	The social achiever, the	Q-methodology	N=102	Games	The identification of
2021)	explorer, the socializer, the	Factor analysis			players based on their
	competitor, the troll				patterns involving
					cheating, playing alone
					story-terning and the
(Bugget 2021)	The obligious Conjug Th			Camaa	The complexity of willing
(Bugcat, 2021)	nestman The speed	-	-	Games	nlevers based on their
	morphant studious				in game behaviour and
	Braggart The jerk				interaction with others
(Kumar 2021)	Crypto whales early	Developer		Blockshain game	The author proposed
(Kuillai, 2021)	adoptors, optropropours	interviews	-	BIOCKCHam game	nlever motivation
	silent investors market	interviews			spectrum consisting of
	speculators workers too				investing earning and
	dippers gamblers fun				nivesting, carling and playing and categorize
	seekers				playing and categorize
	seekers				motivation
(Jaskari & Svriäl	Social completionists.	Interpretive and	N= 31	Education.	The author contributed
2022)	Highly motivated	convergent		Gamification	to gamified learning b
,	completionists,	mixed-method			enabling a more fine-
	Independent				tuned analysis.
	completionists, Pure				•
	completionists				
(Galeote &	Climate selves, climate	Qualitative text	N= 80	Climate change	The study observes ho
Legaki, 2022)	citizens, climate heroes,	analysis		Games	players engage with th
	empowered individuals,				alleviation of climate
	authorities, faction leader				change.
(Harrison, 2022)	The Fortnite builder, The	-	-	Shooting games	The players are
	sharpshooter, The Turtler			Fortnite	categorized based on
	The Fortnite Explorer/				their behaviour and
	Animal Tamer, The				interaction with game
	newbie				features.
(Satsangi, 2022)	Houdini, Brainiac, Realis	Based on	-	Chess	The work provides
	Methodist, Wizard,	personality traits			some insight about the
	Tactician, Elegant Artist,				player types in chess
	Whiz, Master, Dreamer,				games.
	Precisionist, Sleeping				
	giant, Ninja, Viking,				
	Conqueror				<u> </u>
(Tang &	Science gamers, Citizen	Cluster analysis	N=2325	Educational	Categorize players
Prestopnik, 2022	Scientists, Dabblers		N=1507	games: Forgotter	based on their behavio
				Island, Happy	engagement with
				Match	Science games.



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Authors' Contributions

Lim D. conducted the research, analyzed the data and wrote the paper; Sanmugam M. reviewed and further elaborated the paper; Yahaya W.A. J. W. reviewed and made corrections to the paper; all authors have approved the final version.

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