Toward Effective Gamification: Lebanese Post-Secondary Students' Perceptions on the

Influence of Game Elements on Motivation to Learn

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Abstract

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Khaled Ramadan

Motivation has been a topic of vast interest in the realm of education for close to four decades. Technological advancements have paved way for concepts such as gamification, a strategy intended to address motivation and engagement with learning, in the world of computerized learning. Notwithstanding, it has not yet been determined precisely what game elements work best to motivate learners when gamifying educational content, and if different types of students prefer certain game elements amongst others. In efforts to investigate those areas, this thesis explores, via surveys, the perceptions of 42 Lebanese post-secondary students on the influence of a specific set of game elements on Keller's (1987) four components of motivation: attention, relevance, confidence, and satisfaction. Preliminary results showed that the participants perceived an overall positive influence of the selected game elements on motivation. Further analysis revealed that stories and narration topped the list as the most influential game elements on motivation. Minor differences were found in the perceptions of different types of students in terms of their age, gender, level of studies, and the hours they spend gaming per day.

   Keywords: game elements, gamification, motivation

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Introduction

Education has long been haunted by boredom. Whatever a given group of students are subjected to, boredom almost always finds its way as an impeding emotion to learning. Virginia, Daniels, and Klassen (2016) found that "boredom in educational contexts seems to be a universal academic emotion, and one that is frequently experienced by students across age groups, educational needs, and ethnicity" (p. 122). A lot of what students are obliged to learn might not be of interest to them, and that lack of interest translates into demotivation towards learning (Heafner, 2004, p. 43). Accordingly, researchers and practitioners continuously strive towards a solution to keep students engaged and motivated to learn.

Contemporary endeavours to find a solution are redirecting research towards the use of technology in education. Gunuc and Kuzu (2014) argue that "the technology factor had substantial influence both on campus engagement and class engagement, that is, on student engagement." (p. 98). Heafner (2004) concurs stating that "technology has the potential to impact student motivation positively and, subsequently, student learning" (p. 49). Nonetheless, it was also found that the improper integration of technology into education can render it ineffective, even demotivating to learners (Gunuc & Kuzu, 2014, p. 98). A meta-analysis done by Schmidt et al. (2014) on the effects of technology use in postsecondary education led to the conclusion that "it's pedagogy not the technology that matters" (p. 285).

Seeing that the raw integration of technology into teaching and facilitation might prove ineffective, pedagogy comes into play. Ergo, ideas like *gamification* are born and placed under the lenses of researchers and educational technologists. Gamifying educational content and activities is believed to be highly motivating to learners (Bruder, 2014; Ceker & Ozdamli, 2017; Cheong, Filippou, & Cheong 2014; Deterding, Dixon, Khaled & Nacke, 2011; Fen & Lehong,

2011; Fisher, Beedle, & Rouse, 2014). Zicherman and Cunningham (2011) state that gamification incorporates "changing the way of thinking and using some gaming rules in order to increase the interest of learners and to solve problems". In a meta-analysis conducted by Caponetto, Earp, and Ott (2014), a word cloud generated from the abstracts of 119 papers (approximately 14000 words) uncovered the repetitive use of the terms *motivation* and *engagement* when the topic under study is gamification. Ott and Tavella (2009) believe that the main reason why gamification techniques are adopted is to enhance motivation and engagement.

Inconveniently, there exists a confusion between the concepts of gamification, game-based learning, and games among researchers and practitioners (Ceker & Ozdamli, 2017). Until recently, the term 'gamification' was used to refer to game-based learning (Caponetto, Earp, & Ott, 2014, p. 50). Obviously, emerging methods and trends in education seldom function flawlessly and instantly. Aside from varnishing raw technology with pedagogy, the methods themselves have to be impeccable, ecologically sound, and well implemented for proper learning to be achieved. In 2011, Gartner (2011) believed that in the two following years (2012 and 2013), 70% of the largest public companies worldwide would have at least one gamified application. However, Gartner (2012) found that 80% of current (at the time) gamified applications would fail to meet their objectives. This failure would be attributed to the improper application of the gamification process (as cited in Robson, Plangger, Keitzmann, McCarthy, & Pitt, 2015, p. 412). Furthermore, the concept of gamification is relatively new and there are a lot of perspectives to consider.

For gamification to be achieved, game elements should frame non-gamified content (Deterding, Dixon, Khaled, & Nacke, 2011). In other words, gamification involves the use of underlying game elements in delivering content that is not considered a game in itself (see the

section on game elements in the *Literature Review*). However, and bearing in mind the aforementioned shortcomings of the application of gamification, it has not been determined that a constant set of game elements should be used for gamification to be properly designed and implemented. Different researchers have looked at it differently, and their perspectives will be presented in the literature review section. Whatever the perspective, and as mentioned earlier, the ultimate goal of gamification is to boost learners' motivation and subsequent learning.

Gamification is a growing concept both in the business and the educational fields. Seeing that it is relatively a new emerging method, the terminologies revolving around gamification are still used fluidly (Robson et al., 2015, p. 413). Accordingly, the integration of game elements into educational resources remains highly subjective and is variously interpreted by different researchers. This calls for investigating those elements incorporated in gamification strategies in an attempt to pinpoint the most effective ones in terms of their impact on motivation and in order to frame the application of gamification in a more systematic manner.

Seeing that one of the most vital perspectives in the learning process is that of the learners themselves, this study intends to unveil the perceptions of Lebanese post-secondary students on what they believe the most motivating game elements are when gamifying education. Rather than assume all learners are the same and will respond to gamification in like manner, the study will also examine differences in those perceptions across different demographics and academic groupings. Previous exposure to games or gaming may have an impact, as might age or level of study. Finally, there is a concern in the literature about gender. Pedro et al. (2015) implemented a gamification intervention to check for an impact on motivation and performance between two different groups of learners, one that identifies as all male, and the other as all female. They found that there was a different level of improvement between boys and girls after

introducing a gamification intervention. Codish and Ravid (2017) also found a difference between genders, as their results show that "badges had a positive relation with perceived playfulness and were more enjoyable to women", with an extremely significant independent samples t-test result ($p < 0.001$, n = 235). So, do learners of different gender affiliations respond the same way to gaming or gamification, or to technology in general? Accordingly, the following research questions are posed:

1. What are the most influential game elements on motivation to learn with respect to Lebanese post-secondary students?
2. How do the perceptions of Lebanese post-secondary students on the influence of game elements on motivation differ as a result of age, gender, level of studies, and hours spent gaming per day?

Fact is that the educational approaches in both the public sector and most of the private sector in Lebanon are somewhat outdated. There is seldom use of methods that engage learners, or design relatable learning experiences for students. Be it the lack of funds available, the political pressure, lack of research, or any other reasons, some things like a gamified approach to teaching can be done. Therefore, Lebanese students were chosen as subjects for the study in this thesis in efforts to implement future change rooted in any meaningful findings, as well as fill in the gap of lack of research done in that area on this topic.

This thesis begins with a review of the literature concerning gamification and its educational effects. This is followed by a review of different frameworks that have been proposed to describe the components or elements of a game, or gamification frameworks. These frameworks are analyzed in order to arrive to a list of elements that will be represented in the surveys employed in the study. A review of models that describe motivation is then presented,

with a similar aim: to identify the variables describing motivation, in order to inform the development of the questionnaire used in the study.

Following these reviews of literature and identification of relevant game elements and motivational dimensions, the thesis proceeds with an account of methods, results and a discussion of findings and study limitations.

Literature Review

Gamification

Gamification refers to the use of game elements (see the next section for an elaborate explanation of game elements) in non-game situations, procedures, activities, or any kind of educational context there is (Bruder, 2014; Ceker & Ozdamli, 2017; Cheong, Filippou, & Cheong, 2014, p. 233; Deterding et al., 2011; Fen and Lehong, 2011; Fisher, Beedle, & Rouse, 2014; Khaleel, Wook, & Ismail, 2016, p. 868; Robson et al., 2015, p. 412). Games have always been considered to offer both motivating and engaging experiences. Gamification recreates those experiences in situations where regular games are not involved (Cheong et al., 2014, p. 233). The idea of gamification is fairly new. The adoption of the term itself in non-gaming situations and contexts began around 2010 (Zicherman & Cunningham, 2011), making the whole endeavor quite contemporary. The concept is to gain some of the benefits of games by adding structural elements of games to any content that is not designed as a game. The promise is some of the gains in motivation, attention, engagement, time on task, that may come with games, without the cost and effort implicated in the design of a "real" game.

After the rapid technological outbreaks that took place during the past couple of decades, video gaming was viewed as one of the most engaging activities, especially to millennials. The urge to unveil what makes video games extremely engaging, as well as the intent to employ those engaging design elements and techniques in non-gaming contexts inspired the idea of gamification.

Game Elements

There are, incredibly, some 103 different game elements (see the list below) across articles that have to do with gamification, game play, game design, and similar topics of study (Sillaots et al., 2016). Digging deeper into articles that discuss those topics might possibly yield a larger sum of elements, and the following list might not include every element one can come across. However, Sillaots et al. (2016) completed an analysis in which they reduced redundant elements and combined similar ones to come up with a list of 103 game elements.

It is important to keep in mind that across articles and journals, scholars and practitioners use different terminologies to refer to the same game elements. It is possible a similar exercise would conclude a different number of distinct elements. The point here is that the list, if not canonical, is long and an alternative analysis would also yield a large number, if not exactly the same as Sillaots et al.'s (2016) list.

Following is the alphabetically arranged list of the 103 game elements, their definitions, and how they interrelate with one another. The list was edited for the purposes of this thesis. The numbers between parentheses refer to a given element's number on the list (e.g. *Actions* is

number 2) and provide a guide or map to the relations among the elements. Where appropriate, there is also a citation indicating the source from which the element was identified.

1. *Achievements*: a combination of challenges (14), rewards (80) and progress (73) (Fitz-Walter, Tjondronegoro, & Wyeth, 2011).

2. *Actions*: what players can do in a game. Actions are part of the gameplay (48).

3. *Aesthetics*: the visual and auditory language of the game. They are an aspect of artwork (5) and style (91).

4. *Altruism*: providing help or gifts in order to maintain relationships (77) (Antin & Churchill, 2011).

5. *Art*: the visual aspect of the game. Art is a part of the aesthetics (3).

6. *Atmosphere*: the tone or the mood of the game. Atmosphere is generated with the help of artwork (5) and style (91) (Adams, 2009).

7. *Attitudes*: the way a player or a participant feels about the game. Attitudes influence motivation (65) (Schultheiss, 2001).

8. *Autonomy*: the ownership of one's actions (2) (Wang, Khoo, Liu, & Divaharan, 2008). It is reflected by self-expression (85) and creativity (25) (Bunchball, 2010).

9. *Autotelic experience*: doing something for its own sake (Brühlmann, 2013).

10. *Avatars*: the players' characters (Adams, 2009). Avatars are a tool for self-expression (85) (Gee, 2014).

11. *Badges*: are virtual goods with visual representation (Antin & Churchill, 2011). They are a part of the rewarding system (80) (Adams, 2009).

12. *Balance*: the balance between competencies (21) and challenges (14) that affects difficulty (29) and flow (45) (Csikszentmihalyi, 1990).

13. *Big Boss Fight*: the final challenge in a game. It is usually the hardest one.

14. *Challenges*: tasks that require a certain amount of effort to be done to test players' abilities. Challenges are a part of gameplay (48) (Adams, 2009).

15. *Characters*: players' avatars (10), non-player characters (68), and their roles (82) (Adams, 2009).

16. *Cheating*: acting unfairly to gain the upper hand on other players or the game itself. Cheating relates to the element of fairness (41) (Adams, 2009).

17. *Cognitive needs*: needs that are mental in nature, such as the need to achieve goals (49) or feel competent. Cognitive needs are intrinsic motivators (54) (Zhang, 2008).

18. *Collaboration*: players joining efforts to manage a challenge (14) that is too difficult to achieve for a single player alone (Azadegan & Harteveld, 2014).

19. *Communication*: the sharing of information between players or participants. Communication is a form of socialization (88).

20. *Community*: a group of players with similar interests, attitudes (7), and goals (49).

21. *Competencies*: the knowledge (57), skills (86), and abilities that allow players to participate in and get better at the game. Competencies influence game balance (12) (Shernoff, Hamari, & Rowe, 2014). Feeling competent is a cognitive need (17) and an intrinsic motivator (54).

22. *Competition*: a contest between two or more players. Competition is a form of interaction (53) and challenge (14).

23. *Concentration or focusing*: the act of putting in a mental effort on a specific activity or task. Concentration is one of the flow (45) conditions (Csikszentmihalyi, 1990).

24. *Control or power*: the ability to influence the events of the game and/or other players' behaviors in the game. Control is one of the flow (45) enabling factors (Csikszentmihalyi, 1990).

25. *Creativity*: the affordance of creating game items (Adams, 2009).

26. *Culture*: the aesthetics (3), atmosphere (6), and the overall manifestations of human intellect that is put into the game design regarded as whole. Culture is a part of the world (103) in a game (Adams, 2009).

27. *Curiosity*: the strong desire to know something. Curiosity is one of the entertaining (47) and motivational factors (65) (Malone, 1980).

28. *Decision making*: purposely choosing a defined set of actions among alternative possibilities to achieve desired goals. Decision making is a central part in all game challenges (14) (Costikyan, 2002).

29. *Difficulty*: how hard the game is to participate in or master. Difficulty is a factor of balance (12) (Csikszentmihalyi, 1990), and example of achievement levels (58) (Montola, Nummenmaa, Lucero, Boberg, & Korhonen, 2009).

30. *Dimensions*: the spatial (90) aspect of game graphics (Adams, 2009).

31. *Discovering*: the act of finding something when taking action (2). Discovery is an example of a challenge (14) or an achievement (1) (Montola et al., 2009).

32. *Emotional needs*: the intrinsic motivators (54) that manifest in the form of the need to show or share emotions and feelings (Zhang, 2008).

33. *Engagement*: is when the participants are kept active with the assignment or activity at hand (Brockmyer et al., 2009).

34. *Engrossment*: the state of being absorbed by the game. Engrossment is a level of involvement (56) (Brown & Cairns, 2004; IJsselsteijn, Kort, Poels, Jurgelionis, & Bellotti, 2007).

35. *Enjoyment*: a positive feeling of pleasure caused by doing something that is liked (Zhang, 2008).

36. *Environmental needs*: the needs that are rooted in the game environment (103), such as accepting cultural (26) and ethical norms (37). Environmental needs act as extrinsic motivators (39) (Zhang, 2008).

37. *Ethics*: the moral principles that are embedded in the game community (20) that govern the players' behaviors. Ethics are a part of the game world (103) (Adams, 2009).

38. *Events*: the significant happenings that occur in a game. Events are bound by game rules (83) (Adams, 2009).

39. *Extrinsic motivation*: motivation (65) that is in the format of a reward (80), reputation (78), or anything that comes from outside of the self (Farzan & Brusilovsky, 2011).

40. *Extrinsic reward*: a reward (80) that acts as a reinforcer of a favorable and successful behavior, such as points (72), badges (11), and trophies. Extrinsic rewards act as extrinsic motivators (39).

41. *Fairness*: the just nature of the game that offers a discrimination/favoritism free experience. Fairness is a part of game balance (12) (Adams, 2009).

42. *Fantasy*: the act or affordance of experiencing the unrealistic and imaginative aspect of the world (103). Fantasy is one of the entertaining (47) factors (Malone, 1980).

43. *Feedback*: the reaction to the players' actions (2) (Adams, 2009). It is one of the intrinsic motivators (54) (Kapp, 2012) and flow (45) dimensions (Csikszentmihalyi, 1990).

44. *Fight*: a violent confrontation between two or more players, or between one or more players with NPCs (68). Fights are a format of competition (22) (Sheldon, 2011) and interaction (53).

45. *Flow*: an optimal experience on the mind-body level, where the user is absorbed by the activity and continuously feels deep enjoyment (35) (Csikszentmihalyi, 1990).

46. *Followership*: the desire to follow and to be guided. Followership is one of the intrinsic motivators (54) (Zhang, 2008).

47. *Fun or entertainment*: the feeling of entertainment, amusement, and enjoyment. Fun is one of the intrinsic motivators (54) (Eickhoff, Harris, de Vries, & Srinivasan, 2012).

48. *Gameplay*: the relationship between challenges (14) and actions (2) (Adams, 2009).

49. *Goals*: the desired results of players or participants. Goals are achieved when challenges (14) are overcome.

50. *Identity*: who or what a player or a participant is. Identity is a part of avatar (10) design (Hancock, Toma, & Ellison, 2007) and one of the motivational factors (65) (Schultheiss, 2001).

51. *Immersion*: the deep and effortless involvement (56), reduced concern for the self, and losing sense of time (97) (Sweetser & Wyeth, 2005).

52. *Importance*: a sense of urgency to do something of value or significance. It is one of the motivational factors (65) (Pintrich, 2003).

53. *Interaction*: two or more elements (e.g. players, challenges (14), world (103), user interface) affecting each other. Interaction reflects a cycle of gameplay (48) and feedback (43) (Adams, 2009).

54. *Intrinsic motivation*: the engagement (33) with an activity just for the sake of the activity itself, and not for some external reward (40) (Farzan & Brusilovsky, 2011).

55. *Intrinsic Reward*: a reward (80) that occurs when tasks are rewarding by their nature for a given participant (Adams, 2009).

56.*Involvement*: participation and engagement (33) in an activity (Brown & Cairns, 2004; IJsselsteijn et al., 2007).

57. *Knowledge*: the facts and information acquired by a player about a game. Knowledge is a part of user competencies (21).

58. *Levels*: game sections, difficulty (29) criteria, or player achievements (1) (Adams, 2009).

59. *Losing self*: becoming so focused that the self is practically non-existent. This occurs when a user is totally engaged with the activity. It is one of the indicators of flow (45) (Csikszentmihalyi, 1990).

60. *Loyalty*: an immense feeling of allegiance to someone or something. Loyalty is one of the social aspects of gameplay (48) (Yee, 2005).

61. *Luck*: the chance or randomness that comes into play when attempting to succeed in doing something (Adams, 2009).

62. *Meaningfulness*: the sense of importance (52) and purposefulness a player feels towards attempting to tackle an activity or a task in a game. Meaningfulness is one of the game balancing aspects, such as meaningful challenges (14) (Adams, 2009).

63. *Merging action-awareness*: a deep and effortless involvement (56). This occurs when the activity is completed automatically and almost unconsciously done by the participant. The participant feels oneness with the activity (Brühlmann, 2013).

64. *Messages*: a form of interaction (53) between participants. Messages can be either intrinsic (54) or extrinsic (39) motivators.

66. *Narrative*: the part of the story that is narrated by the game and that is not interactive (Adams, 2009).

67. *Not essential*: something that is not indispensable (Adams, 2009), not profitable (Huizinga, 2014) inefficient (Suits, 2014), and is mostly done for recreational purposes in a game.

68. *NPC*: a non-player character.

69. *Opponent*: other players or NPCs (68).

70. *Performance*: the process of attempting an action (2) or a task (whether succeeding or failing), and the activity of doing something that usually relates to feedback (43) and progress (73).

71. *Player:* a person taking part in a game or activity.

72. *Points*: units in a game that could act as a resource, reflect score, or show player achievements (1). Points are a form of an extrinsic reward (40) (Adams, 2009)

73. *Progress*: a sequence of activities that make up the game (Adams, 2009). Progress is reflected in achievements (1) and feedback (43) (Farzan & Brusilovsky, 2011).

74. *Psychological Needs*: the needs for autonomy (8), relatedness (76), and competence (21). Psychological needs act as intrinsic motivators (54) and can be further broken down into the need for self-control, self-identification and self-expression (85) (Zhang, 2008).

75. *Recruiting*: the act of engaging new members (Nonaka, Umemoto, & Sasaki, 1998). Recruiting is reflected in socialization (88) and community (20) activities.

76. *Relatedness*: the need to belong somewhere (Zhang, 2008). Relatedness is one of the social (87) and psychological (74) needs (Pintrich, 2003).

77. *Relationships*: the act of creating and maintaining relations between players (Nonaka et al., 1998).

78. *Reputation or Status*: the social standing of a player in the community (20) of the game or the activity. Having a good status is a kind of a reward (80) (Admiraal, Huizenga, Akkerman, & Dam, 2011) or an extrinsic motivational factor (39).

79. *Resource Accumulation*: the acquisition of game resources (e.g. in-game currency). Accumulating resources is a core element of economical game challenges (14) (Adams, 2009).

80. *Reward*: a game element that can have different forms (e.g. points (72), badges (11), in-game currency etc.) that is gained by and satisfies the participant. Rewards motivate participants to achieve more (Hsu, Chang, & Lee, 2013). They come in the form of intrinsic (55) and extrinsic (40) rewards.

81. *Risk*: the act of attempting an action (2) with uncertainty through luck (61). An example of a risky situation is when a player is encountered with hidden information or opponents (Adams, 2009).

82. *Roles*: participants' assumed responsibilities and functions in a game or an activity (e.g. having certain abilities that impose certain roles, such as supporting or healing others, leading a group etc.).

83. *Rules*: the set of regulations that govern the conduct of players, as well as resources, objects, events (38), connections, and conditions of a game or an activity (Adams, 2009).

84. *Scoreboard*: a game element that documents progress (73) and gives feedback (43). Scoreboards are a form of an extrinsic reward (40) (Sheldon, 2011).

85. *Self-expression*: the expression of one's thoughts, feelings, and ideas. Self-expression is reflected through autonomy (8) and avatar (10) customization (Bunchball, 2010).

86. *Skill*: the ability to do something well. Skills are a part of competencies (21) (Adams, 2009) and an indicator of achievement (1) (Montola et al., 2009).

87. *Social Needs*: a game element that is reflected in socialization (88), relatedness (76), followership (46) and leadership. Social needs act as intrinsic motivators (54) (Zhang, 2008).

88. *Socialization*: the communication and the involvement (56) among players (Simões, Redondo, & Vilas, 2013). Socialization acts as one of the entertaining factors (47) (Adams, 2009).

89. *Sound*: a part of game aesthetics (3) and art (5).

90. *Space*: an aspect of the game world (103) (Adams, 2009)

91. *Style*: the specific appearance of a game or an activity setting that is governed by a set of predetermined design principles. Style is a part of the artwork (5) of a game (Adams, 2009).

92. *Story*: a series of game events (38) (Adams, 2009).

93. *Support*: the act of assisting or helping other players or participants. Support is a format of socialization (88) and collaboration (18).

94. *Surprise*: the experience of an unexpected event. Feeling surprised is an example of a game emotion.

95. *Teams and Groups*: a group of players attempting a competitive (22) or a collaborative (18) task. Teams and groups allow for interaction (53) and collaboration (18) (Adams, 2009).

96. *Teamwork*: the effective combined effort of a group (95). Teamwork is a form of interaction (53) and collaboration (18).

97. *Time*: an aspect of the game world (103) or challenges (14) (e.g. limited time).

98. *Time Transformation*: the occurrence of losing the sense of time (97). This acts as an indicator of flow (45) (Ermi & Mäyrä, 2005).

99. *Turns*: when players must act in succession. Turns are an example of game rules and are governed by the time (97) element (Adams, 2009).

100. *Utility*: anything useful, profitable, or beneficial for the participant in a game or an activity. Utility acts as an extrinsic motivator (39).

101. *Variety*: the diversity within a game or an activity. Variety is reflected when the game provides different challenges (14) and multiple strategies to achieve them (Adams, 2009).

102. *Voluntariness*: when players are free to enter and leave the game or activity (Caillois, 1961).

103. *World or environment*: the place where the participants go to play the game or participate in the activity (Adams, 2009).

Gamification Frameworks: An Overview

Eliciting the students' responses and perceptions on game elements and gamification requires finding a framework that explains gamification and game elements, as well as helps guide the formulation of the questions that the participants would be asked to answer. Accordingly, a review of various models and frameworks was conducted, and a framework that suits the purposes of this thesis was selected.

There have emerged various influential frameworks that guide the design and the implementation processes of gamification over the past decade. Many of those frameworks are influenced by one another. Other frameworks are more original and prevalent in gamification literature. For the sake of brevity, this section sheds light on some of the frequently mentioned and adopted frameworks in the gamification world, as well as what framework best fits the premise of this study.

As mentioned earlier, this study intends to elicit students' perceptions on the influence of game elements on motivation. Accordingly, our main intention is to select a conceptual framework that delves into game elements, what they represent, and how they interact with human emotions. Seeing that this study explores subjective perceptions, it is considered best to employ a conceptual framework that does not map certain game elements with motivation or certain emotional responses. The framework should not have pre-established relations between

game elements or motivation and should be as open and as flexible to human perception as possible. It is also notable that some of the frameworks that will be discussed were originally formulated for game design but were later adopted by scholars and practitioners for gamification purposes.

Design, play, and experiences framework (DPE). As described by Winn (2008), the DPE framework was created for the purpose of designing serious games for learning. Simply put, this framework focuses on a three-step process:

1. Design: goal setting and designing the game

2. Play: play-testing the game

3. Experience: checking if the preset goals and game design led to the desired experience

As highlighted in Fig. 1, the DPE framework highlights an iterative process of game design, where designers set goals for a desired game experience, test the game, and adjust the primary design according to the experience of the users.
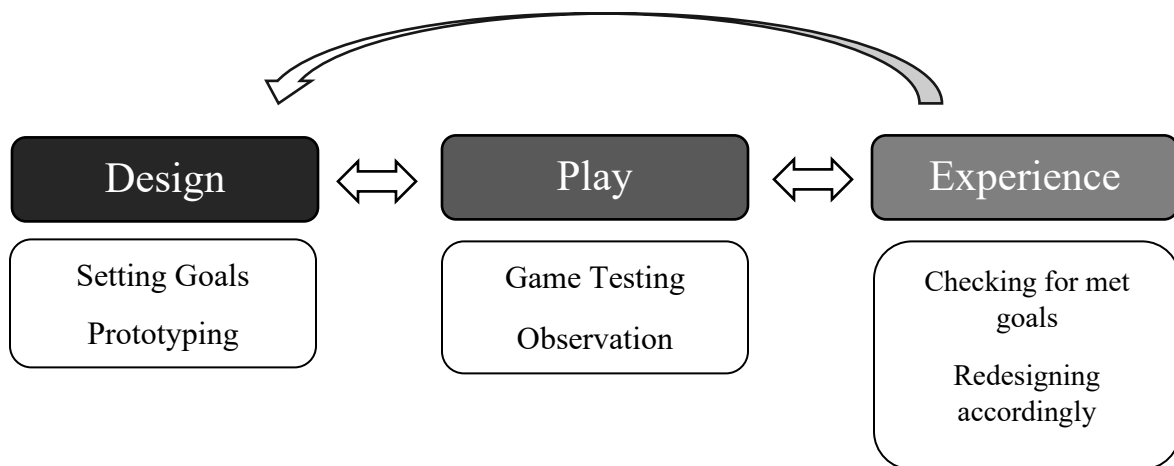
Figure 1. The DPE iterative process

Unfortunately for our purposes,, the DPE framework lacks the capacity to accommodate gamification as opposed to serious games. It facilitates the design of serious games, which are essentially games in their nature. On the other hand, gamifying something does not make it a game, it only incorporates the addition of game elements into non-game contexts. More importantly, the process of design explained in the DPE is overly general, and it does not account for or explain the role of game elements in gamification. These considerations dictate the need for another choice of conceptual framework.

The 6D framework. First suggested by Webach and Hunter (2012), the 6D framework is a widely-accepted framework for planning and implementing gamification. It mainly aims to organize the process of gamification within the boundaries of an organization. It facilitates gamifying employees' activities and endeavors to enhance their performance, which presumably would subsequently increase the overall productivity of the organization.

According to Borderless Technology Corp. (2012), the 6D framework can be explained and subcategorized as follows:

1. Define business objective: defining the business objective of gamification (e.g. gamifying an activity to increase profit)

2. Delineate target behaviors: pinpointing the target expected behaviors of the players that fulfill the previously defined business objective.

3. Describe your players: profiling the players that the gamified activity or content is targeted to (e.g. their motives, age, interests)

4. Devise activity loops: dividing the game into different activities to ensure that the players are kept engaged and feeling a sense of progress.

5. Don't forget the fun: making sure the fun element does not get lost during the process of implementation, and that players would voluntarily play the game.

6. Deploy the appropriate tool: defining and using the appropriate game elements to suit the purposes of the gamification process (e.g. avatars, points, trophies, badges etc.)

The 6D framework might be an appropriate choice if the premise of the study was of a business nature. Unfortunately, this paper aims to dissect gamification in educational settings, making the 6D an inappropriate choice of a conceptual framework. Moreover, this framework does not go into details on what game elements are or how they work. It is highly performance oriented, aiming at eliciting target behaviors deemed as favorable by an employer who wants to improve the performance of his/her employees. What we need is a framework that delves into gamification and game elements in a way that helps guide the development of the questions in the survey.

The GAME framework. The GAME framework was proposed by Marzewski (2012) in his e-book: *Gamification: A Simple Introduction*. This framework suggests that when gamifying a learning process, a designer should abide by the following steps:

1. Gathering information:

   - What is being gamified?

   - Who are the learners/users?

   - Why gamification?

   - How will you measure achievement?

2. Acting on the information:

   - Designing the most fitting solution

- Keeping the preset goals in mind

- Keeping the learner's engagement in mind

- Testing the design

3. Measuring success:

    - Measuring how much the preset outcomes were met

    - Eliciting feedback

    - Redesigning with improvements

4. Enriching the system:

    - Changing the goals along with how the learners are changing

    - Keeping up with the learners or staying one step ahead of them

Although the GAME framework is specifically targeted towards gamification and not games, it does not account for game elements and how they fit in the design process, which is a limitation with respect to the goal of this thesis, which aims to elicit the participants' perceptions of the influence of game elements on motivation. Looking through steps one to four mentioned on the previous page, it is clear that this framework guides the design of gamification through a wide, process-oriented lens, much resembling other models for generic design-action processes we encounter in our field (e.g., needs analysis, high-level design, implementation, and formative evaluation). In other words, one could simply replace the concept of gamification in the previous page with a completely different concept and still make the model work. This line of logic does not imply that the GAME framework is of no use, but that it does not delve into the actual mechanical process of gamification and aligning game elements. There is no regard for the specifics that go into gamification, making it a poor choice of a conceptual framework for this study.

De Paz's framework. In her PhD dissertation on gamification, De Paz (2013) suggested general guidelines to follow when gamifying any type of project. Her guidelines were highly influenced by the aforementioned Werbach's and Hunter's (2012) 6D framework.

She plots a three-phase approach to gamification as follows:

1. Preparation

    - Is gamification the right choice?

    - Who are the members working on the project?

    - What are the objectives and the desired outcomes?

    - Who are the users/players? What are their characteristics?

2. Design

    - Determination of the desired behaviors

    - Definition of the initial game components

    - Development of the game design

        i. Game mechanics

        ii. Game dynamics

3. Implementation and Maintenance

    - Choosing whether to buy or build the design

    - Implementing and deploying the application / design

    - Collecting data, adjusting, and maintaining the design

Similar to what was discussed concerning the 6D framework, De Paz's (2013) guidelines are general and generic. They do not account for the navigation of a gamification design while

accounting for the specifics of game elements. Accordingly, De Paz's (2013) framework does not fit with the design and purposes of this thesis.

Robinson and Bellotti's taxonomy. Robinson and Bellotti (2013) draw on extensive literature on game elements (e.g. curiosity, challenge, virtual abilities etc.) to come up with an elaborate taxonomy that can guide the process of gamification. They believe that there does not exist a perfect framework that guides said process while providing a concise presentation of game elements in terms of the user experience aspects that those elements support.

Accordingly, their taxonomy presents a six top-level category design with various subcategories mapped with how much commitment is required by the user for the elements to be effective. Following are the top-level elements with some examples of subcategories:

1. General Framing: both the context and the motivation for participation.
   - E.g. Context: is a sub-element in this category. It is considered to be salient, meaning that it requires minimal commitment and time investment. Such elements are denoted by an (L) for low.

2. General Rules and Performance: what is expected from the users in general (e.g. scoring as high as possible when operating an avatar)
   - E.g. Ambiguous path to the objective (puzzles): is a sub-element in this category. Ambiguity requires a high level of commitment (H) to be effective and engaging.

3. Social Features: the affordances that users have to interact with each other during and outside the game/gamified project.

- E.g. Relationships: is a sub-element in this category. Building relationships usually require a high level of commitment (H) to be engaging and effective.

4. Incentives: reinforces of the users' behaviors. Incentives can be intrinsic or extrinsic

   - E.g. Curiosity: is a sub-element of intrinsic incentives. Curiosity can be triggered quickly, meaning it requires low (L) commitment by the users for the element to be engaging.

   - E.g. Virtual currency: is a sub-element of extrinsic incentives. Virtual currencies only work if the users highly commit (H) to using them.

5. Resources and Constraints: what the users are bound by while participating in the gamified project

   - E.g. Specific rules: is a sub-element of resources and constraints. Specific rules are expected to be in all gamified experiences, thus requiring a low (L) level of commitment from the users.

6. Feedback and Status Information: the feedback provided to the users to allow them to understand what's going on, as well as monitor their progress throughout the gamification process.

   - E.g. Graphical indications: is a sub-element for feedback and status information. Graphical indicators require a low (L) level of commitment by the user to work.

Robinson and Belloti's (2013) taxonomy suggests gamification guidelines that account for both key elements of this study, namely game elements and motivation, making it at first

glance a good fit for this study. However, the entirety of elements in the taxonomy function on presumed established connections between certain game elements and the amount of commitment they require to trigger a definite response of engagement and motivation by the users. For example, according to this taxonomy, it is set that the element of *relationships* requires a high level of commitment to be engaging. Keeping that in mind, the purpose of this study is to determine the perceptions of students on the influence of specific game elements on motivation, without any prejudices or assumptions. Ergo, it is not viable to go into the study with assumptions on how certain elements influence motivation and engagement (regardless of the amount of commitment required by the users/students). Consequently, this taxonomy does not fit the requirements of a valid conceptual framework for this thesis.

Francisco-Aparicio's framework. Fransisco-Aparicio, Gutierrez-Vela, Isla-Montes and Gonzalez Sanchez (2013) present a framework for applying gamification to improve the motivation of users as well as their participation levels.

Mainly, this framework foregrounds the importance of analyzing the social needs of the users, and deciding which exact game mechanics help satisfy those needs. Furthermore, Fransisco-Aparicio et al. (2013) suggest a method to analyze how effective the application of gamification is based on preset metrics "associated with the properties of playability as a measure of fun induced by the process of gamification".

1. Step 1
    i. Identify the users' psychological and social needs of human motivation
    ii. Choose the game mechanics that best serve fulfilling those needs

2. Step 2: Asses the effectiveness of gamification

i. Assess the properties of playability

ii. Assess the user's degree of improvement in achieving the desired and satisfactory results

While Fransisco-Aparicio et al.'s (2013) framework provides extensive emphasis on the relationship between game elements and human motivation, it mainly outlines an implementation process for gamification rather than provide an explanatory perspective on how gamification works. This framework would serve well as a general tool that guides the design and the formative analysis of a gamified endeavor, but is not so useful as an overarching framework that explains how gamification works.

The moral gamification design framework. Versteeg (2013) proposes a framework that specifically addresses potential moral and ethical issues designers can encounter while gamifying a project. He breaks down his systematic process into a four-element iterative cycle as follows:

1. Moral principles and values: establishing a set of moral principles

   • Designers should not persuade users of behaviors they would not agree to be persuaded to do.

   • The behavior that is intended to be elicited should not be harmful or risky to the users.

   • The persuasive technology should aim to benefit the users.

   • The persuasive technology should not be discriminatory.

   • Deception should be avoided and all intentions should be disclosed to the users.

   • Designers should be responsible for evaluating the outcomes of their design.

2. Conceptual Investigation

- Identifying all the stakeholders influenced by the gamification process

- Envisioning possible positive and negative outcomes of gamification

- Determining how the overall moral principles are harmed or supported by the gamification process

3. Involve Stakeholders

- Taking the stakeholders' feedback on the gamification through:

    i. Interviews

    ii. Surveys

    iii. Other valid quantitative or qualitative methods

- Including the stakeholders in the design process

4. Evaluate and Iterate

- Adjusting the design when new input comes along

- Iterating back and forth throughout the earlier steps when necessary

Similar to Fransisco-Aparicio et al.'s (2013) framework, Versteeg's (2013) framework outlines an implementation process that can be best utilized as a tool to guide a gamification process. Furthermore, this framework mainly focuses on the moral aspect of designing gamification as opposed to the objective concept of gamification. So much so, this framework can be viewed as providing supplementary moral guidelines to a gamification design developed with a conceptual framework that highlights what gamification is and how it works. Generally,

Versteeg (2013) does not delve into specific game elements, rendering this a poor choice of a framework for this study.

The Octalysis framework. Chou (2013) coined the term *Octalysis*, referring to a full-fledged gamification framework rooted in ten years of research on the topic. Chou (2013) believes that gamification is a "human-focused design" process as opposed to a "function-focused design" process.

As the name suggests, the Octalysis framework features an eight-sided octagon, each side reflecting a facet of the suggested framework. The eight facets are mainly drives rooted in human beings that push them to engage and to be active parts of a given gamified activity or project. Following are the eight core drives of gamification as defined in the Octalysis framework:

1. Epic meaning and calling: occurs when players/users believe in a higher calling, or that they were chosen to do something in the gamified process. Examples of elements that come into play are narratives, hero characters, and beginners' luck.

2. Development and accomplishment: is the internal drive expressed by the users to make progress, develop skills, and overcome challenges. Examples of elements that come into play are progress bars, quest lists, and boss fights.

3. Empowerment of creativity and feedback: is when users engage in a creative process, receive feedback by the design itself, and repeat the creative process all over again. Examples of elements that come into play are unlocked milestones, boosters, and instant feedback.

4. Ownership and possession: occurs when users are motivated because they sense they own something and want to make it better. Examples of elements that come into play are virtual goods, avatars and collections.

5. Social influence and relatedness: includes all the social elements that function as drives for people, such as acceptance, companionship and competition. Examples of elements that come into play are group quests, mentorship, and friending.

6. Scarcity and impatience: is the human drive of wanting what one can't have. Examples of elements that come into play are appointment rewards and dynamics, prize pacing, and torture breaks.

7. Unpredictability and curiosity: is when the user wants to find out what is going to happen next. Examples of elements that come into play are sudden rewards, Easter eggs, and visual storytelling.

8. Loss and avoidance: is when a user's drive is rooted in avoiding something bad happening. Examples of elements that come into play are progress loss, fear of missing out, and rightful heritage.

Similar to what was said about Robinson and Belloti's (2013) taxonomy, the Octalysis framework accounts for both aspects of this study, game elements and motivation. However, this does not come without a limitation. This framework binds certain game elements with certain aesthetic outcomes (e.g. narratives or hero characters can elicit the aesthetic of epic meaning and calling). As discussed before, coming into this study, the main intention is to determine the undirected and unprejudiced perceptions of students on the influence of game elements on motivation. The whole idea is to ground the conclusions of this study in the results from the data themselves. Moreover, The Octalysis framework restricts the emotional responses to gamification into its eight categories of human drives. Based on a grounded approach to data analysis, this study requires a framework that allows for a spectrum of emotional responses that

can be elicited from exposure to game elements, without the assumption that certain elements trigger certain emotional responses.

The elemental tetrad. One of the most fundamental and widely accepted frameworks for game design and gamification is Schell's (2008) elemental tetrad. It was first suggested in his book *The Art of Game design* published in 2008. In a review of the book, Simoens (2018) breaks down the tetrad into four overarching elements:

- Technology: every technological aspect that impacts the design of the game, ranging from coding to the interface and the technology the user is interacting with

- Mechanics: all the players' affordances in a game or gamified content. Mechanics reflect what users can or cannot do while interacting with the gamified activity

- Aesthetics: all the feelings the users undergo, through all their senses, while interacting with the game or the gamified activity

- Subject matter/story: the element that contains the overall atmosphere or the world of the game/gamified activity as well as all the different player and non-player participants.

Schell's (2008) tetrad serves as a tool a developer or a designer can use to keep their game balanced and coherent. It serves as a framework one can always revise to make sure that all the aforementioned elements are in service of one another and act as a singular and functional entity. However, the elemental tetrad heavily relies on technology and narration/story to be part of game design. Schell (2008) believes that there are direct and interconnected relationships between all the aforementioned components: technology, mechanics, aesthetics, and story. Although this study regards gamification as mostly a computerized endeavor, it is not always the

case, and digital technology and/or narration are not definite parts of a gamification design. In addition, this thesis is looking to investigate the influence of *only* game elements on aspects of motivation, regardless of the technology used or the ecological factors at play. Accordingly, the elemental tetrad is not a suitable fit as a conceptual framework for this study.

Mechanics, dynamics, and aesthetics: The MDA conceptual framework. Perhaps the most commonly adopted framework for guiding the process of gamification is the MDA framework suggested by Hunicke, LeBlanc and Zubec (2004). It is sometimes referred to as the MDE framework for *emotions* instead of *aesthetics* (Robson et al., 2015). This framework suggests that all elements of a game fall within the boundaries of its mechanics, dynamics, and the elicited emotional response of players that is referred to as aesthetics or emotions.

Some researchers solely study game mechanics (Kosmadoudi et al., 2013, p. 777), while others study both mechanics and dynamics (Simoes, Redondo, & Vilas, 2013). These constructs are explained below.

Game mechanics. The entirety of the actions and controls that players can do and interact with in a game is referred to as game mechanics (Hunicke et al., 2004). It is all the small affordances to players, and they remain constant in the game and do not change from player to player (Robson et al., 2015). For example, in first person shooter games, mechanics include the weapons and the utilities players can use or have access to during the game. There are three types of game mechanics: setup mechanics, rule mechanics, and progression mechanics.

Setup mechanics include everything that has to do with the environment of the gameplay, such as the overall setting, objects, weapons, buildings etc. (Elverdam & Aarseth, 2007).

As described by Elverdam and Aarseth (2007), rule mechanics "shape the concept or goal of the gamified experience to be pursued" (as cited in Robson et al., 2015, p. 415). Rule mechanics permit or prohibit players from certain actions (e.g. path/time restrictions, choice restrictions, unlock level requirements).

Progression mechanics influence the players' experience as the game progresses (Elverdam & Aarseth, 2007). Those types of mechanics can be embedded by designers to reinforce certain behaviors. Some examples include scores, progress bars, badges, currency, trophies etc. (Robson et al. 2015, p. 415).

There is a plethora of game mechanics that can be found in literature on games and gamification (see the list in the *Game Elements section)*. This makes it difficult to investigate all the mechanics one can come across. Following is an aggregate list of the most commonly studied and used mechanics suggested by Blohm and Leimeister (2013), Simoes et al. (2013), and Scheiner (2015):

- Game points

- Game levels and difficulties

- Trophies and badges

- Leaderboards and rankings

- Stories and narrations

- Avatars and virtual identities (e.g. customizable profiles)

- Progress bars and documentation of behavior

- Group tasks

- Time pressure

- Quests

- Virtual goods and a virtual trade system

Game dynamics. According to Robson (2015), "gamification dynamics are the types of player behavior that emerge as players partake in the experience" (p. 415). Dynamics are the players' behavioral reactions to the various game mechanics and interactions with other players during gameplay. For example, *information sharing* is a dynamic that can occur if mechanics like *multiplayer team fights* and/or *eliminate the opposing enemy* are available for players to interact with. A game of poker includes the mechanic of *betting*, which allows for the emergence of *bluffing* as a dynamic (Hunicke et al., 2004). Occurring game dynamics collectively produce an aesthetic experience for players, which will be discussed in the following section (Hunicke et al., 2004).

Game aesthetics/emotions. From the designers' point of view, game aesthetics or emotions are the desired emotional reactions of players after interacting with game mechanics and generating dynamics. (Hunicke et al., 2004; Robson et al., 2015, p. 416). Consider the poker example. *Betting* is the mechanic afforded to the player, which elicits the *bluffing* dynamic. Accordingly, the player might experience *sensation* and *pleasure* if the bluff works, or *challenge* if another player was onto him/her and called his/her bluff. As Hunicke et al. (2004) put it, "the mechanics give rise to dynamic system behavior, which in turn leads to particular aesthetic experiences".

Although there is an abundance of emotional responses one can exhibit when exposed to a game or gamified content, following is Hunicke et al.'s (2004) suggested taxonomy for the most common emotional responses to gameplay:

- *Sensation:* game experienced as pleasure

- *Fantasy*: game experienced as make-belief

- *Narrative*: game experienced as drama/story

- *Challenge*: game experienced as an obstacle course

- *Fellowship*: game experienced as social

- *Discovery*: game experienced as uncharted territory

- *Expression*: game experienced as self-discovery and expression

- *Submission*: game experienced as a pastime

Rationale. The MDA framework is mostly used to design games with the sole purpose of entertainment. It was used in designing a variety of the most engaging games throughout the past decade. Accordingly, the MDA might not, on first gloss, be considered the best choice of a framework when it comes to educational gamification. However, it seems to fit the premise of this study perfectly.

The MDA framework offers a robust and analytical view on game elements compared to the other frameworks discussed in this chapter. It delves into game elements and divides them into three separate categories (mechanics, dynamics and aesthetics), and it explains the relationships between said categories. Moreover, the way those relationships are represented within the boundaries of the MDA does not constrain a designer with a pre-established set of causal relations between those elements. This can be explained as: any game mechanic can give rise to any game dynamic, which in turn can give rise to any emotional response (even if not mentioned in Hunicke et al.'s (2004) list). Accordingly, the MDA offers a flexible and an

unbiased explanation of how game elements work and interact with one another Thus, it appears to be an appropriate and useful framework for this thesis.

Admittedly, over the past decade, the MDA framework was heavily criticized by various scholars for different reasons. Mainly, it is viewed as a framework that puts too much weight on game mechanics, without regard to other design aspects of games or gamification. The MDA justifies any influence or outcome of a game by the choice of the employed game mechanics. In a nutshell, the designer only has control over arising dynamics and resulting aesthetic experiences via his/her choice of appropriate game mechanics, rooting everything back to the choice of those mechanical elements and affordances. To many scholars, this limitation rendered the MDA a poor choice of framework for game design as it does not give the designer control over other game elements (e.g. dynamics or aesthetics) through anything other than game mechanics. (e.g. technology). Although this has been proposed as a limitation in contemporary literature, this is exactly why the MDA works as a framework for this thesis: it allows for justifying aesthetic experiences as a result of exposure to game elements (mechanics in this specific case). The aim of this thesis is not to design a game, or even facilitate the design of gamification. Had this thesis included an experimental approach to data collection where designing an intervention was a necessity, one would argue that the DPE framework is that way to go. Our purpose, on the other hand, is to explore the participants' perceptions on the influence of game elements (game mechanics that we have control over) on certain aspects of motivation (aesthetic outcome) through questioning and recording, and not through experimentation. Seen through that lens, even the aforementioned limitation argues for the employment of the MDA for the purposes of this study.

Another point is that the MDA is one of the most adopted frameworks in gamification-focused studies across the literature. Perhaps that is because of its elaborate explanations concerning game elements, or because a significant number of successful and engaging commercial games were designed on its foundations. No matter the reason, this framework seems to be the first choice for a lot of scholars studying gamification.

This thesis intends to elicit Lebanese students' subjective and unguided perceptions on the impact of game elements on motivation. This calls for choosing game elements for a questionnaire without allowing for any prejudices or preconceived notions about the relationships between those elements and any aspect of motivation. The MDA offers an open approach to explaining game elements, which offers grounds for what is required in this study.

Motivation

Like the way a gamification framework was selected, there is a need to select a motivation framework that best accommodates the premise of this thesis and helps shape the way the survey questions are designed. In a nutshell, we now have an idea of how to view gamification with respect to this thesis and developing the tool (i.e. The MDA framework), but we still need a framework that explains how motivation will be looked at in terms of components (what constitutes motivation) and/or indicators (what indicates motivation). Following is a breakdown of some of the most prominent motivation frameworks that were scanned in efforts to find the one that best fits this thesis.

Maslow's hierarchy of needs theory. Treading into the realm of motivation does not go without a mention of Maslow's (1954) hierarchy of needs. It is considered by many to be the root

of many theories that discuss motivation. Maslow altered the paradigm of belief that human beings are driven solely by power, achievement, or mere biology (as cited in Huitt, 2007). He suggested that humans are driven by two overarching types of needs:

1. Deficiency needs: the deficiencies a human being cannot function, advance, or even survive without overcoming. Following is a chronological breakdown of deficiency needs ("i" being the most urgent need to overcome):

   i. Physiological needs: thirst, hunger, physical wellness etc.

   ii. Safety needs: one's feeling that he/she is not in danger

   iii. Belongingness and love needs: affiliation with others and being accepted by them

   iv. Esteem needs: a sense of achievement, competence, and recognition

Within the deficiency needs category, human beings try to get rid of the abovementioned deficiencies in a chronological manner. For example, if one is striving for achievement (i.e. fulfilling the *esteem needs* deficiency) and feels a sudden sense of danger (i.e. *safety* deficiency), he/she would alter his/her attention to the safety need first.

2. Growth needs: are the needs that promote growth instead of satisfying deficiencies. Maslow (1954) believes that a person can only start fulfilling these needs if all the deficiency needs have been satisfied:

   i. Cognitive needs: the need to know and understand, as well as explore

   ii. Aesthetic needs: the need to have order, symmetry, and beauty

   iii. Self-actualization: the need to find fulfillment in the self and realize its potential

   iv. Self-transcendence: the need to go beyond one's ego and help others reach self-fulfillment and actualization

Although Maslow's (1954) breakdown of motivation and human needs is comprehensive, it does not fit the purposes of this thesis. His explanations of human needs and motivation drives are too meta, as in he views motivation from a *human* lens rather than a *learner* lens, which is not what we are looking for in this thesis project. Also, the way Maslow (1954) describes needs (e.g. aesthetic needs) does not offer a means of indicating the drive to fulfill those needs (e.g. what indicates striving for aesthetic needs like beauty or order?). To be able to question the participants about their perceptions of the influence of game elements on motivation, we need to devise questions that describe motivation in a more tangible manner by breaking the whole concept down into observable components and/or indicators.

Murray's theory of psychogenic needs. Similar to what was suggested by Maslow, Murray's (1938) theory of psychogenic needs proposes that there are a set of basic needs that are universal to everyone. However, he believes that those needs vary between individuals in terms of priority and prevalence, which results in the uniqueness of personalities:

1. Ambition needs:

    - Achievement: the need to overcome obstacles and succeed

    - Recognition: the need to gain approval and social status

      Exhibition: the need to attract attention

2. Materialistic needs:

    - Acquisition: the need to obtain and possess

    - Construction: the need to build or create

    - Order: the need to organize, arrange, and be precise

- Retention: the need to keep things

3. Power needs:

- Dominance: the need to control and lead others

- Aggression: the need to injure, attack, or ridicule others

- Autonomy: the need to resist others and be independent

- Deference: the need to obey and cooperate with others

- Blame avoidance: the need to follow rules and avoid blame

  Abasement: the need to confess, apologize, and accept punishment

4. Affection needs:

- Affiliation: the need to make associations and friendships

- Rejection: the need to reject and exclude others

- Nurturance: the need to protect and help others

- Play: the need to relieve tension and relax

  Succorance: the need to seek sympathy and protection

5. Information needs:

   a. Cognizance: the need to seek knowledge and ask questions

   b. Exposition: the need to provide information and educate others

Similar to Maslow's (1954) hierarchy of needs, Murray's (1938) theory views motivation from a broad, human oriented lens as opposed to a learner oriented one. However, Murray breaks down motivation into more components and categories, which gives more grounds to work with. For example, the Power need *autonomy* can easily translate to an intrinsic motivation indicator and be used in devising the questions for the survey. Both Information needs can also be

integrated into an education focused setting. Nonetheless, picking and choosing what we want out of a framework that explains an abstract concept like motivation distorts the vision of that concept. Choosing Information needs for example and completely disregarding affection needs renders the whole framework lacking and distorted in the way it explains motivation. Accordingly, it seems to be wiser to find a framework that explains motivation purely from an academic perspective and employ that framework as whole, leaving the conceptual way that motivation is explained within the boundaries of said framework intact and undistorted.

McClelland's needs theory. McClelland (1953) also posited a theory on motivation based on the human drive to fulfill needs. His theory evolved from the 1940s till the 1960s, with an initial focus on *achievement*. The focus of the three-faceted needs theory is mainly on the three main needs that apply to all human beings, regardless of gender, cultural background, race or other differentiators. The three needs McClelland discusses are:

- Achievement: the need to achieve desired outcomes and fulfill objectives

- Power: the need to control and impose one's opinions and views over other people

- Affiliation: the need to develop interpersonal relations

McClelland's theory helps identify which one of the abovementioned needs a certain person is striving to fulfill and cater education or guidance accordingly. However, and like the two aforementioned theories on motivation, McClelland's views are too broad and human-focused rather than learner-focused. His theory might prove to be an effective approach to devise an overarching vision or philosophical approach to education, but it lacks the complexity and the specificity to frame a formal learning process or help indicate the presence or absence of motivation.

Bandura's social learning theory (SLT). Albert Bandura (1977a) put forward a learning theory that contributed to bridging the gap between cognitivism and behaviorism in the late 1970s. Unlike the previously mentioned motivation theories, his proposed theory is specific to learning and can be directly integrated into the education world. He believed that alongside human behavior, conditioning, and reinforcement, memory and attention come into play. The SLT is rooted in a Vygotskian school of thought, with a major emphasis on social and reciprocal learning, as well as modeling after observation. In a nutshell, Bandura believes that we learn by observing others and imitating them. For modeling to properly work, the following four factors have to be properly aligned:

1. Attention: how much the modeler is keenly observing the person to be imitated later
2. Retention: remembering what the modeler paid attention to
3. Reproduction: modeling said behavior
4. Motivation: having a good reason to model and imitate

Regarding the fourth element, i.e., Motivation, Bandura (1977b) delves into the importance of self-efficacy in achieving desired outcomes. Prior to the cognitivist school of thought, behaviorists believed that a behavioral outcome can be elicited via classical or operant conditioning (e.g. reinforcement and punishment), with or without the conscious knowledge of the learner. On the other hand, Bandura (1977b) argues that "stimuli influence the likelihood of a behavior's being performed by virtue of their predictive function, not because the stimuli are automatically connected to responses by their having occurred together". He argues that stimuli in the form of reinforcers help learners develop outcome expectations, and in return generate internal "motivators of behavior" to achieve the outcomes and get the reward. In that regard,

Bandura argues that motivation is influenced by (a) goal setting and (b) self-evaluation to achieve self-motivation. The logic is as follows:

1. Setting a certain level of behavior as a goal

2. Setting a reward that's acquisition is conditional on attaining that certain level of behavior

Which would lead to:

- The creation of self-motives in order to achieve the set behavior and attain the reward

- Dissatisfaction whenever the current behavior does not meet the standards of the set behavior, which would also serve as an incentive for advancement

Bandura (1977b) also proposes a motivation theory that revolves around self-efficacy, which "refers to an individual's belief in his or her capacity to execute behaviors necessary to produce specific performance attainments". He suggests that the attainment of an outcome is dependent on two factors:

- Efficacy expectations: one's conviction in the ability to perform a certain behavior to achieve a desired outcome

- Outcome expectations: one's conviction that a certain behavior would lead to a desired outcome

Bandura (1977b) further dissects efficacy expectations, suggesting that there are four main sources that factor into its enhancement:

- Performance accomplishments: regular and repetitive success in performances that lead to desired outcomes

- Vicarious experience: the drive to perform after seeing others perform the intended behavior

- Verbal persuasion: the verbal suggestion that one can perform a desired behavior and achieve the consequential outcome

- Emotional arousal: the emotional state of a person, be it positive or negative, that has a direct influence on perceived self-efficacy

You do not get through an Education degree anywhere in the world without coming across Bandura's (1997a) Social Learning theory; this is how valuable it is. Also, the extent that Bandura (1997b) goes into motivation is elaborate.

Looking at how Bandura (19771; 1977b) discusses motivation, terms like self-efficacy, goal setting, self-evaluation, efficacy expectations, and outcome expectations come to light. What these terms have in common is that they are all rooted in intrinsic motivation and internal processes. Even when Bandura (1997a) discusses external stimuli, he explains that they only motivate learners in a way that these stimuli trigger an internal response that leads to goals setting to attain a reward. Furthermore, Bandura's (1997b) explanation of motivation revolves around efficacy expectations, with factors like repetitive success and imitation after observation increase said internal efficacy expectations. In this thesis, our approach views motivation as an outcome of exposure to game elements. This means that we are choosing to view game elements as explicitly external motivators that have the capacity to trigger both an internal and/or an external response. Moreover, Bandura's (1997b) ideas on motivation hardly suggest any external indicators to a motivation response, as all processes from his perspective are internal. In a nutshell, if we choose to employ Bandura's (1997b) theory on motivation and efficacy expectations, it would be hard to pinpoint physical indicators, observable, or measurable external

responses to check for a positive or a negative motivation response, other than the successful completion of a given task or activity. This makes it hard to breakdown motivation as a concept and include any indicators or components in the questionnaire that we plan on administering. Accordingly, Bandura's theory (1997b) is not a good fit for this thesis.

The self-determination theory (SDT). The self-determination theory was designed and developed by Ryan and Deci (2000a) over the span of 50 years and is also more guided towards learning and education. This theory suggests that learning is highly influenced by intrinsic motivation, where autonomy, competence, and relatedness are regarded as basic psychological needs that govern one's capacity to learn and advance. This theory also acts as a framework for gamification by mainly focusing on the three aforementioned facets of intrinsic motivation (Brühlmann, 2013):

- Autonomy: one's capacity to make decisions that are followed by actions on his/her own behalf
- Competence: one's ability to do something efficiently and successfully
- Relatedness: the urge to socialize, connect, and interact with others, as well as care for them

According to Ryan and Deci (2000b), competence can be enhanced through positive feedback, challenges, and the learners' freedom of choice when it comes to demanding their evaluations. Autonomy can be increased by providing learners with free choices, acknowledging their feelings, and giving them opportunities to self-regulate and direct their actions.

Ryan and Deci's (2000a) SDT provides a suitable breakdown of motivation when it comes to this thesis. The three components can easily be viewed as indicators of motivation and

can be included as the main components of motivation in the questionnaire (e.g. does a given game element trigger autonomy?). However, we chose to employ Keller's (1987) ARCS model seeing that it has more to offer on motivation for this thesis. Following is an explanation of Keller's (1987) ARCS and its development over the years, as well as a justification of why Keller's (1987) breakdown of motivation is the most suitable one for this thesis.

Motivation Framework: Keller's ARCS Model

Historical background. Keller's (1987) ARCS (attention, relevance, confidence, and satisfaction) originated from Tolman (1932) and Lewin's (1938) Expectancy-Value theory. Their theory suggests that predicting an individuals' future actions is highly dependent on his/her expectancies and values regarding the target task, where:

- Expectancies: are the individuals' perceptions and judgements about his/her abilities and capacity to engage in and achieve a certain task
- Values: are the individual's rationalizations about the reasons and the values behind pursuing that task

Tolman (1932) and Lewin (1938) argue that for a person to be motivated to commit to a decision to take action, engage in said action, persist in doing it, and achieve the desired results, he/she should have positive expectancies and values towards the task.

Keller (1987) expanded Tolman (1932) and Lewin's (1938) two categories into an amalgamation of four new and adopted ones. He divided the *value* category into *interest* and *relevance*, kept the *expectancy* category, and added a new category called *outcomes*:

- Interest

- Relevance

- Expectancy

- Outcomes

He separated the *value* category into *interest* and *relevance* to differentiate between interest related values (e.g. arousal and curiosity) and relevance related values (e.g. the need to achieve or perceived utility). In a nutshell, "interest refers more to attentional factors in the environment, and relevance refers more to goal directed activity" (Keller, 1987).

Expectancy retained Tolman (1932) and Lewin's (1938) definition as one's perception of being able to successfully engage in and finish a task. Keller (1987) states that one's positive expectancy is highly dependent on how confident he/she is in "their feelings of control over their environment".

The *Outcomes* category represents the reinforcing role that instruction plays in boosting both expectancy and value. Keller (1987) specifically highlights the role of operant conditioning (Skinner, 1938) in maintaining an appropriate level of intrinsic motivation.

The ARCS. After extensive research on human motivation and motivating practices, as well as "generating a large list of motivational strategy statements and sorting them", Keller (1987) formulated the ARCS model based on the foundation of his adjusted expectancy-value model. The aforementioned categories were renamed in efforts to foreground their central features. Keller (1987) believes that for a learner to become motivated and maintain that motivation, the four ARCS categories, or "conditions" as he refers to them, should be met:

1. Attention: refers to the leaner's taken notice regarding what he/she is being subjected to

   a. It is an element that factors into motivation.

   b. It is a requirement for learning.

   c. It can be triggered by various stimuli, such as sharp noises, calculated pauses etc.

   d. It is easy to trigger, but difficult to sustain. Sustaining attention requires:

      i. Arousing the learners' curiosity to seek knowledge

      ii. Knowing and responding to the learners' "sensation-seeking needs".

      iii. Balancing between triggering boredom and hyperactivity/anxiety.

2. Relevance: refers to the meaning and the purpose behind learning or engaging in a task as perceived by the learners themselves. It is the answer to the question: Why am I learning this?

   - The purpose behind learning should be clear, otherwise there would be a relevance problem.

   - The purpose can be learning in by itself.

   - The purpose can also be embedded within the learning process rather than it being an end-result and/or relating to the content.

      i. E.g. Affiliation needs can be fulfilled by cooperative work.

      ii. E.g. Achievement needs can be fulfilled by achieving set goals.

   - If learners' needs are addressed during the process of learning, learners would feel that the process itself is relevant to what they want and motivating accordingly.

3. Confidence: refers to the learner's trust and positive expectancy in the ability to succeed

- It influences both accomplishment and persistence to learn.

- It is positively influenced by:

    i. Attributing success to effort and ability rather than luck.

    ii. Involvement in the activity at hand

    iii. Enjoying learning

    iv. Accepting the fact that one makes mistakes

- It is negatively influenced by

    v. Effort that is rooted in ego and the intention to impress others

    vi. Fearing failure

    vii. Unhealthy competition

4. Satisfaction: refers to the learner's positive feelings about what he/she is learning, as well as his/her accomplishments

    - It can be elicited by traditional schedules of reinforcement and extrinsic rewards.

    - Predetermined rewards and/or an inflexible learning design might lower a learner's sense of control if the learner is originally intrinsically motivated for his/her own reasons. It may result in resentment and lower levels of intrinsic motivation.

    - Appropriate methods should be chosen to elicit satisfaction depending on the learners to avoid problems as the one mentioned above.

Why ARCS. Unlike various motivation theories that focus on the general psychological nature of human beings, some of which were mentioned in this thesis, the ARCS model was

purposefully formulated to guide the processes of designing and implementing motivating instructional endeavors. Keller and Kopp (1987) clarify that the ARCS model was developed for "identifying and solving motivational problems in instructional materials and methods". Keller and Suzuki (1987) further specify that the ARCS can be best utilized "in computer assisted instruction" (as cited in Keller, 1987). Accordingly, and considering that the premise of this study relates to motivation in learning and instruction in general, and computer-assisted learning in specific, the ARCS model was found to be a perfect motivation framework to stick to. Moreover, Keller (1937) develops the ARCS model by breaking down motivation into components that act as indicators for a positive or a negative motivation outcome. This means that according to this model, one can determine if a learner is motivated or not by simply observing the occurrence or fulfillment of one or more of the ARCS's components (e.g. attention) and judging accordingly. This indicatory nature of the components makes the ARCS model a good fit for the questionnaire, as the components can easily be included and inquired about as indicators of motivation (e.g. Does a given game element elicit attention? Satisfaction?).

Method

This study follows an exploratory quantitative approach utilizing a cross-sectional survey design to elicit descriptive data, builds to further inferences, and eventually answers the following research questions:

1. What are the perceived most influential game elements on motivation to learn with respect to Lebanese post-secondary students?

2. How do the perceptions of Lebanese post-secondary students on the influence of game elements on motivation differ as a result of age, gender, level of studies, and hours spent gaming per day?

Participants

The responses of 42 Lebanese post-secondary students were included in this study. The participants were conveniently sampled through an online snowballing technique. Convenience in the sampling method refers to the requirement that one should be a post-secondary student in Lebanon to be able to answer the questionnaire (will be discussed later in this section) and contribute to the results of the study. Otherwise, choosing the participants was random as the survey reached the participants through random online and word-of-mouth snowballing. It was estimated that the questionnaire was disseminated to more than 1000 students, making the response rate rather low. On average, the participants were between 18 and 23 years of age. All the participants were enrolled in a post-secondary program at a university in Lebanon at the time of data collection. Their educational backgrounds were diverse as they came from ten different schools of study. Most of the participants were Lebanese, three participants were Palestinian, and one participant was Pakistani.

Tools and Procedure

Questionnaire. In efforts to answer the research questions, a questionnaire was designed and disseminated to the participants (see Appendix A for the complete questionnaire). The questionnaire included 14 different sections. Section 1 included the consent form that the

participants had to read and agree on before being able to proceed with filling out the rest of the questionnaire. Section 2 required the participants to fill out personal information (e.g. age, gender, school of studies). Sections 3 to 13 were 5-level Likert scale questions designed to elicit the students' perceptions on how much the selected game elements have an influence on the four components of motivation suggested in Keller's (1987) ARCS model. Finally, section 14 included a single question on the participants' preferred emotional experiences while gaming in terms of their impact on motivation.

On a side note, although those emotional experience questions and other questions (e.g. types of games preferred) may relate more to gaming rather than gamification, the purpose of asking them was to elicit what emotional and entertaining experiences the participants prefer in an effort to unveil what experiential outcomes can be best planned for when gamifying a learning endeavor. It is as simple as taking what the participants perceive as motivating in games and using those motivating aspects and elements to gamify learning, which is what gamification is in the first place.

The variables suggested by the research questions and that were present in the questionnaire were treated as follows:

- Dependent variables
  - Participants' overall scores on the Likert questions, which indicate their perceptions of how much influence game elements have on motivation
  - Participants' scores on specific Likert questions, which indicate their perceptions of how much influence certain game elements have on specific aspects of motivation (attention, relevance, confidence, and satisfaction)

- Participants' choices of their preferred emotional experiences while gaming in terms of their influence on motivation (see Appendix A, section 14)

- Independent variables
  - Age
  - Gender
  - Level of studies
  - Hours spent gaming per day

Software. The questionnaire was designed and posted on Google Forms. The tool itself allows for a survey design with various types of questions, which was helpful in the case of this study. There was a need for questions that allow for open ended answers, multiple choice questions, Likert scale questions, and the affordance to insert an open ended 'other' item in some of the questions. Google Forms has the capacity to accommodate all those requirements and was found to be a good fit. In addition, Google Forms allows for the exporting of the acquired data in a .csv format, which can be opened on Microsoft Excel as well as various data processing programs such as SPSS.

IBM SPSS version 24 was used to analyze the data. It was selected because it is a program that was initially designed for the purposes of analyzing data that relates to social sciences. Also, it is one of the most widely accepted programs for data analysis, and it allows for conducting all the necessary statistical tests that were needed in this study.

Finally, Gmail was used to send out the initial letter of invitation to the participants (see Appendix B for the e-mail).

Procedure. The series of steps that were followed to implement the data collection process, prepare the data, and analyze it can be chronologically illustrated as follows:

Data Collection.

1. The questionnaire was designed after examining and selecting the needed game elements and motivation components from the literature review.

2. The actual plotting of the questionnaire took place on Google Forms, where it was finalized for dissemination.

3. The invitation email was sent (see Appendix B) to the key participants (e.g. acquaintances and friends) via Gmail. The email included a link to the questionnaire.

4. The email and the link to the questionnaire were snowballed by those first participants to their own friends, acquaintances, colleagues etc.

Data Preparation.

1. The participants' responses to the questionnaire were downloaded in the form of a .csv file from Google Forms.

2. The .csv file was opened and edited on excel to properly set the variable columns for easy transfer to SPSS.

3. The data was transferred to IBM SPSS version 24, where the answers of the participants were set into proper variables and converted to numerical data (e.g. below 18 of age = 1; 18 to 21 of age = 2 etc.).

4. A new variable of 'total scores' was added to sums up the individual total scores of the participants on all the Likert scale questions.

Data Analysis.

1. Frequency tests were run on the data to unveil the participants' demographic and personal information (e.g. how the participants were grouped in terms of age, gender, school of study).

2. Descriptive statistics were run on the data to determine basic measures of central tendency (e.g. means and medians) of the participants scores on the Likert scale questions.

3. Normality tests were run to determine if the participants' scores were normally distributed according to their different groupings. Tests were also run to check for outliers in the overall scores of the participants as well as their scores on questions that relate to specific elements.

4. According to what assumptions were violated, specific statistical tests were chosen and conducted to compare between the different groups of participants in terms of their age, gender, level of studies, and time they spend gaming per day. This will be further elaborated on in the *Results* section.

Results

For the sake of thoroughness, this section provides both descriptive statistics that reveal the demographics of the participants and possible trends in the data, as well as inferential statistical tests that compare the participants' responses in different forms of groups.

Descriptive Statistics

Demographics. Preliminary examination of the data through frequency testing showed that the questionnaire yielded 42 responses. In terms of the grouping parameters set by the questionnaire, the responses were divided as follows:

1. Level of studies: 30 undergraduate students and 12 graduate students responded to the questionnaire.

2. Age: 21 students between the ages of 18 and 21, and 21 students above the age of 21 responded to the questionnaire.

3. Gender: 23 females and 19 males responded to the questionnaire.

4. Hours spend on gaming per day: 19 students who game less than an hour a day, and 23 students who game more than an hour a day responded to the questionnaire.

The participants came from ten different schools of study, as well as enjoyed different types of games as observed in Fig.2 and Fig.3 respectively. As the response rate to the questionnaire did not accommodate elaborate groupings as observed in the aforementioned figures, both *School of Study* and *Type of Games Played* categories could not be considered in any inferential parametric or non-parametric testing because of the low number of participants in each group.
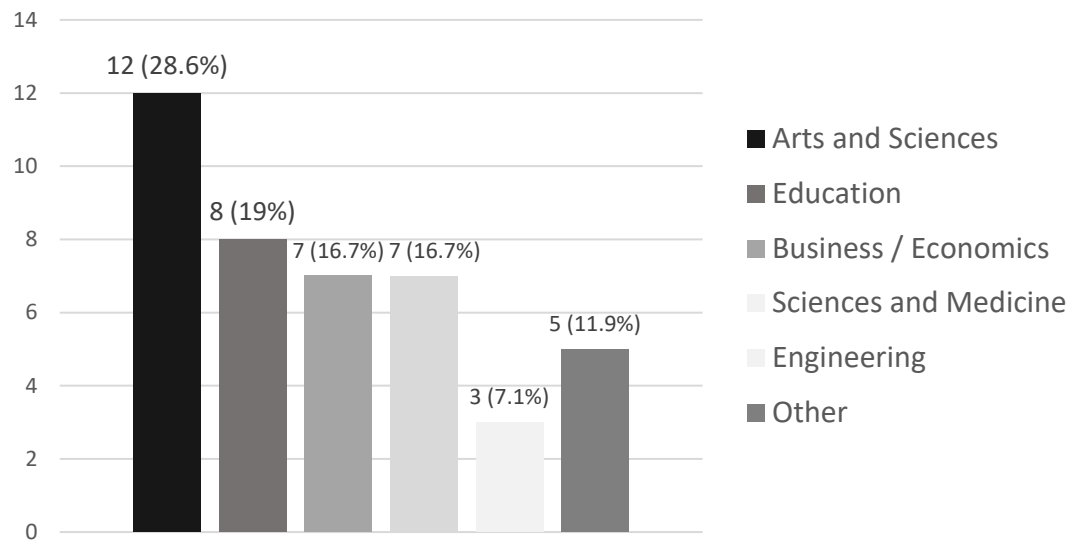
School of Study

Figure 2. School of study. The exact number of participants as well as their percentage with regard to the sample size of 42
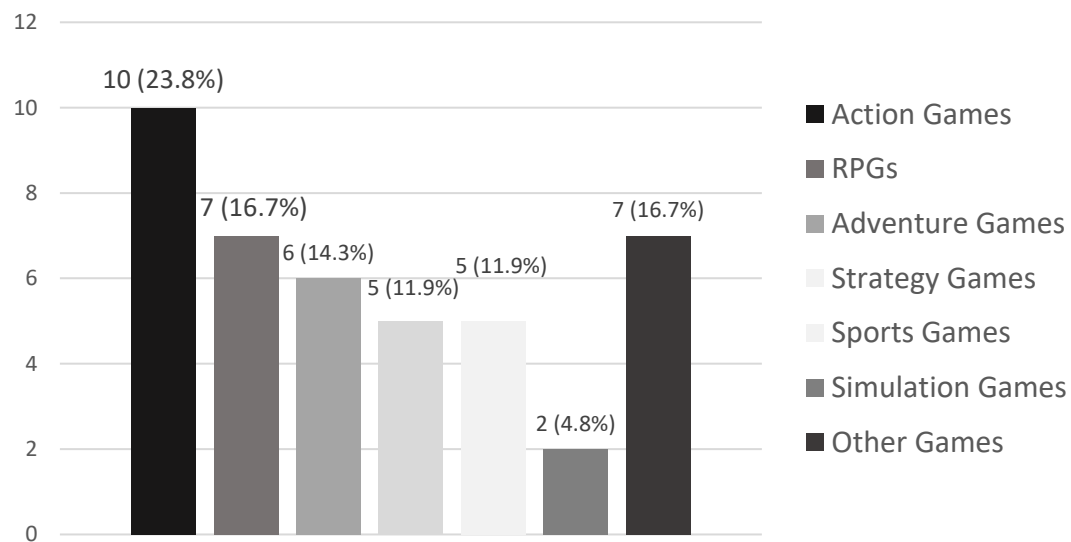
Type of Games Played

Figure 3. Type of games played. The exact number of participants as well as their percentage with regard to the sample size of 42

Overall scores. The main purpose of the paper was to examine the participants'
perceived influence of game elements on motivation. The mean of the participants' scores was
166.4, which yielded a number of: 3.8 when transformed back to a Likert scale.

Further descriptive tests were run to inspect the mean scores of the participants on each
game element question separately, that is the perceived influence of each game element on each
component of motivation according to the ARCS model. Table 1 shows the labels that were
assigned to the variables in all those separate questions.

Table 1

Variable Labels and the Related Items in the Questionnaire

Variable Labels	Likert Scale Questions in the Survey (1 to 5, 3 being no perceived impact)
Avatars.Attention	Perceived influence of the *Avatars* game element on attention
Avatars.Confidence	Perceived influence of the *Avatars* game element on confidence
Avatars.Relevance	Perceived influence of the *Avatars* game element on relevance
Avatars.Satisfaction	Perceived influence of the *Avatars* game element on satisfaction
GamePoints.Attention	Perceived influence of the *Game Points* game element on attention
GamePoints.Confidence	Perceived influence of the *Game Points* game element on confidence
GamePoints.Relevance	Perceived influence of the *Game Points* game element on relevance
GamePoints.Satisfaction	Perceived influence of the *Game Points* game element on satisfaction

Group.Tasks.Attention	Perceived influence of the *Group Tasks* game element on attention
Group.Tasks.Confidence	Perceived influence of the *Group Tasks* game element on confidence
Group.Tasks.Relevance	Perceived influence of the *Group Tasks* game element on relevance
Group.Tasks.Satisfaction	Perceived influence of the *Group Tasks* game element on satisfaction
Leaderboards_Ranks.Attention	Perceived influence of the *Leaderboards/Ranks* game element on attention
Leaderboards_Ranks.Confidence	Perceived influence of the *Leaderboards/Ranks* game element on confidence
Leaderboards_Ranks.Relevance	Perceived influence of the *Leaderboards/Ranks* game element on relevance
Leaderboards_Ranks.Satisfaction	Perceived influence of the *Leaderboards/Ranks* game element on satisfaction
Levels_Difficulties.Attention	Perceived influence of the *Levels/Difficulties* game element on attention
Levels_Difficulties.Confidence	Perceived influence of the *Levels/Difficulties* game element on confidence
Levels_Difficulties.Relevance	Perceived influence of the *Levels/Difficulties* game element on relevance
Levels_Difficulties.Satisfaction	Perceived influence of the *Levels/Difficulties* game element on satisfaction
ProgressBars.Attention	Perceived influence of the *Progress bars* game element on attention
ProgressBars.Confidence	Perceived influence of the *Progress bars* game element on confidence
ProgressBars.Relevance	Perceived influence of the *Progress bars* game element on relevance

ProgressBars.Satisfaction	Perceived influence of the *Progress bars* game element on satisfaction
Quests.Attention	Perceived influence of the *Quests* game element on attention
Quests.Confidence	Perceived influence of the *Quests* game element on confidence
Quests.Relevance	Perceived influence of the *Quests* game element on relevance
Quests.Satisfaction	Perceived influence of the *Quests* game element on satisfaction
Stories_Narration.Attention	Perceived influence of the *Stories/Narration* game element on attention
Stories_Narration.Confidence	Perceived influence of the *Stories/Narration* game element on confidence
Stories_Narration.Relevance	Perceived influence of the *Stories/Narration* game element on relevance
Stories_Narration.Satisfaction	Perceived influence of the *Stories/Narration* game element on satisfaction
TimePressure.Attention	Perceived influence of the *Time Pressure* game element on attention
TimePressure.Confidence	Perceived influence of the *Time Pressure* game element on confidence
TimePressure.Relevance	Perceived influence of the *Time Pressure* game element on relevance
TimePressure.Satisfaction	Perceived influence of the *Time Pressure* game element on satisfaction
Trophies_Badges.Attention	Perceived influence of the *Trophies/Badges* game element on attention
Trophies_Badges.Confidence	Perceived influence of the *Trophies/Badges* game element on confidence

Trophies_Badges.Relevance	Perceived influence of the *Trophies/Badges* game element on relevance
Trophies_Badges.Satisfaction	Perceived influence of the *Trophies/Badges* game element on satisfaction
VirtualGoods_Currency.Attention	Perceived influence of the *Virtual Goods/Currency* game element on attention
VirtualGoods_Currency.Confidence	Perceived influence of the *Virtual Goods/Currency* game element on confidence
VirtualGoods_Currency.Relevance	Perceived influence of the *Virtual Goods/Currency* game element on relevance
VirtualGoods_Currency.Satisfaction	Perceived influence of the *Virtual Goods/Currency* game element on satisfaction

Tables 2, 3, 4, and 5 show the mean scores of the participants on the variables shown in Table 1. Take the first element in Table 2 for example: *TimePressure.Satisfaction*. This variable represents the question that elicits the participants' responses on how much they think the *time pressure* element influences the satisfaction of a learner on a Likert scale of 1 to 5 (1 being extremely negative influence, 3 being no influence, and 5 being extremely positive influence).

Tables 2, 3, 4, and 5 illustrate the participants' responses to all of the *game element* questions, shows the range of their answers, their minimum and maximum answers on the questions, the sum of their answers, the mean of their answers, as well as standard deviation (*SD)* and variance of their scores. The descriptive statistics of the responses were divided into four tables according to the mean score of the answers on each question in an ascending manner.

It is noteworthy that prior to running tests on the data, no labels were assigned to the continuous spaces between the Likert scale levels (e.g. 3.4). Accordingly, and for the sake of this analysis, the following labels were assigned:

1. 2.5-3.0: Slightly negative influence

2. 3.0 to 3.5: Slightly positive influence

3. 3.5-4.0: Moderately positive influence

4. 4.0-4.5: Very positive influence

Table 2

Game Elements with a Slightly Negative Perceived Influence on Motivation

Game Elements.Motivation	Range	*Min*	*Max*	Sum	Mean	*SD*	Variance
TimePressure.Satisfaction	4	1	5	122	2.90	1.28	1.65
TimePressure.Confidence	4	1	5	122	2.90	1.17	1.36
TimePressure.Relevance	4	1	5	125	2.98	1.26	1.59

Note. Means that fall between 2.5 to 3.0 reflect a slightly negative perceived influence.

Table 3

Game Elements with a Slightly Positive Perceived Influence on Motivation

Game Elements.Motivation	Range	*Min*	*Max*	Sum	Mean	*SD*	Variance
Leaderboards_Ranks.Relevance	4	1	5	137	3.26	0.99	0.98
Leaderboards_Ranks.Confidence	4	1	5	140	3.33	1.18	1.40
Avatars.Confidence	3	2	5	145	3.45	0.92	0.84
Trophies_Badges.Relevance	4	1	5	146	3.48	0.94	0.89
VirtualGoods_Currency.Confidence	3	2	5	147	3.50	0.80	0.65

Note. Means that fall between 3.0 and 3.5 reflect a slightly positive perceived influence.

Table 4

Game Elements with a Moderately Positive Perceived Influence on Motivation

Game Elements.Motivation	Range	*Min*	*Max*	Sum	Mean	*SD*	Variance
GroupTasks.Satisfaction	4	1	5	148	3.52	1.23	1.52
Avatars.Relevance	3	2	5	149	3.55	1.04	1.08
GroupTasks.Relevance	4	1	5	150	3.57	1.11	1.23
GamePoints.Relevance	3	2	5	151	3.60	0.91	0.83
VirtualGoods_Currency.Relevance	3	2	5	151	3.60	0.77	0.59
TimePressure.Attention	4	1	5	152	3.62	1.51	2.29
Leaderboards_Ranks.Satisfaction	4	1	5	152	3.62	1.19	1.41
GroupTasks.Confidence	4	1	5	153	3.64	0.98	0.97
GamePoints.Confidence	3	2	5	154	3.67	0.90	0.81
Levels_Difficulties.Relevance	3	2	5	155	3.69	0.92	0.85
Levels_Difficulties.Confidence	4	1	5	158	3.76	1.03	1.06
GroupTasks.Attention	4	1	5	159	3.79	1.18	1.39
Avatars.Satisfaction	4	1	5	161	3.83	0.96	0.92
Stories_Narration.Confidence	3	2	5	162	3.86	0.84	0.71
Leaderboards_Ranks.Attention	4	1	5	162	3.86	1.16	1.35
VirtualGoods_Currency.Satisfaction	3	2	5	162	3.86	0.84	0.71
Quests.Relevance	3	2	5	163	3.88	0.83	0.69
ProgressBars.Relevance	3	2	5	163	3.88	0.89	0.79
GamePoints.Attention	3	2	5	165	3.93	0.84	0.70
Quests.Confidence	3	2	5	165	3.93	0.87	0.75
VirtualGoods_Currency.Attention	3	2	5	166	3.95	0.80	0.63
ProgressBars.Confidence	3	2	5	167	3.98	0.84	0.71

Note. Means that fall between 3.5 and 4.0 reflect a moderately positive perceived influence.

Table 5

Game Elements with a Positive to a Very Positive Perceived Influence on Motivation

Game Elements.Motivation	Range	*Min*	*Max*	Sum	Mean	*SD*	Variance
Levels_Difficulties.Attention	4	1	5	168	4.00	1.06	1.12
Stories_Narration.Attention	3	2	5	168	4.00	1.01	1.02
Avatars.Attention	4	1	5	168	4.00	0.94	0.88
Trophies_Badges.Confidence	4	1	5	172	4.10	0.88	0.77
Levels_Difficulties.Satisfaction	4	1	5	172	4.10	0.98	0.97
ProgressBars.Attention	4	1	5	173	4.12	0.94	0.89
ProgressBars.Satisfaction	3	2	5	174	4.14	0.75	0.56
Quests.Satisfaction	3	2	5	174	4.14	0.87	0.76
Quests.Attention	3	2	5	174	4.14	0.90	0.81
Stories_Narration.Satisfaction	3	2	5	176	4.19	0.83	0.70
Stories_Narration.Relevance	3	2	5	176	4.19	0.89	0.79
GamePoints.Satisfaction	3	2	5	178	4.24	0.88	0.77
Trophies_Badges.Satisfaction	3	2	5	178	4.24	0.85	0.72
Trophies_Badges.Attention	3	2	5	179	4.26	0.73	0.54

*Note.* Means that fall between 4.0 and 4.5 reflect a very positive perceived influence.

Analysis of Group Differences

Various tests were run to determine if there were any significant differences between the groups of participants in terms of their responses on the questions.

The dependent variables in most of the Mann-Whitney U tests conducted in this study are of an ordinal nature (i.e. 5-level Likert scale). Therefore, the calculated exact *p*-value does not account for ties in the data presented in the dependent variable (Dineen & Blakesley, 1973). This occurs when two participants have identical answers on the same question (which is highly likely in Likert scale questions). When those ties are not accounted for, SPSS inflates the exact *p*-value,

yielding a large number. However, and considering that the sample size in some of the groups is less than 20 (e.g. 12 graduate students), the asymptotic *p*-value was not considered as an option. Ergo, the exact *p*-value was reported in most cases although it might have been inflated.

Level of study. Initially, the questionnaire yielded four different levels of study: undergraduate studies, master's studies, doctoral studies, and one case of a graduate diploma. However, the number of responses was considerably low for detailed grouping. Accordingly, it was decided that the responses should be grouped dichotomously under the *Level of Study* domain as (a) undergraduate studies and (b) graduate studies as observed in Fig.4. The main goal was to determine if there is a significant difference between the aforementioned groups in terms of their total scores on the Likert scale items (i.e. the total scores of their perceived influence of game elements on motivation).
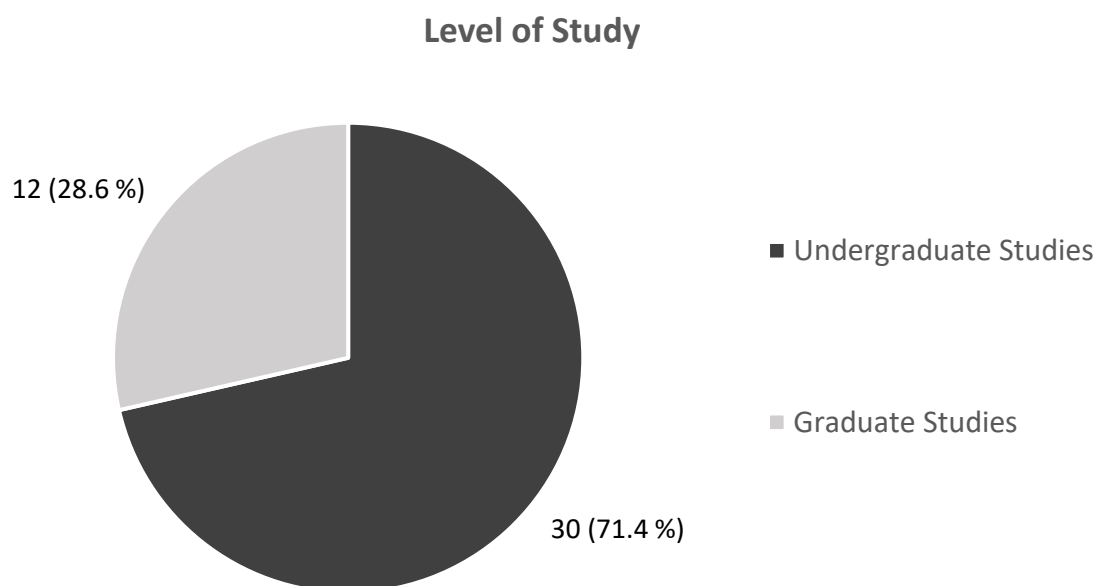
Level of Study

Figure 4. Level of study. The exact number of participants as well as their percentage with regard to the sample size of 42

Seeing that the dependent variable at hand is of a categorical and dichotomous nature, and that the independent variable is continuous (total scores of the participants), an independent samples t-test was considered to be the best option to compare the groups. However, and although the scores were normally distributed, multiple outliers were detected in the total scores of the undergraduate group, which violates one of the assumptions of independent samples t-tests. Consequently, it was found fit to substitute it with a non-parametric option.

A Mann-Whitney U test was run to determine if there were differences in the perceptions of the influence of game elements on motivation between undergraduate and graduate students. Distributions of the motivation scores for undergraduate and graduate students were not similar, as assessed by visual inspection. Motivation scores for graduate students (mean rank =23.12) and undergraduate students (mean rank = 20.85) were not statistically significantly different, U =199.5, z = .54, p = .59, using an exact sampling distribution for U (Dineen & Blakesley, 1973).

Accordingly, a series of Mann-Whitney U tests were run to determine if there were specific differences in the perceptions of the influence of individual game elements on the four facets of motivation between undergraduate and graduate students. The tests yielded two significant results and one noticeable result:

Levels and difficulties. A Mann-Whitney U test was run to determine if there were differences in the perceptions of the influence of the *levels and difficulties* element on attention between undergraduate and graduate students. Distributions of the levels and difficulties-attention scores for undergraduate and graduate students were not similar, as assessed by visual inspection. Levels and difficulties-attention scores for graduate students (mean rank =28.12) were statistically significantly higher than undergraduate students (mean rank =

18.85), U =259.5, z = 2.36, p = .02, using an exact sampling distribution for U (Dineen &

Blakesley, 1973).

A second Mann-Whitney U test was run to determine if there were differences in the

perceptions of the influence of the *levels and difficulties* element on relevance between

undergraduate and graduate students. Distributions of the levels and difficulties-relevance scores

for undergraduate and graduate students were not similar, as assessed by visual inspection.

Levels and difficulties-relevance scores for graduate students (mean rank =28.46) were

statistically significantly higher than undergraduate students (mean rank = 18.72), U =263.5, z =

2.5, p = .01, using an exact sampling distribution for U (Dineen & Blakesley, 1973).

Game points. A Mann-Whitney U test was run to determine if there were differences in

the perceptions of the influence of the *game points* element on attention between undergraduate

and graduate students. Distributions of the game points-attention scores for undergraduate and

graduate students were not similar, as assessed by visual inspection. Game points-attention

scores for graduate students (mean rank =26.67) and undergraduate students (mean rank = 19.43)

were not statistically significantly different, U =242, z = -1.95, p = .050.

Age Group. The questionnaire aimed to elicit four different age groups: below 18, 18 to

21, 21 to 23, and above 23. However, the *below 18* category did not get any responses. Also, the

number of responses was considerably low for the responses to be grouped in more than two

groups. Accordingly, it was decided that the responses should be grouped dichotomously under

the *Age* domain as (a) 18 to 21 and (b) above 21 as observed in Fig.5. The main goal was to

determine if there is a significant difference between the aforementioned groups in terms of their

total scores on the Likert scale items (i.e. the total scores of their perceived influence of game

elements on motivation).
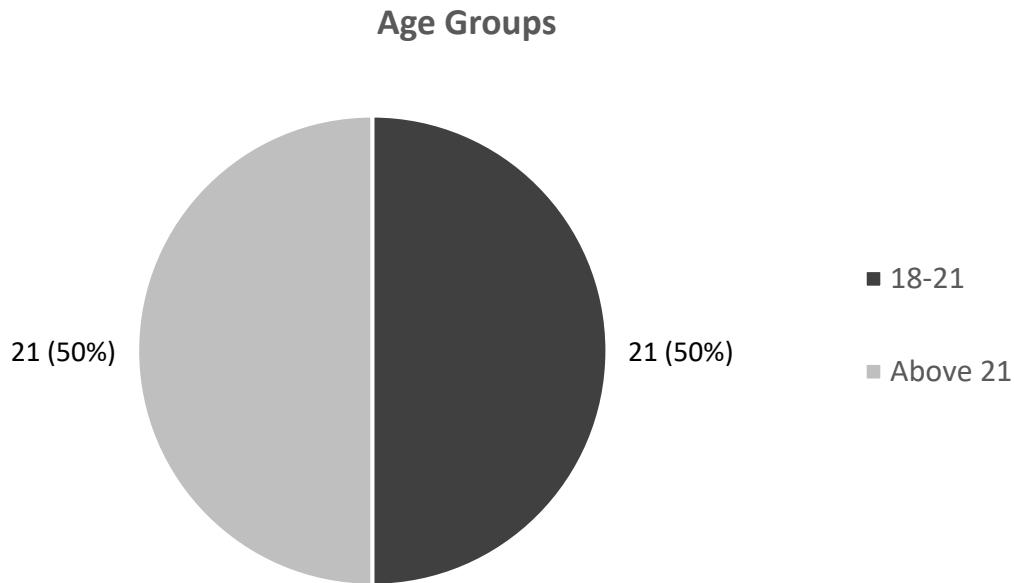
Age Groups

Figure 5. Age groups. The exact number of participants as well as their percentage with regard to the sample size of 42

Seeing that the dependent variable at hand is of a categorical and dichotomous nature, and that the independent variable is continuous (total scores of the participants), an independent samples t-test was considered to be the best option to compare the groups. However, and although the scores were normally distributed, two outliers were detected in the *above 21* group, and one in the *18-21* group, which violates one of the assumptions of independent samples t-tests. Consequently, it was found fit to substitute it with a non-parametric option.

A Mann-Whitney U test was run to determine if there were differences in the perceptions of the influence of game elements on motivation between participants who are 18 to 21 years of age and those who are above 21. Distributions of the motivation scores for 18 to 21-year-old students and those above 21 were not similar, as assessed by visual inspection. Motivation scores

for 18 to 21-year-old students (mean rank =20.33) and students above 21 (mean rank = 22.67) were not statistically significantly different, U =245, z = .61, p = .53.

Accordingly, a series of Mann-Whitney U tests were run to determine if there were specific differences in the perceptions of the influence of individual game elements on the four facets of motivation between different age groups. The results yielded one significant result, and another noticeable one:

Avatars. A Mann-Whitney U test was run to determine if there were differences in the perceptions of the influence of the *avatars* element on attention between 18 to 21 year-old students and students who are above 21. Distributions of the avatars-attention scores for 18 to 21-year-old students and those above 21 were not similar, as assessed by visual inspection. Avatar-attention scores for students who are above 21 (mean rank =25.55) were statistically significantly higher than 18 to 21-year-old students (mean rank = 17.45), U =305.5, z = 2.26, p = .02.

Virtual goods and currency. Another noticeable although not significant difference was found in the virtual goods and currency category. A Mann-Whitney U test was run to determine if there were differences in the perceptions of the influence of virtual goods and currency element on relevance between participants who are 18 to 21 years of age and those who are above 21. Distributions of the motivation scores for 18 to 21-year-old students and students above 21 were not similar, as assessed by visual inspection. Motivation scores for 18 to 21-year-old students (mean rank = 18.17) and students above 21 (mean rank = 24.83) were not statistically significantly different, U =290.5, z = 1.9, p = .057.

Hours spent gaming per day. The questionnaire posed a question to divide the responses to four different groups in terms of the time spent on gaming per day: less than an hour, 1 to 2 hours, 2 to 4 hours, and more than 4 hours. However, the *more than 4 hours* category only got two responses. Also, the amount of responses was considerably low for the responses to be grouped in more than two groups. Accordingly, it was decided that the responses should be grouped dichotomously under the *Hours spent gaming* domain as (a) less than an hour a day and (b) more than an hour a day as observed in Fig. 6. The main goal was to determine if there is a significant difference between the aforementioned groups in terms of their total scores on the Likert scale items (i.e. the total scores of their perceived influence of game elements on motivation).

Hours Spent on Gaming Per Day

19 (45.2%)

23 (54.8%)

■ Less than an hour

■ More than an hour
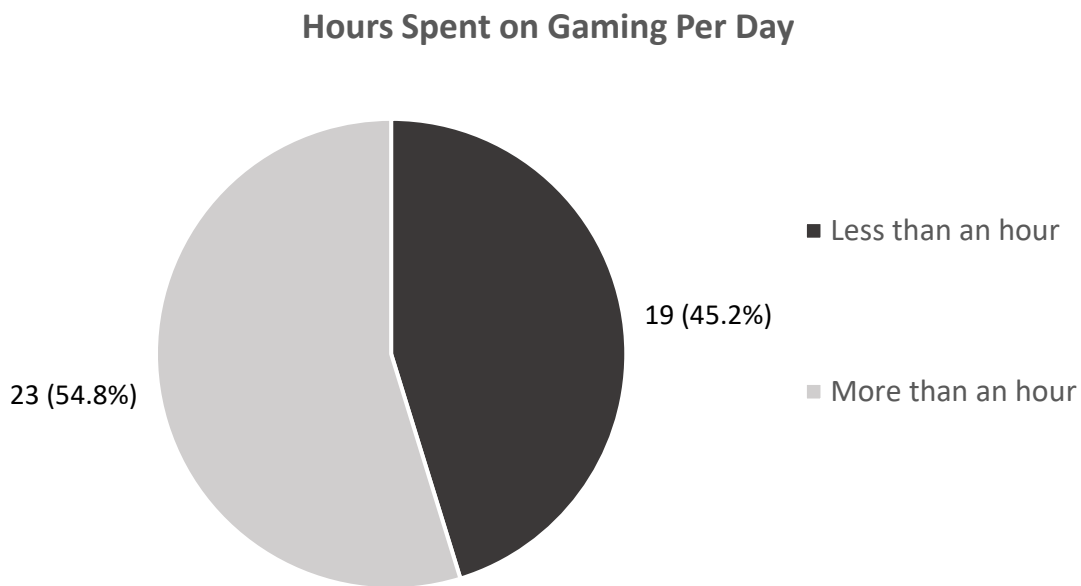
Figure 6. Hours spent on gaming per day. The exact number of participants as well as their percentage with regard to the sample size of 42

Seeing that the dependent variable at hand is of a categorical and dichotomous nature, and that the independent variable is continuous (total scores of the participants), an independent samples t-test was considered to be the best option to compare the groups. However, and although the scores were normally distributed, one outlier was detected in the *less than an hour* group, and another in the *more than an hour* group, which violates one of the assumptions of independent samples t-tests. Consequently, it was found fit to substitute it with a non-parametric option.

A Mann-Whitney U test was run to determine if there were differences in the perceptions of the influence of game elements on motivation between participants who game for less than an hour a day and those who game more than an hour a day. Distributions of the motivation scores for students who game for less than an hour and those who game for more were not similar, as assessed by visual inspection. Motivation scores for less than an hour-students (mean rank =22.55) and more than an hour-students (mean rank = 20.63) were not statistically significantly different, $U = 245$, $z = .61$, $p = .53$.

Accordingly, a series of Mann-Whitney U tests were run to determine if there were specific differences in the perceptions of the influence of individual game elements on the four facets of motivation between the different time-spent-on-gaming groups. The results yielded one significant result, and three noticeable ones:

Group tasks. A Mann-Whitney U test was run to determine if there were differences in the perceptions of the influence of the group tasks element on satisfaction between students who game for less than an hour and those who game for more than an hour. Distributions of the group tasks-satisfaction scores for students who game for less than an hour and those who game for more were not similar, as assessed by visual inspection. Group tasks-satisfaction scores for

students who game for more than an hour (mean rank =24.87) were statistically significantly higher than students who game for less than an hour (mean rank = 17.42), U =296, z = 2.03, p = .04.

Another noticeable although not significant difference was found in the group tasks category. A second Mann-Whitney U test was run to determine if there were differences in the perceptions of the influence of the group tasks element on relevance between students who game for less than an hour and those who game for more than an hour. Distributions of the group tasks-relevance scores for students who game for less than an hour and those who game for more were not similar, as assessed by visual inspection. Group tasks-relevance scores for students who game for more than an hour (mean rank =24.46) and students who game for less than an hour (mean rank = 17.92) were not statistically significantly different, U =286.5, z = 1.78, p = .07.

Progress bars. A close to significant result manifested in the progress bars category. A Mann-Whitney U test was run to determine if there were differences in the perceptions of the influence of the progress bars element on confidence between students who game for less than an hour and those who game for more than an hour. Distributions of the progress bars-confidence scores for students who game for less than an hour and those who game for more were not similar, as assessed by visual inspection. Progress bars-confidence scores for students who game for more than an hour (mean rank =18.35) and students who game for less than an hour (mean rank = 25.32) were not statistically significantly different, U =146, z = -1.95, p = .050.

Another noticeable difference was found in the progress bars category. A Mann-Whitney U test was run to determine if there were differences in the perceptions of the influence of the progress bars element on attention between students who game for less than an hour and those who game for more than an hour. Distributions of the progress bars-attention scores for students

who game for less than an hour and those who game for more were not similar, as assessed by visual inspection. Progress bars-attention scores for students who game for more than an hour (mean rank =18.80) and students who game for less than an hour (mean rank = 24.76) were not statistically significantly different, $U =156$, $z = -1.698$, $p = .090$.

Gender. The gender related question in the questionnaire allowed for four possible responses: female, male, prefer not to say, and an open ended *other* option. However, all the answers fell into the male or female categories as observed in Fig.7. The main goal was to determine if there is a significant difference between the aforementioned groups in terms of their total scores on the Likert scale items (i.e. the total scores of their perceived influence of game elements on motivation).
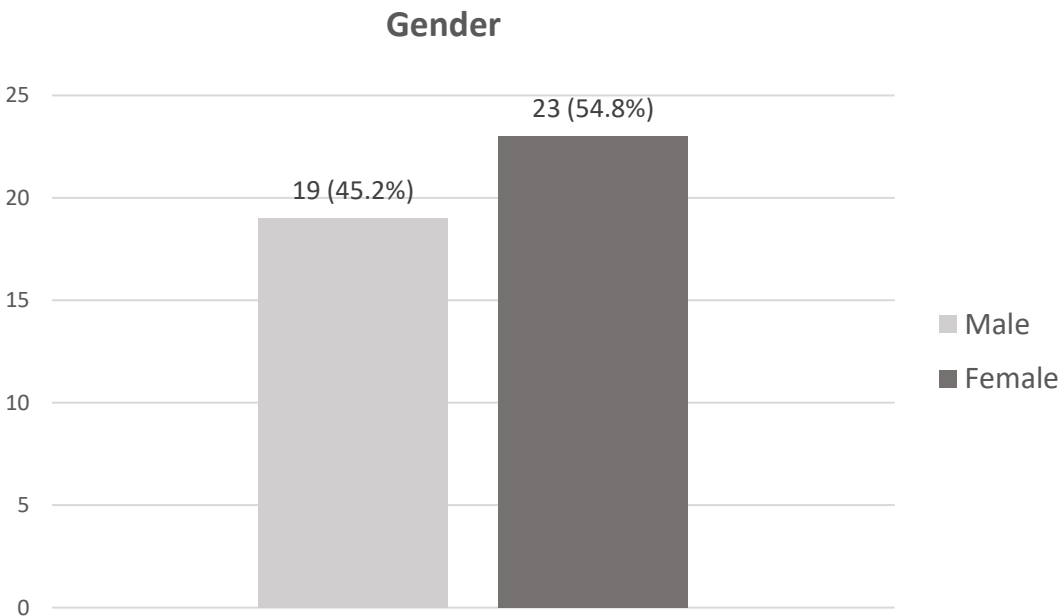
Gender

Figure 7. Gender. The exact number of participants as well as their percentage with regard to the sample size of 42

Seeing that the dependent variable at hand is of a categorical and dichotomous nature, and that the independent variable is continuous (total scores of the participants), an independent samples t-test was considered to be the best option to compare the groups. However, and although the scores were normally distributed, multiple outliers were detected in the *males* group, which violates one of the assumptions of independent samples t-tests. Consequently, it was found fit to substitute it with a non-parametric option.

A Mann-Whitney U test was run to determine if there were differences in the perceptions of the influence of game elements on motivation between male and female students. Distributions of the motivation scores for males and females were not similar, as assessed by visual inspection. Motivation scores for male students (mean rank =19.71) and female students (mean rank = 22.98) were not statistically significantly different, U =252.5, z = .86, p = .39.

Accordingly, a series of Mann-Whitney U tests were run to determine if there were specific differences in the perceptions of the influence of individual game elements on the four facets of motivation between males and females. The results yielded two significant results, and two noticeable ones:

Trophies and badges. A Mann-Whitney U test was run to determine if there were differences in the perceptions of the influence of the trophies and badges element on satisfaction between males and females. Distributions of the trophies and badges-satisfaction scores for males and females were not similar, as assessed by visual inspection. Trophies and badges-satisfaction scores for males (mean rank =26.92) were statistically significantly higher than females (mean rank = 17.02), U =115.5, z = -2.82, p = .005.

Time pressure. A Mann-Whitney U test was run to determine if there were differences in the perceptions of the influence of the time pressure element on relevance between males and females. Distributions of the time pressure-relevance scores for males and females were not similar, as assessed by visual inspection. Time pressure-relevance scores for females (mean rank =25.67) were statistically significantly higher than males (mean rank = 16.45), U =314.5, z = 2.49, p = .01.

A second noteworthy Mann-Whitney U test was run on the time pressure category to determine if there were differences in the perceptions of the influence of the time pressure element on satisfaction between males and females. Distributions of the time pressure-satisfaction scores for males and females were not similar, as assessed by visual inspection. Time pressure-satisfaction scores for females (mean rank =24.74) and males (mean rank = 17.58) were not statistically significantly different, U =293, z = 1.93, p = .053.

Visual goods and currency. A notable Mann-Whitney U test was run on the visual goods and currency category to determine if there were differences in the perceptions of the influence of the visual goods and currency element on satisfaction between males and females. Distributions of the time visual goods and currency-satisfaction scores for males and females were not similar, as assessed by visual inspection. Visual goods and currency-satisfaction scores for females (mean rank =18.65) and males (mean rank =24.95) were not statistically significantly different, U =153, z = -1.75, p = .08.

Progress bars. A notable Mann-Whitney U test was run on the time pressure category to determine if there were differences in the perceptions of the influence of the progress bars element on confidence between males and females. Distributions of progress bars-confidence scores for males and females were not similar, as assessed by visual inspection. Progress bars-

confidence scores for females (mean rank =24.39) and males (mean rank = 18.00) were not statistically significantly different, U =285, z = 1.79, p = .07.

Emotional Experiences. A series of tests were run in order to determine if there was a difference between the participants' perceptions on the influence of emotional experiences during gaming on motivation. The questionnaire allowed for seven possible answers on the question that had to do with why the participants play games and how they experience gaming: gaming experienced as sensation, fantasy, narrative, challenge, fellowship, discovery, or expression. Table 6 illustrates the frequencies of the participants' responses on each of the types of gaming experiences.

Table 6

Frequencies of the Participants' Responses on the Emotional Experience Question

Emotional Experience	Frequency	Percentage	Cumulative Percentage
Sensation	11	26.2	26.2
Narrative	3	7.1	33.3
Challenge	10	23.8	57.1
Fellowship	1	2.4	59.5
Discovery	10	23.8	83.3
Expression	7	16.7	100
Total	42	100	

Note. None of the participants chose the Fantasy option as a response.

In order to determine if there was a difference between the multiple groups (gender, level of studies, age, and time spent on gaming) on a multinomial dependent variable (the seven categories of game experiences listed above), multiple Chi-Square tests of homogeneity were seen as a fit option. However, and due to the small sample size as well as a seven-layer

dependent variable, multiple expected cell counts were less than five in all the cases. Accordingly, Fisher's exact test (r x 2) was the option to go with.

Gender. A sample of 19 males and 23 females responded to the emotional experience question. Males had higher preferences regarding sensation experiences ($n = 6$, 31.6% versus $n = 5$, 21.7%), narrative experiences ($n = 2$, 10.5% versus $n = 1$, 4.3%), challenge experiences ($n = 5$, 26.3% versus $n = 5$, 21.7%), and fellowship experiences ($n = 1$, 5.3% versus $n = 0$, 0%), than females. Whereas females had higher preferences regarding discovery experiences ($n = 6$, 26.1% versus $n = 4$, 21.1%) and expression experiences ($n = 6$, 26.1% versus $n = 1$, 5.3%) than males.

Age. A sample of 21 students who are 18 to 21 years old and 21 students who are above 21 years old responded to the emotional experience question. Students between 18 and 21 had higher preferences regarding narrative experiences ($n = 3$, 14.3% versus $n = 0$, 0%), fellowship experiences ($n = 1$, 4.8% versus $n = 0$, 0%), and expression experiences ($n = 4$, 19% versus $n = 3$, 14.3%), than students above 21. Whereas students above the age of 21 had higher preferences regarding sensation experiences ($n = 6$, 28.6% versus $n = 5$, 23.8%) and challenge experiences ($n = 7$, 33.3% versus $n = 3$, 14.3%) than 18 to 21-year-old students. Both groups had equal preferences regarding discovery experiences ($n = 5$, 23.8% versus $n = 5$, 23.8%).

Level of studies. A sample of 30 undergraduate students and 12 graduate students responded to the emotional experience question. Undergraduate students had higher preferences regarding sensation experiences ($n = 11$, 36.7% versus $n = 0$, 0%) and challenge experiences ($n = 8$, 26.7% versus $n = 2$, 16.7%) than graduate students. Whereas graduate students had higher preferences regarding narrative experiences ($n = 2$, 16.7% versus $n = 1$, 3.3%), fellowship experiences ($n = 1$, 8.3% versus $n = 0$, 0%), discovery experiences ($n = 4$, 33.3% versus $n = 6$, 20%), and expression experiences ($n = 3$, 25% versus $n = 4$, 13.3%) than undergraduate students.

Hours of gaming per day. A sample of 19 students who game less than an hour a day and 23 students who game more than an hour a day responded to the emotional experience question. Students who game for less than an hour a day had higher preferences regarding sensation experiences ($n = 7$, 36.8% versus $n = 4$, 17.4%), narrative experiences ($n = 2$, 10.5% versus $n = 1$, 4.3%), and discovery experiences ($n = 5$, 26.3% versus $n = 5$, 21.7%), than students who game for more than an hour. Whereas students who game for more than an hour had higher preferences regarding challenge experiences ($n = 7$, 30.4% versus $n = 3$, 15.8%), fellowship experiences ($n = 1$, 4.3% versus $n = 0$, 0%), and expression experiences ($n = 5$, 21.7% versus $n= 2$, 10.5%) than students who game for less than an hour.

Discussion

Overall Scores

As mentioned earlier, the main purpose of this study was to investigate the participants' perceptions on the influence of game elements on motivation. The mean of the participants' overall scores on the questionnaire was 3.8, falling closer to the 'positive impact' category than the 'no impact' category. This determines that the collective opinion of the 42 participants in this study is that game elements have a moderately positive to positive influence on motivation to learn.

What are the most perceived influential game elements on motivation to learn with respect to Lebanese post-secondary students?

Specific elements. As for what specific elements the participants in this study perceived as least or most influential, the game elements were divided into four categories: those with a

negative perceived influence on motivation, those with a slightly positive perceived influence on motivation, those with moderately positive to positive perceived influence on motivation, and finally those with a positive to a very positive perceived influence on motivation.

Elements with a slightly negative perceived influence. As observed in Table 2, this category includes three element-motivation questions with mean scores that fall below 3.0, which was the 'no impact' point in the questionnaire. The game element in all three questions in this category was 'time pressure'.

When it comes to Lebanese post-secondary students, there appears to be an issue with time pressure as an element to increase satisfaction (mean=2.9), confidence (mean=2.9), and a sense of relevance (mean=2.98) in learning. It is without a doubt not a coincidence that the only three mean scores that fell below the 'no impact' boundary on the Likert scale were relate to time pressure. Ergo, it would seem that when designing gamified experiences to Lebanese post-secondary students, steering away from time pressure as a gamification element to enhance those exact facets of motivation would be the best route to take.

Elements with a slightly positive perceived influence. As observed in Table 3, this category includes five element-motivation questions with mean scores that fall between 3.0 and 3.5.

What is noteworthy is that 'leaderboards and ranks' had the lowest two means in this category. As it seems, the aforementioned element has a fairly low, although slightly positive influence on both relevance (mean=3.26) and confidence (mean=3.33) within the eyes of the participants. Not that the five mean scores mentioned in this category reflect a negative influence, but the results of this study suggest that gamifying activities and content for students

who resemble those in the sample in order to increase those facets of motivation would be more effective if the designer considers elements with a higher perceived influence on motivation.

Elements with a moderately positive perceived influence. As observed in Table 4, this category includes 22 element-motivation questions with mean scores that fall between 3.5 and 4.0. The highest number of mean scores fell within this category.

All four questions that relate to the 'group task' element fell within this category, with a moderately positive perceived influence on satisfaction (mean=3.52), relevance (mean=3.55), confidence (mean=3.67), and attention (mean=3.79).

Also, three questions that relate to the 'virtual goods and currency' element fell within this category, with a moderately positive perceived influence on relevance (mean=3.6), satisfaction (mean=3.86), and attention (mean=3.95). The fourth motivational element of confidence (mean=3.5) was not too far behind as the highest mean score in Table 3.

In addition, three questions that relate to the 'game points' element fell within this category, with a moderately positive perceived influence on relevance (mean=3.6), confidence (mean=3.64), and attention (mean=3.93). The fourth motivational element of satisfaction (mean=4.24) was far ahead in Table 5.

Elements with a positive to very positive perceived influence. As observed in Table 5, this category includes 14 element-motivation questions with mean scores that fall between 4.0 and 4.5.

The highest two means in Table 5 incorporate the 'trophies and badges' element, with a very positive perceived influence on satisfaction (mean= 4.24) and attention (mean=4.26). Also, the perceived influence of 'trophies and badges' on confidence (mean=4.1) wasn't very far

behind in the table either. However, the influence of this game element on relevance (mean=3.48) was only slightly positive as observed in Table 3.

Moreover, three of the questions that had to do with the 'stories and narration' element yielded means that reflect a positive perceived influence on attention (mean=4), and a very positive perceived influence on both satisfaction (mean=4.19) and relevance (mean=4.19).

Referring to the four abovementioned tables could help a designer or a practitioner determine the extent of influence that exact elements have on specific facets of motivation within the boundaries of a similar sample of students. Below is the ranking of those game elements in terms of their overall perceived influence on motivation that was determined through the sum of their means on the four questions that incorporated them:

1. Stories and narration (sum of four means=16.24)

2. Progress bars: (sum of four means=16.12)

3. Quests: (sum of four means=16.09)

4. Trophies and badges: (sum of four means=16.08)

5. Levels and Difficulties: (sum of four means=15.55)

6. Game points: (sum of four means=15.54)

7. Virtual goods and currency: (sum of four means=14.91)

8. Group tasks: (sum of four means=14.52)

9. Avatars: (sum of four means=14.83)

10. Leaderboards and ranks: (sum of four means=14.07)

11. Time pressure: (sum of four means=12.4)

In brief, the ranking above demonstrates the importance of the game elements in this study in terms of their influence on motivation from most to least influential. However, and as discussed earlier, targeting specific motivation components calls for a deeper inspection of the tables provided in the *Results* section.

Finally, below is are the highest-ranking elements in terms of their influence on specific components in motivation that can be fostered and used by practitioners working with similar samples:

1. Game element with the most perceived influence on attention: trophies and badges (mean=4.26)

2. Game element with the most perceived influence on relevance: stories and narration (mean=4.19)

3. Game element with the most perceived influence on confidence: trophies and badges (mean=4.1)

4. Game element with the most perceived influence on satisfaction: trophies and badges (mean=4.24)

Group Differences

How do the perceptions of Lebanese post-secondary students on the influence of game elements on motivation differ as a result of age, gender, level of studies, and hours spent gaming per day?

In the *Results* section, multiple tests were reported to reveal significant differences between the participants of this study in terms of four different groupings: age, gender, level of studies, and hours spent on gaming.

Age. In terms of age, the results of the main test that compared the two groups (18-21 and above 21) were not statistically significant ($p=.53$). Accordingly, there appears to be no difference between the age groups in this study when it comes to their perceived influence of game elements on motivation. Ergo, designing gamified activities for Lebanese students to motivate them should not be influenced by age according to the results of this study.

However, two specific instances should be accounted for. Students above the age of 21 perceived a higher influence of 'avatars' on attention ($p=.02$), and a higher influence of 'virtual goods and currency' on relevance ($p=.05$) as opposed to students under the age of 21.

Building on those results, and when dealing with a similar sample of students, a designer should account for age groups when wanting to increase attention or relevance while gamifying with those specific game elements as follows:

1. Avatars impact students above the age of 21 more than students below 21 when it comes to attention.

2. Virtual goods and currency impact students above the age of 21 more than students below 21 when it comes to relevance.

Gender. As for gender, the results of the main test that compared the two groups (males and females) were not statistically significant ($p=.39$). Therefore, there appears to be no difference between the gender groups in this study when it comes to their perceived influence of game elements on motivation. Ergo, designing gamified activities for Lebanese students to motivate them should not be influenced by gender according to the results of this study.

Nonetheless, four specific instances should be accounted for. Males perceived a higher influence of 'trophies and badges' on satisfaction ($p<.05$), and a near significant higher influence

of 'virtual goods and currency' on satisfaction ($p=.08$) as opposed to females. On the other hand, females perceived a higher influence of 'time pressure' on relevance ($p=.01$), and a near significant higher influence of 'progress bars' on confidence ($p=.07$) as opposed to males.

Building on those results, and when dealing with a similar sample of students, a designer should account for gender when wanting to increase satisfaction, relevance, or confidence while gamifying with those specific game elements as follows:

1. Trophies and badges impact males more than females when it comes to satisfaction.
2. Virtual goods and currency impact males more than females when it comes to satisfaction.
3. Time pressure impacts females more than males when it comes to relevance.
4. Progress bars impact females more than males when it comes to confidence.

Level of studies. With regard to the level of studies, the results of the main test that compared the two groups (undergraduate students and graduate students) were not statistically significant ($p=.59$). Therefore, there appears to be no difference between those groups when it comes to their perceived influence of game elements on motivation. Ergo, designing gamified activities for Lebanese students to motivate them should not be influenced by the level of studies of the students according to the results of this study.

Nonetheless, three specific instances should be accounted for. Graduate students perceived a higher influence of 'game points' on attention ($p=.05$), and a higher influence of 'levels and difficulties' on both satisfaction ($p=.02$) and relevance ($p=.01$) as opposed to undergraduate students.

Building on those results, and when dealing with a similar sample of students, a designer should account for the level of studies of students when wanting to increase satisfaction, relevance, or attention while gamifying with those specific game elements as follows:

1. Game points impact graduate students more than undergraduate students when it comes to attention.

2. Levels and difficulties impact graduate students more than undergraduate students when it comes to both satisfaction and relevance.

Hours spent on gaming per day. As for hours spent on gaming, the results of the main test that compared the two groups (less than an hour and more than an hour) were not statistically significant (p=.53). Therefore, there appears to be no difference between those groups when it comes to their perceived influence of game elements on motivation. Ergo, designing gamified activities for Lebanese students to motivate them should not be influenced by how much they game per day according to the results of this study.

Nonetheless, four specific instances should be accounted for. Students who go for more than an hour a day perceived a higher influence of 'group tasks' on both satisfaction (p=.04) and relevance (p=.07) as opposed to students who game for less than an hour a day. On the other hand, students who game for less than an hour a day perceived a higher influence of 'progress bars' on both confidence (p=.05) and attention (p=.09) as opposed to students who game for more than an hour.

Building on those results, and when dealing with a similar sample of students, a designer should account for hours spent on gaming per day when wanting to increase satisfaction,

relevance, confidence, or attention while gamifying with those specific game elements as follows:

1. Group tasks impact students who game for more than an hour a day more than students who game for less than an hour a day when it comes to both satisfaction and relevance.

2. Progress bars impact students who game for less than an hour a day more than students who game for more than an hour a day when it comes to both attention and confidence.

Emotional Experiences in Gaming

Although the results that relate to emotional experiences could not be tested for statistical significance, there are a few findings worth mentioning.

First of all, Table 6 shows the frequencies of how much students chose each element in the questionnaire. The top three ranking experiences were sensation (11 students), challenge (10 students), and discovery (10 students). Consequently, designers dealing with similar samples might want to consider tailoring one or more of those three emotional experiences as an aesthetic end goal when gamifying activities. The 'fantasy' experience was not chosen by any of the participants, so it is definitely an aesthetic a designer should steer away from in a similar context. The same argument applies for the 'fellowship' experience that was only chosen by one participant.

Regarding gender, it was noteworthy that 'expression' was chosen by six females as opposed to one male. Consequently, a designer might want to consider tailoring gamification towards self-expression as an end result aesthetic when gamifying for Lebanese female students.

When it came to age, the 'narrative' experience was chosen by three students between the ages of 18 and 21, and no students above the age of 21. Also, the 'challenge' experience was

chosen seven times by students who were above 21 as opposed to three students between the ages of 18 to 21. Accordingly, one might say that younger post-secondary students do not game for challenge as much as older ones do. Moreover, older post-secondary students do not seem to like gaming for a narrative experience.

Seeing that the sizes of the level of studies groups are vastly different (30 undergraduate students and 12 graduate students), not a lot of comparison can be done. However, none of the graduate students chose the 'sensation' experience, while 11 undergraduate students did, which might amount to something. It could be that graduate students similar to ones in the sample might not prefer gaming for the purposes of sensation as opposed to other aesthetic experiences. Moreover, and seeing that 'sensation' was the most frequently chosen aesthetic preference, and that all of those choices came from undergraduate students, one could say that it might be the best aesthetic experience to design for when dealing with Lebanese undergraduate students.

Limitations

The most apparent limitation in this study was having a small response rate to the questionnaire. The sample size was only 42 students, which hindered the possibility of running more reliable parametric tests (e.g. t-tests or ANOVAs) while analyzing the data. Also, the small sample size made it difficult to compare the students in terms of the different groups they fall into (e.g. hours spent playing per day), especially in groups with multiple divisions (e.g. school of study). Also, the students were not asked if they had prior experience with gamification or gamified content, which would've provided more data that relates to prior experience and present preferences.

Another limitation is that the students' responses were recorded on Likert scale items, making them measured on an ordinal scale. This affected the Mann-Whitney U tests that were run by inflating the exact p-value when multiple students had the same answer on certain questions, which yielded less significant results.

A third limitation is that multiple Mann-Whitney U tests were run against the same subjects without using tests to adjust for overlapping variances (e.g. Bonferroni adjustment). Accordingly, some false significant results might have occurred. If data had permitted, a MANOVA test would have overcome this problem. However, and given the small sample size of the participants in most of the reported tests in this thesis, an adjustment was not made as it would have rendered multiple results insignificant. Given the exploratory and descriptive nature of this study that mainly aims to show where the preferences of the participants lie, an adjustment was not made.

A fourth limitation was the large number of outliers that turned up during the data analysis phase. In some instances, the variables were measured on a continuous scale (e.g. overall scores), the scores were normally distributed, and the distributions were of homogenous variances. However, parametric tests could not be run because of the presence of outliers in all of the cases, which violates the assumption of 'no outliers' for parametric tests used to compare means (e.g. t-tests).

Finally, the fact that the results of this study revolve around the perceptions of the participants rather than true experimentation and actual testing is one of its biggest limitations. What the students perceive could significantly differ from how they would react to exposure to all the various elements mentioned in this paper. However, resources and accessibility issues did not allow for a true experimental design. Extended studies on the topic with proper access to

resources and participants would definitely yield much more accurate results, as well as highlight differences that could not be investigated in this study.

Conclusion

Engagement and motivation have always been vital topics of study in the field of education. There is no single approach to motivating students to learn. With the rapid outburst of technology throughout the past years, devices like computers and tablets gained an immense focus as tools to engage students in learning, which paved way for concepts like gamification. However, there exists a gap concerning what game elements to use to gamify activities and content. In this thesis, it was unveiled that 42 Lebanese post-secondary students believe that gamification has a moderately positive influence on motivation, and that one of the most influential game elements on motivation is *stories and narration*. Some specific differences were uncovered in the participants' perceptions according to their age, gender, level of studies, and the time they spend playing games a day. Although there were limitations, overall descriptive statistics and frequency testing uncovered obvious trends that urge for more studies to be conducted to further explore this topic in vast detail, and in order to figure out what game elements work best for different types of learners and in various situations. Gamification was not born yesterday, but it is still a fairly new and inadequately explored phenomenon. We have a lot more to learn about its application in education. We have to keep in mind that technology keeps changing, which is causing an ever-fluctuating reformation in the platforms that new generations are using, as well as perhaps altering what is considered to be engaging to them every day.

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Appendix A

Questionnaire

This is the questionnaire that was used to elicit the participants' responses and perceptions on the influence of game elements on the different components of motivation. This appendix does not include the consent form that was at the beginning of the questionnaire. Also, the format of the questionnaire was adjusted to be more suitably presented in a word document.

Section 1: Introduction and Consent Form

Section 2: Personal Information

Q1) Please enter a valid email address so that we could contact you if you win the draw on a $100, or for us to be able to identify your responses if you choose to withdraw from the study: (open ended answer)

Q2) How old are you?

1. Below 18
2. 18-21
3. 21-23
4. Above 23
5. Prefer not to say

Q3) What is your gender?

- Female
- Male

- Prefer not to say

- Other (open ended)

Q4) What is your country of origin?

- Lebanon

- Palestine

- Syria

- Saudi Arabia

- United Arab Emirates

- Kuwait

- Jordan

- Egypt

- Oman

- Other (open ended)

Q5) Choose your current level of study

- Undergraduate studies

- Master's studies

- Graduate diploma

- Doctoral studies

- Post-Doctoral studies

- Other (open ended)

Q6) What school/faculty does your field of study fall under?

- School of agriculture and food sciences

- School of arts and sciences

- School of business administration / economics

- School of dentistry

- School of education

- School of engineering

- School of fine arts

- School of health sciences

- School of law / political sciences

- School of medicine

- School of nursing

- School of pharmacy

- School of social sciences

- School of sciences

- School of technology

- School of tourism and hospitality

- School of architecture

- Other (open ended)

Q7) On average, how much time do you game per day? (include gaming on all kids of devices)

- Less than an hour

- 1-2 hours

- 2-4 hours

- More than 4 hours

Q8) What type of games do you mostly play?

- Action games (first-person shooters, stealth, survival etc.)

- Adventure games (exploration, story lines, visual novels etc.)

- Role playing games RPGs (fantasy, choices, avatars etc.)

- Simulation games (construction and management, vehicle simulations etc.)

- Strategy games (tactics, tower defense, war etc.)

- Sports games

- Other (open ended)

Section 3: Game Points (all questions are answered on a 5-level Likert scale)

Description: refers to the addition of a point element to an educational process, where points are granted upon the successful completion of certain tasks or objectives.

Q1) On a scale of 1 to 5 (3 being No Impact), what impact do you think the inclusion of "Game Points" in learning processes would have on learners' attention?

Q2) On how much learners relate to what is being learned?

Q3) On learners' confidence in what is being learned?

Q4) On learners' satisfaction in the learning process?

Section 4: Levels and Difficulties (all questions are answered on a 5-level Likert scale)

Description: refers to the addition of multiple levels of difficulty to learning activities.

Q1) On a scale of 1 to 5 (3 being No Impact), what impact do you think the inclusion of "Levels and Difficulties" in learning processes would have on learners' attention?

Q2) On how much learners relate to what is being learned?

Q3) On learners' confidence in what is being learned?

Q4) On learners' satisfaction in the learning process?

Section 5: Trophies and Badges (all questions are answered on a 5-level Likert scale)

Description: refers to the rewarding of successful learners and high achievers with trophies and badges that highlight their progress.

Q1) On a scale of 1 to 5 (3 being No Impact), what impact do you think the inclusion of "Trophies and Badges" in learning processes would have on learners' attention?

Q2) On how much learners relate to what is being learned?

Q3) On learners' confidence in what is being learned?

Q4) On learners' satisfaction in the learning process?

Section 6: Leaderboards and Ranks (all questions are answered on a 5-level Likert scale)

Description: refers to the addition of a rank system to a learning process, where top achievers will have a chance to have their name shown to their peers.

Q1) On a scale of 1 to 5 (3 being No Impact), what impact do you think the inclusion of "Leaderboards and Ranks" in learning processes would have on learners' attention?

Q2) On how much learners relate to what is being learned?

Q3) On learners' confidence in what is being learned?

Q4) On learners' satisfaction in the learning process?

Section 7: Stories and Narration (all questions are answered on a 5-level Likert scale)

Description: refers to the addition of a story element to a learning activity or session, where learning would follow a specific narrative.

Q1) On a scale of 1 to 5 (3 being No Impact), what impact do you think the inclusion of "Stories and Narration" in learning processes would have on learners' attention?

Q2) On how much learners relate to what is being learned?

Q3) On learners' confidence in what is being learned?

Q4) On learners' satisfaction in the learning process?

Section 8: Avatars and Virtual Identities (all questions are answered on a 5-level Likert scale)

Description: refers to the addition of an avatar element to a learning process, where learners would be able to design/choose their own avatars as a front to their desired appearance and personality.

Q1) On a scale of 1 to 5 (3 being No Impact), what impact do you think the inclusion of "Avatars and Virtual Identities" in learning processes would have on learners' attention?

Q2) On how much learners relate to what is being learned?

Q3) On learners' confidence in what is being learned?

Q4) On learners' satisfaction in the learning process?

Section 9: Progress bars and Documentation of Behavior (all questions are answered on a 5-level Likert scale)

Description: refers to the addition of a progress bar to a learning process, where learners can constantly check what step they are at in their learning, as well as check their own progress with respect to the learning process.

Q1) On a scale of 1 to 5 (3 being No Impact), what impact do you think the inclusion of "Progress bars and Documentation of Behavior" in learning processes would have on learners' attention?

Q2) On how much learners relate to what is being learned?

Q3) On learners' confidence in what is being learned?

Q4) On learners' satisfaction in the learning process?

Section 10: Group tasks (all questions are answered on a 5-level Likert scale)

Description: refers to the addition of group tasks and activities to a learning process, where collaboration or cooperation is a must to achieve desired outcomes.

Q1) On a scale of 1 to 5 (3 being No Impact), what impact do you think the inclusion of "Group tasks" in learning processes would have on learners' attention?

Q2) On how much learners relate to what is being learned?

Q3) On learners' confidence in what is being learned?

Q4) On learners' satisfaction in the learning process?

Section 11: Time pressure (all questions are answered on a 5-level Likert scale)

Description: refers to the addition of time pressure and restraints to a learning process, where learners would have to finish certain tasks in a limited amount of time.

Q1) On a scale of 1 to 5 (3 being No Impact), what impact do you think the inclusion of "Time Pressure" in learning processes would have on learners' attention?

Q2) On how much learners relate to what is being learned?

Q3) On learners' confidence in what is being learned?

Q4) On learners' satisfaction in the learning process?

Section 12: Quests (all questions are answered on a 5-level Likert scale)

Description: refers to the addition of a quest element to a learning process or activity, where learners would have to conduct an extensive search for something to fulfill their tasks.

Q1) On a scale of 1 to 5 (3 being No Impact), what impact do you think the inclusion of "Quests" in learning processes would have on learners' attention?

Q2) On how much learners relate to what is being learned?

Q3) On learners' confidence in what is being learned?

Q4) On learners' satisfaction in the learning process?

Section 13: Virtual Goods / Trade system (all questions are answered on a 5-level Likert scale)

Description: refers to the addition of virtual goods and a trade system to a learning process, such as the ability to trade points earned to exchange tasks, buy/trade virtual avatar outfits, etc.

Q1) On a scale of 1 to 5 (3 being No Impact), what impact do you think the inclusion of "Virtual Goods / Trade system" in learning processes would have on learners' attention?

Q2) On how much learners relate to what is being learned?

Q3) On learners' confidence in what is being learned?

Q4) On learners' satisfaction in the learning process?

Section 14: Game Aesthetics/Emotions

Description: refers to the emotional experiences of gamers during gaming, or learners during a gamified learning process.

Q1) Which of the following emotional experiences do you think best motivates learners to learn?

- Sensation: learning process experienced as pleasurable

- Fantasy: learning process experienced as make belief

- Narrative: learning process experienced as a story

- Challenge: learning process experienced as an obstacle course

- Fellowship: learning process experienced as social

- Discovery: learning process experienced as uncharted territory

- Expression: learning process experienced as self-discovery and expression

Appendix B

Invitation E-mail

Greetings,

You are being invited to participate in a research study concerning the use of game-like elements in formal teaching and their effect on students' motivation to learn.

This study is being conducted by chief investigator, Khaled Ramadan, in pursuit of his master's degree in Educational Technology at Concordia University.

Participating in this study gives you the chance to win one of two $100 rewards! So do not hesitate to forward this e-mail to your friends and colleagues.

If you choose to participate, please click on the link below and fill in the provided questionnaire. Do not forget to go over the consent form at the beginning of the survey before agreeing on participating. You can contact the researcher at kramadan360@gmail.com should you have any questions concerning the research study.

Go to Questionnaire

Kindest Regards,

Khaled

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