Διεθνές Συνέδριο για την Ανοικτή & εξ Αποστάσεως Εκπαίδευση

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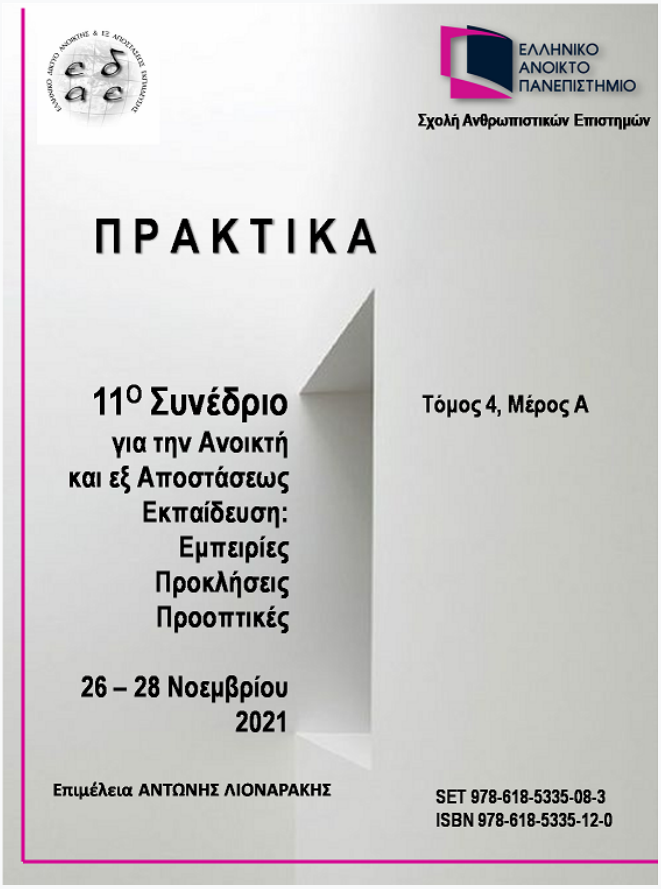

Insightful Puzzle Design: Innovative Distance Education Practices as an Immediate Response to COVID-19

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Λειτουργικός Σχεδιασμός Παζλ: Καινοτόμες Πρακτικές στην Εξ Αποστάσεως Εκπαίδευση κατά στον COVID-19

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Abstract

Games offer untapped learning potential, present in the cognitive spectrum with the facilitation of knowledge, as well as social and emotional benefits educational process. The immense possibilities which games provide on the levels of the three previous sectors establish the need for innovative design practices which foster distance education during the era of the pandemic crisis of COVID-19.

The digital game "The Witness" provides an exceptional example of puzzle design practices, that will be further discussed in the present paper. The name itself indicates a "provocative" contradiction to the dipole of presence - absence, whomever the player is, they explore the game space almost in a documentary manner; as a mere observer, ignoring the past and gradually setting their way towards uncovering the game narrative in the most insightful way.

Insightful puzzle design focuses on providing to undergraduate students of the Pedagogical and Didactical Sufficiency Program guidelines regarding the use of puzzles as educational tools in distance education in two parts. The first one being the players themselves, experiencing the gameplay mechanics of the puzzle game "The Witness" and get accustomed with the ways of presenting original mechanics, while slowly implementing more advanced mechanics and various methods of setting the proper difficulty of each game. On the second part, allowing the undergraduate students to realize their roles as future educators and how insightful puzzle design could assist them into producing their own educational puzzles for pedagogical purposes for distance education practices.

Puzzle insights provided in this paper aim into a playful educational experience, achieved by reducing the feelings of entrapment and threatful defeat. By empowering the individuals on the cognitive, behavioural and affective segments, this analysis focuses on diminishing the detrimental responses that maintain the depressogenic feedback loop, responsible for the feelings of entrapment and threatful defeat in games.

Keywords: *puzzle design; puzzle games; game-based learning; entrapment; defeat; distance education practices; pandemic crisis*

Περίληψη

Τα παιχνίδια διευρύνουν τη σκέψη και οξύνουν την κρίση. Η αναγκαιότητά τους και τα μαθησιακά οφέλη, όπως η καλλιέργεια γνωσιακών, κοινωνικών δεξιοτήτων και ενσυναίσθησης, τα εμπλέκει με έναν ξεχωριστό τρόπο στη μαθησιακή διαδικασία. Ιδιαιτέρως, κατά την εποχή της πανδημικής κρίσης του COVID-19, η διαδικασία του «παίζειν» -ψηφιακά- αποτέλεσε συναρπαστική δραστηριότητα, καλύπτοντας περιορισμούς της καθημερινής ζωής και δίνοντας τη δυνατότητα να πειραματιστούν εκπαιδευτικοί και παιδιά.

Κατανοώντας τη σημασία της διαδικασίας του παιχνιδιού στην προσωπική και ιδιωτική πραγματικότητα του παιδιού και στη μαθησιακή διαδικασία, μελετήθηκε το ψηφιακό παιχνίδι «The Witness», καθώς αποτελεί ένα εξαιρετικό παράδειγμα σχεδιασμού παζλ, όπου παρέχει ευχαρίστηση, εμπλέκει ενεργά τους παίκτες και νοηματοδοτείται αναλόγως από τους παίκτες. Ο παίκτης εξερευνά τον χώρο του παιχνιδιού, κινείται μεταξύ ενός διπόλου παρουσίας - απουσίας. Αρχικά, καταγράφει ως απλός παρατηρητής, αγνοώντας το παρελθόν και σταδιακά ανακαλύπτεται ο μύθος του παιχνιδιού.

Ο προσεκτικός σχεδιασμός παζλ «χαράζει» κατευθυντήριες γραμμές, ώστε οι γνωσιακές διαδικασίες μεταφοράς πληροφορίας ή νοήματος από μία συγκεκριμένη πηγή σε κάποιο στόχο, να ευοδώνονται με τον καλύτερο τρόπο. Η παρούσα θεωρητική ανάλυση εστιάζει στη μείωση των αρνητικών αντιδράσεων που «τρέφουν» και ανατροφοδοτούν καταπιεστικά συναισθήματα εγκλωβισμού και ήττας, που παρουσιάζονται στα παιχνίδια και σαφώς επηρεάζουν όλες τις εκφάνσεις της ζωής των παικτών. Οι προπτυχιακοί φοιτητές και απόφοιτοι του Προγράμματος Πιστοποίησης Παιδαγωγικής και Διδακτικής Επάρκειας του Τμήματος Τεχνών Ήχου και Εικόνας (ΠΠΕΤΤΗΧΕ), οι οποίοι συμμετείχαν ως παίκτες, ανακάλυψαν τους μηχανισμούς του παιχνιδιού «The Witness» και εξοικειώθηκαν με τους τρόπους παρουσίασης πρωτότυπων μηχανισμών. Μέσω της χρήσης του παζλ συνειδητοποίησαν κομβικά σημεία στο σχεδιασμό, ώστε να αξιοποιηθούν μελλοντικά σχεδιάζοντας δικά τους εκπαιδευτικά παζλ. Κατά τη διάρκεια της εξ αποστάσεως εκπαίδευσης, οι συμμετέχοντες στο ΠΠΕΤΤΗΧΕ απέκτησαν την πολύτιμη εμπειρία παίζοντας οι ίδιοι το παιχνίδι. Η υποστήριξη και η καθοδήγησή τους εστίασε στην ανάλυση του τρόπου σχεδιασμού, των αρχών και των παραμέτρων για την κατασκευή εκπαιδευτικών παζλ, ώστε να αποφευχθούν αρνητικά συναισθήματα εγκλωβισμού των παικτών σε επαναλαμβανόμενες λανθασμένες κινήσεις.

Λέξεις-κλειδιά: *σχεδιασμός παζλ; παιχνίδια παζλ; παιχνιδοκεντρική μάθηση; εγκλωβισμός; ήττα; πρακτικές εξ αποστάσεως εκπαίδευσης; πανδημική κρίση*

Introduction

The usage of games as tools for educational purposes is commonly encountered in various practices, ranging from game-based learning to gamification. Although games as artifacts are quite complex to be integrated as a solid medium generated only to serve educational purposes, a common practice is the implementation of game features into the educational procedure. Games offer countless opportunities for exploration and implementation; hence this paper proposes insightful design advices that could be applied on already existing games, or alter parts of them, in order to

achieve a smooth, unhindered educational experience. Creating games for the players to embrace their educational benefits is almost repulsive and often leads to game-like exercises rather than games which implement educational features. Games as tools should exploit the plethora of their structural elements such as rules, conflict, goals, decision-making, make-belief or form of art in order to affect the educative procedure. Games have goals and end states which players pursue to accomplish and reach their outcome. These may vary from victory to defeat or sometimes the outcome may be unspecified. Players experience these states as a direct form of evaluation of their performance, according to the norm of the player base, their previous attempts, or even their fixated standards. In certain cases, players are unable to find the solution, goal or ending trigger of the game, hence entrapping them into it. The option of giving up is always present, but does not contribute towards the completion of the game, thus players are unable to gather any form of self-evaluation regarding their performance.

During the time of the global pandemic and due to the social distancing measures, there has been a surge in the use of distance education. Years of research and application of distance learning practices were finally utilized due to the emergence of COVID-19 who transformed that option into an established imperative circumstance. Exploiting the dramatic technology innovations of hardware, software and telecommunication altogether distance education achieves to overcome the barriers of COVID-19 making learning more available, accessible and more cost-effective. Amongst the most undoubtful benefits of distance education from the standpoint of students, is being able to designate the time and place of the learning procedure (Simonson, Smaldino, Albright, & Zvacek, 2019, p. 5). Despite the fact that distance education provides plenty applications and solutions during the global pandemic, entails risks as its designing process requires careful attention to detail and meticulous planning before implementation (Simonson et al., 2019, p. 127). Distance education is not a plain relocation of the conventional courses just virtually with the utilization of digital media and telecommunication technologies. The advantages of distance education practices are numerous compared to the conventional educational curriculums. Online courses materials are easily accessed and students can participate from several locations. The asynchronous course components are constantly available, providing to students an adjustability on their schedule, while being time-zone independent. Each student can maintain their pace in a student-centered learning environment while participating in the educational process. In matters of accessibility, the web-based distance learning environments offer flexibility and interoperability providing access to any computer device and cross-platform compatibility. Distance education also grants plenty of adaptability to the students' profile while maintaining their personal identities concealed, not allowing any room for discrimination practices (Simonson et al., 2019, p. 107).

The target audience selected for this theoretical approach is undergraduate university students following the courses of "Teaching Art and Creative Technologies" and "Educational Psychology" within the Pedagogical and Didactical Sufficiency Program (PDSP) for Audio and Visual Arts, conducted in the Ionian University, Greece during the time of the pandemic crisis of COVID-19. The PDSP for Audio and Visual Arts is a series of eight compulsory courses that aims at a deep and coherent understanding of theories and educational practices. The PDSP is essential for the acquisition of pedagogical knowledge and teaching skills, required in order for the graduates of the Department of Audio and Visual Arts, but also for the graduates of other artistic oriented Departments, in order to be effective in matters of organization, method, direction of choices and exercise of their didactic work. The reason in focusing on

undergraduate students is primarily due to their upcoming role as educators themselves, assisting them by providing an insightful approach on puzzle design used as an educational tool in class using game-based learning and applying it on distance education practices. Raised to the occasion of the presence of COVID-19, the focus on entrapment and defeat becomes particularly relevant as aftereffects of social distancing. The social coercive deterrence measures, such as social distancing, are accountable for the evoked subjective emotions of entrapment (Lee & Park, 2021, p. 6; O'Connor et al., 2021, p. 326), especially to individuals with low social cohesion, who were affected by these long-term isolation measures (Lee & Park, 2021, p. 2). Thus, a need of developing insightful and innovative design practices has arisen, aiming towards equipping future educators with guidelines specifically designed to foster the future of distance education. Games have proved that as a medium they possess the capacity of improving and developing spatial skills, creativity, communication and resourcefulness (Barr & Copeland-Stewart, 2021, p. 12; Granic, Lobel, & Engels, 2014, p. 69). The concept of the current paper is to inspire upcoming educators with the usage of insightful mediums such as puzzle games and they on their turn to apply the accumulated knowledge through creating pedagogical scenarios and teaching on their students. The writers' purpose to achieve this design practice is based on three axes. The first two are the theoretical framework which insightful puzzle design is shaped into a learning experience, whereas the second one being the exemplification of these design insights via playing "The Witness" by students of the PDSP. As upcoming project, the third axis is the presentation of the findings and their implementation on new puzzle design tasks. The whole procedure expanded throughout the semester; hence as a sequence the next level of this approach is the students' implementation of these insights as an upcoming puzzle design project.

Leading the way by displaying to undergraduate students the advantages of insightful puzzle design on cognitive, behavioural and affective responses (Granic et al., 2014, p. 66) to create an unhindered educational process with the use of puzzle games, allows them to expand their horizons on educational approaches and organize creative educational scenarios with minimum appearance of entrapment and threatful defeat. The proposed puzzle game theme and difficulty stand at a certain content and complexity (which will be further analyzed in later sections of the paper). Undergraduate students of the PDSP compose an ideal target group for the current case due to their training on educational practices and strategies, while being exceedingly capable of reaching into conclusions and provide a thorough approach based on literature analysis regarding the feelings of entrapment and defeat.

The premise of this paper is to provide insightful design assistance towards a specific category of games, puzzles, which will lead to a deeper understanding of games as educational tools and mediums and their potential during the era of COVID-19. The contribution of this paper is to analyze and "diagnose" the factors that affect entrapment and defeat in games, especially in puzzles, and form a game-based approach aiming to distance education by implementing puzzle design techniques in avoidance of the experiences of entrapment and defeat.

Theoretical Framework

This analysis aims into insightful puzzle design practices for educational purposes, towards the minimization of experiencing entrapment and threatful defeat. A game-based analysis on the fundamentals of puzzle design, which focuses on elaborating the faulty parts that allow the appearance of entrapment during the global pandemic crisis of COVID-19, exploiting the benefits of games on well-being (Barr & Copeland-

Stewart, 2021, p. 9). The implementation of puzzle design guidelines aimed for educational practices is going to allow undergraduate students to experience a "within the flow" way of playing puzzle games as an educational tool, free of the hazardous effect of entrapment and the unproductive experience of threatful defeat (Griffiths et al., 2015, p. 1190).

As Linehan state in puzzle-based games, the element of fun is primarily derived by learning and applying a specific skill to progress. In continuance, they analyze that "puzzle games can . . . help to understand the usefulness of game design elements in wider educational contexts, where the aim is similarly on the acquisition and application of specific skills" (Linehan et al., 2014, p. 192).

Starting by defining the word puzzle itself, will aid educators and students to realize why this approach focuses specifically on puzzles instead of any other form of games. The distinction between a puzzle and a game according to C. Crawford is that puzzles are strictly technical operations; while playing a game is an interpersonal operation (Crawford, 1984, p. 11). Crawford mentions that when players find the solution to a puzzle, the secret is known, therefore players lose any future interest towards the same puzzle (1984, p. 12). Puzzles are encountered into various genres of games, but also are a standalone genre as well. Within the grey zone of Crawford's puzzle definition, puzzle designer K. Scott in an interview given in the book written by T. Fullerton, he distinguishes puzzles from games and toys altogether, by stating that "a puzzle is fun and has a right answer" (Fullerton, 2014, p. 38). The part of the definition elaborating the fun factor is perceived from Scott that puzzles are a form of play, while the second part categorizes puzzles in a separate spot from other forms of play. The aforesaid definition has the subtlety of accepting that a puzzle does not need to have only one right answer or only one way towards achieving that answer, but at the same time Scott differentiates puzzles from games and other play activities. Siding on the same side as K. Scott, G. Costikyan considers that C. Crawford overstates the case with the statement that the game "Zork" is a puzzle after all. His opposition towards Crawford's definition lies on the "static" state, while considering that is not the use of the word "static" which creates the confusion, but rather the absence of interaction. Pointing out that interaction is a core element of computer media, he emphasizes on the existence or lack of interaction being the main feature of the distinction between puzzles and games (Costikyan, 2002, p. 11).

Opposing to Crawford's opinion on puzzles, K. Salen and E. Zimmerman claim that puzzles fall into their definition of games. Quoting, they declare that "although the conflict is between the player and the system rather than between a set of players, . . . all kinds of puzzles are games" (Salen & Zimmerman, 2004, p. 12). The distinction lies in the existence of a fixed "correct answer" that players have to find to solve the puzzle game. This element also showcases that puzzles in general fall under the category of "Agon" as defined by R. Caillois in the book translated by M. Barash. He implies that such games "leave the champion to his own devices, to evoke the best possible game of which he is capable, . . . within the fixed limits, and according to the rules applied equally to all . . ."(Caillois & Barash, 2001, p. 15). Such is the reason why selecting a puzzle as a challenge is crucial to determine the players' performance against a fixed task with specific limitations and application of rules.

The case of puzzle design specifically allows the observation of entrapment and defeat as personal as they could be due to the limited deviation provided to the players. Players experience the outcome of puzzles as personal achievements; therefore, the emotions are always relevant with their performance. Jesse Schell mentions that "a puzzle is a game with a dominant strategy" (Schell, 2008, p. 209).

What Schell describes as a dominant strategy is a game where its components are not tuned or balanced (2008, p. 142) and according to Sirlin "a multiplayer game is balanced if a reasonably large number of options to the player are viable – especially, but not limited to, during high-level play by expert players" (Sirlin, 2009, p. 1). He continues by explaining that this definition of balance hides two significant concepts. First that the game does not degenerate down to just one tactic or as we previously mentioned a dominant strategy, therefore obliging players to follow this strategy in case they seek the most potent outcome (viable options); on the other hand, that the variety of options allow the player to start from fair point in the game (fairness) (2009, p. 1).

Puzzles are repetitive games which players solve and acquire the knowledge of the solution. There are two types of puzzles, puzzles that can and cannot be replayed. An example of such puzzle is Rubik's cube; where the player may be able to solve once, but the steps that the player is expected to follow may differ from one solution to another. This leads towards a puzzle distinction; the puzzles that have only one possible solution and the puzzles that could be solved using a variety of methods. Due to this linearity of puzzles, they assemble an excellent tool for performance measurement, based on the lack of deviation of the puzzle solutions.

Based on the linear process of puzzles and the limited external interaction, they provide an exceptional educational way to "detect" the appearance of entrapment and defeat. Leading towards the distinctions of the two different states "entrapment appears to represent ongoing appraisals of a situation, whereby the situation is judged to be inescapable, with no likelihood of rescue through either personal volition or the agency of others" (Taylor et al., 2011, p. 394). In the case of games, entrapment represents the situation where an ongoing evaluation of a state is considered inescapable and no internal or external factor is able to terminate successfully the repeating process. A possible internal termination would be the acceptance not being able to solve the puzzle, hence giving up on the game. Whereas an external termination for the player would be to look up the answer. Either way the termination of the process could be fraudulent perceived as successful, but players have not actually been able to solve the puzzle, therefore the feeling of defeat emerges. The distinguish of defeat and entrapment is that "defeat primarily involves the processing of goal or status attainability" (2011, p. 394). It has nothing to do with the outcome altogether, but rather with the players' perception regarding the outcome. A player might actually solve a puzzle and perceive it as defeat after all, due to the meaning applied on the outcome. For instance, someone might argue that solving the Rubik's cube in more than a minute is a defeat, whereas another might believe it's a glorious victory. The meaning of the victorious or defeated state is generated by the players themselves. The order of appearance is also something considerable, since perceptions of defeat are the first to emerge, based on the state evaluation, whereas perceptions of entrapment follow according to the individual's self-evaluation of the ability to liberate or maintain the defeating cycle (2011, p. 394).

Entrapment and Defeated State

Defeat is undoubtedly related with social rank factors such as low self-esteem and submissive behaviours (Gilbert & Allan, 1998; Taylor et al., 2011) and research has shown that "repeated instances of social defeat leads to . . . decreased motivation . . . and lack of interest in rewarding stimuli" (Taylor et al., 2011, pp. 391–392) often reaching to anhedonia. The individual's strategy therefore involves giving-up on the factors that underlie the initial conflict and signal to others their lack of interest while

displaying a no-threat status towards competitors. Research first was applied on animals and which showed blocked or arrested defensive behaviours, whereas when applied on humans some of the effects were displayed during stressful situations and included gaze aversion, minimal scanning of the surroundings and few facial expressions, which mostly appeared on participants that were diagnosed with depression. The presence of entrapment "involves psychological processes, relating to an individual's subjective perception of his or her circumstances as being uncontrollable, unremitting and inescapable" (Taylor et al., 2011, p. 393). Entrapment and defeat are classified into three scales. On the one hand, internal entrapment is associated with the escape motivation of the individual's psyche, such as thoughts and feelings, whereas external entrapment is connected with the perception of outer events or circumstances that induce escape motivation (Gilbert & Allan, 1998, p. 589). Defeat on the other hand, portrays the "sense of failed struggle and losing social rank" (1998, p. 589)

The Involuntary Defeat Strategy (IDS) is a prescribed strategy which is "triggered by the individual's recognition that defeat in social competition is inevitable"(Sloman et al., 2003, pp. 110-111). The IDS signals a submissive no-threat status facilitating the withdrawal from unachievable ambitions and inhibiting further activity in avoidance of excessive costs (Taylor et al., 2011, p. 394). The purposes of the current paper focus only in a fragment of the IDS, the part of the depressogenic feedback loop. As presented in the table 1.1 below the loop starts with the emotions of upcoming defeat which in most cases derive from a stressor point. Continuing towards the individual's response in three primary segments; cognition, behaviour and affection. In matters of cognitive responses, the ongoing pressure the individual withstands revolve around low personal adequacy, syndrome of inferiority and low judgement in the ability for success. The significance of the cognitive response lies in the case of cognitive incongruity resulting from a standpoint of personal failure or the inability of the individual to solve the problem or task presented, leading to the state of them confronting an unresolved problem, therefore their false perception of inability to succeed (Vogl, Pekrun, & Loderer, 2021, p. 43). The cognitive quality of tasks presented is also a subject of great importance; as they are capable of influencing the measurement of perceived competence, hence highly correlating with the achievement emotions of the individual (Pekrun & Stephens, 2010, p. 245). On the behavioural segment the responses are commonly in regards to hypervigilance creating a state of extreme alertness of the possible peripheral dangers, often accompanied by overthinking which may lead to analysis paralysis and behavioural inhibition. On the affective segment the individual's responses depict low positive affect, therefore being less confident and enthusiastic for upcoming situations. These responses drive the individual into either the option of low-adequacy, depression or involuntary defeat, thus prolonging the depressogenic feedback loop depicted below.

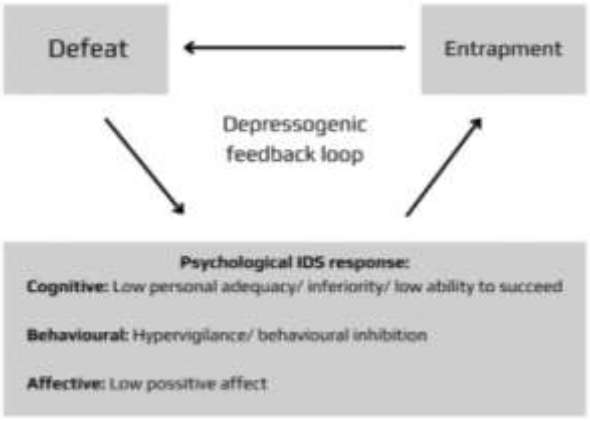

Figure 1. Depressogenic feedback loop (Taylor et al., 2011, p. 395).

Puzzle Game Design Insights

The uses of puzzles from the game "The Witness" are going to be used in order to exemplify the statements regarding insightful puzzle design. Starting by focusing on cognitive reinforcement each puzzle needs to have a climax (Fullerton, 2014, p. 118). The climax should be constituted by a slight raise in difficulty always reaching towards the peak moments before the epilogue. Imagine of a puzzle game that has three chapters and each chapter consists of ten puzzles. Each chapter should reach its peak around the 7th to 9th puzzle. This allows the players to place their minds at rest and relax while solving easier puzzles, before the designers start teaching them new mechanics in another chapter. Players should also seek a heroic quest to solve, which would provide meaning to their playful journey as a whole. This for instance might be collecting fragments of an ultimate puzzle challenge that would appear in the end of the story where the dramatic tension should reach its peak (Adams, 2009, p. 557). It also surges players' confidence creating a realization that they have figured the solutions of previous puzzles in a significant manner; therefore, the latter puzzles seem easier in comparison with the rest. By boosting player's confidence, their self-realization regarding low personal adequacy declines, enhancing their self-esteem while keeping them motivated. Confidence as a feeling is related with the feedback loop, informing players about the attainment of their success, while being profoundly significant for cognitive development due to influencing motivation towards resolving tasks (Vogl et al., 2021, p. 47). The unfamiliarity, the steep rise in challenge, cognitive and kinetic overload could be intimidating and quite discouraging (Meyer III, Falkner, Sooriamurthi, & Michalewicz, 2014, p. 138), for that reason the first couple of game puzzles should be constituted by simple interactions, acknowledging the players with the new mechanic of the puzzle presented (Figure 2). Upon building the base of how the designers think, the difficulty could rise and provide the players advanced interactions (Adams, 2009, p. 344), while implementing neutral elements of previously acquired knowledge (Figure 3). The constant intensification of difficulty contributes to the abandonment of inferiority, while simultaneously reinforcing the players ability to succeed.

Figure 2. Initial Puzzles in the Blue & Green Gardens. *The Witness*. 2016. Thekla Inc.

Figure 3. Puzzles in the Marsh. *The Witness*. 2016. Thekla Inc.

In continuance, difficulty substantially influences the behavioural response. The difficulty of each individual puzzle is based on the complexity of the core mechanic, but this could be deconstructed towards the number of steps that are required for the solution, or the time needed. A designer should allocate enough time for the players to have their epiphany moment; as creativity cannot be rushed, players should be provided with the time needed to personally get involved with the task and pace their way towards solving the puzzle (Meyer III et al., 2014, p. 54). Five-step puzzles are profoundly easier than ten-step puzzles using the same mechanic; exactly as puzzles that the solution involved is ten seconds opposing to others that the solution requires twenty seconds to be drawn or written. During the ongoing attempts of players to solve the puzzles there should always be present a form of feedback positive or negative (Adams, 2009, p. 350; Fullerton, 2014, p. 42). If a player has invested into a twenty-step solution there should be around the midway a confirmatory sign of any kind that would reassure the player that this is the right way to go. Letting players doubt their progress creates space for dissonance with reference to their performance. Avoiding such practices would assist players into a stress-free experience and allow them to recover from hypervigilant circumstances due to the implementation feedback mechanisms reassuring their current progress at any point of the puzzle or informing them if they have hit a dead end.

Always design for somebody. Designers have an intended audience while designing a game. Make sure that each implemented design feature within your puzzle always serves your target group. Examples of outraging puzzle design could be annotated in the game “Playing History 2 - Slave Trade” from Serious Games Interactions at 2013 (Figure 4.). The premise of the game is to “fit slaves” within a transportation boat. Each “slave” falls in a specific shape and players try to maneuver their landing in order to create a full row in the boat by using the arrows. Providing this game as an

example, of why it would be a preposterous fit into the schedule of primary schools. The use of the word "slaves" in the title, the representations of "slaves" only as people of colour or the general logic that people come in certain geometric shapes unable to transform into something else, would be a total improper and wretched way to present the notion of slavery within primary schools.

Figure 4. Gameplay screenshot. *Playing History 2 - Slave Trade*. 2013. Serious Games Interactive.

Designers always take into consideration their intended audience and act accordingly. Each new concept should be presented in an orderly fashion and target the selected audience. A player of a strategy game would not appreciate the final outcome of a battle to derive from a roll dice. At the same time players should always feel that they are testing some sort of skill while playing a game. As R. Koster mentions "Not requiring skill from a player should be considered a cardinal sin in game design"(Koster, 2005, p. 124). Another way of forming quickly grasped concepts is to imitate natural mechanics. Below is depicted an example from the puzzle game "The Witness" (Figure 5.). The way that the mechanic of the puzzles presented are imitating the reflection of water. The player realizes the horizon in the back and the reflections of the land and trees on the water, providing insights that these puzzles should be solved by taking into consideration the phenomenon of reflection.

Figure 5. Puzzles in the Marsh. *The Witness*. 2016. Thekla Inc.

Providing the players with playful mechanics, which require an out of the box way of thinking, while imitating a natural adaptation into puzzles, generating an onwards trend towards building their positive affect. Designers' purpose is to make players feel smart and empowered while solving puzzles and there is not a better way to achieve this, rather than providing ingenious features presented in a clear, distinctive and easily grasped manner. Puzzles after all are challenges of increasing difficulty,

provide to the players a clear goal with well-structured rules. This kind of flow activities as Csíkszentmihályi says in the book of J. McGonigal "achieve the greatest form of happiness available to human beings: intense, optimistic engagement with the world around us" (McGonigal, 2011, p. 36). Contributing to the empowerment of the players' positive affect and generating possibilities for growth in order to escape the depressogenic feedback loop.

Conclusion

The groundwork of this paper is to provide puzzle design insights to undergraduate students of the Pedagogical and Didactical Sufficiency Program for Audio and Visual Arts, conducted in the Ionian University, Greece**.** The participants and future educators were encouraged to play various puzzle games throughout the Program, one of which was selected to be played by everybody was "The Witness" in the PlayStation platform. The focus of the insightful puzzle design was to create a playful educational experience for the players, free of the feelings of entrapment and threatful defeat. In order to achieve that, this analysis focused on identifying the sequence from a stressor point, to defeat and tied up to entrapment, while providing fundamental principles of puzzle design. Highlighting these principles such as the intended audience, quest, theme coherence, imitation, challenge, complexity, climax, regular feedback, optimistic engagement ensuring an engaging and "nonthreatening" way of play. As future work, the implementation of these fundamental principles will be applied in educational projects setting an excellent way to provide further data on innovative puzzle design approaches.

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