

Aesthetic Design For Learning With Games

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Abstract: This paper presents a design framework for educational games utilizing the notion of game aesthetics. Aesthetics in games is presently defined by all the facets of gaming experienced by players either directly through audio and graphics or indirectly through rules, geography, temporal characteristics and number of players. Researchers have observed that learning depends on the aesthetic qualities of an instructional environment and therefore the design of effective learning environments is dependent on its aesthetic considerations. Using the aesthetic principles of instructional design and the Design/Creativity loop model as the overall framework this paper elucidates how a game can be aesthetically conceived to reveal the core learning concepts and complexities for a deeper engagement with the content. To emphasize the role of creativity, we conceptualize the design process through a comparative analysis between choreography and the aesthetic configuration of a game based learning environment. We present and discuss the parallel processes of these two creative and iterative design activities, using various exemplary educational games and West African dance forms.

Keywords: Aesthetics, game based learning environments, choreography, creativity in design

1. Introduction

Although game based learning environments are recognized as good media for learning and socialization through the dimension of play (Van Eck, 2006), designing games for classroom use to advance cognitive development has been a challenge. In order for teachers to use games in the classroom, they not only need to consider students' level of engagement, motivation and prior knowledge but also ensure the alignment of the curriculum, pedagogical techniques and clear learning goals for games (Kirkland, Ulicsak & Harlington, 2010). Shute, Rieber and Van Eck, (2012) discussed that the hurdle faced with wider usage of games in classrooms is due to the lack of understanding of the gaming environments' effects on learning and a corresponding lack of theory and practice for their design and implementation. Educational games can often be ineffective if they fail to unpack the students' interests and extend them into the academic domain (Squire, 2011). We argue that learning becomes a meaningful experience when it is aesthetic in nature, and hence propose a reconceptualization of game design from an aesthetic perspective. An aesthetic learning experience is engaging, lends continuity to a learning process and is concerned with the qualitative meaning attributed to it (Parrish, 2009). Reemphasizing the importance of aesthetics in game design, Squire (2011) reiterates how design teams or designers must strive towards making game development an iterative or creative process with frequent prototyping and testing to create compelling educational experiences. We therefore advocate that game design as a process in itself has to be an aesthetic experience so that the designers engage in a creative process and are able to reflect their creativity through the aesthetics of game based learning environments.

2. Aesthetics and Creativity in Designing Game Based Learning Environments

An aesthetic experience is similar to being pulled out of one's subjectivity into a web of relations that demand his or her attention (Gadamer, 2011). An aesthetic understanding depends on the notion of play through participation, which is crucial for individuals in deciphering the ways of the world (Jardine, 2006). Egenfeldt-Nielsen, Smith & Tosca (2013) from a purely technical point of view, define aesthetics in games constitute the elements such as audiovisuals, rules, geography, temporal features and number of players, and how these work in unison to showcase the experience of "how it plays" (p.

117). Learning environments possess aesthetic qualities, which become evident through instructional activities or methods that foster intellectual and emotional tensions or through content and strategies that provide significant learning experiences (Wilson, 2005; Parrish, 2009). Aesthetic experiences within learning environments make the learning immersive, meaningful, coherent, complete and transformative (Parrish, 2009). Extending the notion to game based learning environments we suggest that aesthetics in games affects learning and plays a coherent role towards understanding the game (Gupta & Kim, 2014). In game based learning the learners derive the meaning from interacting directly with the gaming world and through observations of the consequences of their actions (Squire, 2011). The aesthetics of a game also captures the subjective experience and invokes the emotional response of the players (Aleven, Myers, Easterday & Ogan, 2010). Game design, which bring out the aesthetic qualities, is therefore of immense importance for facilitating learning and creating meaningful learning experiences.

Aesthetic qualities help to establish the theme of learning if the issues arising from the subject are part of the situation (Parrish, 2009). Elements such as rules or geography can help present the problem and the theme of learning. Aesthetic qualities such as patterns, routines or motifs help to see the connections or the changes thus supplying an anchor for new learning (Parrish, 2009). Aesthetic elements of a game similarly provide patterns, routines or motifs, which holistically reveal the changes and connections as the game progresses. Aesthetic elements, especially visual representations, are critical for making sense of a game: they not only communicate educational concepts and enable players to see patterns in the gaming process but also shape and reshape various game elements depending on the player's choices (Egenfeldt-Nielsen, Smith & Tosca, 2013; Squire, 2011). Aesthetic learning experiences also involve tension and anticipation in the course of clarifying a problem, making it challenging and engaging for learners (Parrish, 2009). We claim that aesthetic tension or anticipation arising out of the game elements can motivate the player impacting his or her critical thinking skills and emotions towards solving the problem (Gupta & Kim, 2014). We assert that creating a game based learning environment rich in aesthetics demands embodying the above mentioned aesthetical qualities in the design.

We also propose that the designers themselves have to undergo an aesthetical experience as instructional designers, to come up with creative designs for presenting a problem or a theme in a project. Hokanson and Miller (2009) suggested how designers have to be in a creative frame of mind for visualizing innovative ideas to commence and end the process of design. The Design/Creativity Loop Model (see Clinton & Hokanson, 2012) further develops the role of creativity by focusing on the various processes that take place during instructional design and development. The model illustrates an iterative process of creative thinking. The design process may commence with the problem identification or the creative vision and proceed to the preparation stage where the designer pursues supporting design tasks. Incubation involves creative endeavours of the designer while processing the design problems, which leads to illumination reflecting the designer's comprehension of solutions. These solutions are derived through repeated mental iterations, which the designer then builds upon or verifies through the design.

Creativity in game design must surface through a mix of the visual arts, the content and the connections to learning theory (Squire 2011). Drawing from Chen, Kasof, Himsel, Dmitrieva, Dong and Xue's (2005) notion of creative response, we propose that an instructional design of a game, which involves insightful problem identification, divergent and evaluative thinking, is bound to extract creative responses from the learners. An instructional design process can bear similarities to an artistic approach "since designers can actually devise specific instructional strategies and make aesthetic decisions" (Clinton & Hokanson, 2012, p.123). Choreography is a highly artistic and creative process of design. It is an integral part of performance arts and we have chosen to explain the game design process by drawing similarities between the processes. We use the Design/Creativity Loop Model to understand the fundamental process of creative design and devise our own model specifically for an aesthetic design of game based learning environments.

3. The Aesthetic Process of Designing a Game Based Learning Environment

Design requires creativity. Choreography often starts with an artistic intention, inspiration or vision and dwells on the possibility of finding novel solutions through a chain of reasoning (Pakes, 2009).

Choreography can emerge as an evidence of the synthesis of competing ideas such as problem finding, problem solving and metaphorical thinking (McKechnie & Stevens, 2009). The purpose of a choreographed dance therefore is to highlight an issue, express the process of resolving it and bring about a conclusive end to the narrative. The purpose of an educational game is similar: it identifies the issues in the context and engages players in the problem solving process within the game situation as the protagonist(s) in the narrative.

There are four creative operations of dance making – improvisation, development, evaluation and assimilation (Lavender, 2009). Improvisation begins with generating the artistic value of movements or dance structure ideas. Since it is exploratory, choreographers have to make critical choices about the form and structure of the movements based on their aesthetic values (Lavender & Predock-Linnell, 2001). The movements are then developed through the application of choreographic principles and devices. In order to infuse the movements with a particular energy or quality the choreographers may attend to the structural frames of the movements and alter the expressive details (Lavender, 2009). Choreographers then evaluate their actions and outcomes because choreography is a critical process that incorporates reflection, instantaneous or otherwise, to analyze, interpret and assess how the ideas are working towards shaping the dance (Lavender & Predock-Linnell, 2001). Finally choreographers assimilate all the materials they have composed to form smaller chunks that eventually coalesce into the fully formed dance, set for performance (Lavender, 2009). Thus choreographic approach remains entrenched in the aesthetic-artistic environment of the choreographers and goes through iterative stages of preparation, creative thinking and decision making regarding style, form, tempo or other characteristics. The final creative piece when woven together becomes an ensemble that has evolved as a dynamical system to communicate the flow of thought of the choreographer.

To understand how choreography bears similarities to the game design process we have devised a model (see Figure 1), drawing from key concepts of creativity in design (Clinton & Hokanson, 2012) and the creative operations of dance making.

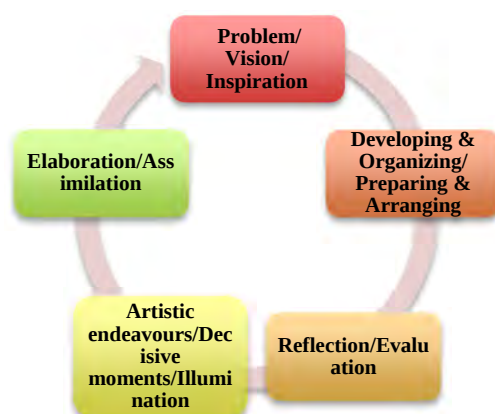


Figure 1. The Aesthetic Game Design Cycle

The aesthetic game design cycle is based on the creativity of the individual designers and is not prescriptive but descriptive towards reorienting the process of game design. Creativity as an iterative process involves divergent thinking and is grounded in everyday capacities such as association of ideas, perception, analogical thinking or reflective self-criticism (Boden, 1998). As a creative endeavour the Aesthetic Game Design Cycle is therefore repetitive and cyclical. Using the aesthetic principles for instructional design (Parrish, 2009) we now elaborate how the aesthetic elements of a game establish the theme, create sustained engagement and anticipation and emerge through patterns and motifs that mark progression and novelty.

3.1 Establishing the Game Theme

Inspiration for choreography can stem from a piece of music, a visual concept, image or perhaps an emotion or feeling (McKechnie & Stevens, 2009; Pakes, 2009; Smith-Autard, 2009; D.J. Walsh, personal communication, 26th April, 2014). In comparison, the game designer has to identify the problem first, wrap it contextually (Clinton & Hokanson, 2012) to express the complexity so that there

are divergent means of solving the problem. The theme of learning as an aesthetic principle concerns itself with the learning activity (Parrish, 2009). Learning activity in game based environments evolves through game play where the focus has been to narratize the discipline or the subject through a core problem so that the learners can engage in socio-scientific inquiry (Barab, Sadler, Heiselt, Hickey & Zucker, 2010). The narrative therefore becomes a framework for the aesthetic principles of instruction as it helps to understand the theme, the subject or the problem that is presented through the game. Narrative is an important element of choreography as it helps to conceptualize the dance (Lavender, 2009). The mini narratives or intention framing exercises both in design and choreography, thus help to build the narrative.

The aesthetic elements of a game can bring out the theme by portraying the conflicting information or the tension as the narrative progresses. Elements of a theme are decipherable from the rules of dance forms (Pakes, 2009). Rules define what the style will be (example Jazz, West African or Contemporary), and depending on the style chosen the rules help to elaborate the theme by establishing the structure, form, tempo, time signature and characteristics of the dance (Lavender, 2009). Genres or types of games are similarly classified by rules, which define the basic structure of the game. Depending on the theme the designer may choose completely open-ended environments (*Assassin's Creed*) where the outcome of the game depends on the actions of the player or point and click games (*On the Ground Reporter*, *Darfur*) where the player's actions are guided by artificial intelligence. In traditional West African dance, a wedding dance like *Guinea Lamban*, performed separately by men or women has a unique rhythm and certain signature movements. In Africa, dance serves as an index to the value systems that enable the community to interpret and express the various events of life (Nii-Yartey, 2009). Based on some of these rules, the choreographer can portray the narrative by sequencing the steps, modifying the artistic movements through complexities within the steps. (D.J.Walsh, personal communication, 26th April, 2014). Different genres of games (simulation exercises, role-playing games, building games etc) have different sets of rules. The designer is guided by these rules but can be creative within the defined parameters.



Figure 2. Screen Shot (*Assassin's Creed*)



Figure 3. Cuban Dancers on Stage
(Photo courtesy of C. M. Constantinescu, 2014)

The choreographer or designer may choose to work on the geographical or spatial elements of the design for example (Lycouris, 2009; D.J.Walsh, personal communication, 26th April, 2014). The spatial arrangement can speak to the narrative and hence to the theme. The stage can be divided into halves or quadrants with site specific installations. Such arrangements play a crucial role in the choreographer's decision. For example it can be a piece in isolation or an invitation to the audience to be part of the world (see Figure 3). A designer can similarly conceptualize the geography or the physical landscape to portray the theme accurately and help create the mood for the story to unfold (see Figure 2). Just like in a dance piece, the game designer has the option to select the number of players depending on the theme (see Figure 3), adding a social component to the game.

3.2 Creating Sustained Engagement and Anticipation

Once the choreographer/designer goes through a number of iterations of the creative cycle to arrive at major decisions (Decisive moments stage) regarding the theme, the process of elaboration and assimilation of the theme commences for the entire dance form/the game design. During this stage the

choreographer/designer can revisit the design to verify and elaborate towards sustaining the engagement and anticipation of the audience/players as well as their own visions.

Sustained engagement can be achieved in a learning environment through enhancement of the complication by introducing new tensions or complexities (Parrish, 2009). The game designer can reconstruct the narrative to introduce complications and create small achievements towards anticipation. Maintaining such anticipation demonstrates unity in the learning process and helps towards consummation of learning (Parrish, 2009). Small-scale tensions and consummations can come alive through the choreographic elements of intrigue, resolve or surprise (Nii-Yartey, 2009). Such elements are woven in through the changes of dynamic in audiovisual representations incorporating movement, music and lighting (McKechnie & Stevens, 2009). The form, style, tempo, time signatures, specific movements, spatial arrangements and number of dancers help to elaborate these minor complications within the choreography. In a similar way game designers can build up mini complications through the audio-visual representations or the narrative by suddenly exaggerating problems that appeared earlier or by augmenting unexpected turn of events through the game play.

The designer(s), having a thorough understanding of the problem may be further inspired to embed emergent problems within the parameters (curriculum) of the content/subject. Such emergent problems may be conceived through self-perception or through influences of the socio-cultural perspectives of the designers. These conflicts or problems can help establish continuity for the game.

3.3 Using Patterns, Routines and Motifs to Mark Progress

Patterns, routines and motifs are aesthetic traits that help to comprehend connections in the theme or even the narrative. Without patterns, routines or motifs the context emerges as chaotic and the novelty of situation is lost in the process (Parrish, 2009). Patterns in choreography cultivate a sense of understanding of the theme by reemphasizing certain dance movements (D.J.Walsh, personal communication, 26th April, 2014). In games patterns, routines and motifs are yardsticks for measuring progress particularly the onset of new situations, changes and connections in the problem. Patterns or routines repeated over time or through the action of players may have special significance towards comprehending the theme or narrative. The designer can elaborate on the theme by initiating the patterns and routines to establish the sequence or growth in the narrative. Repetitive patterns in West African rhythms emphasize the organic flow of one movement to the other (Nii-Yartey, 2009) which introduces novelties and meaningful progression. Patterns can also be established in games using the rules, geography, characters, the tempo as well as through the music and visual artistry. In *On the Ground Reporter Darfur*, as the player travels to a new area, a certain piece of music is repeated to establish familiarity and progress.

3. Implication and Conclusion

Games, which have strong elements of aesthetics and are conceived through a creative process, enable the learners to come up with creative responses to the theme, content or problems. As the learners start making sense of the aesthetic elements they create their own framework, which define and shape their understanding. The aesthetic qualities of the gaming environment thus specify, depict and convey visual representations to the learners. Characters, contexts, events or even objects within game based learning environments may serve as emotional anchors of learning depending on their aesthetic capacity (Kim & Kim, 2010). Each interaction in the game evokes different emotions from learners depending upon their sociocultural context. They seek solutions, which serve as artifacts or evidence of learning and the learners develop new identities to establish their learning. As noted earlier game based learning is often not used in classrooms for lack of proper pedagogies. However when the game designers establish themselves as model protagonists and experienced learners by revealing their own creative perceptions and sociocultural understandings through their game design, educators and researchers can better understand how games facilitate meaningful learning experiences and contribute to knowledge advancement. By sharing what motivated them to design the game they share their expertise in the subject or field through their creative design. Creativity is an integral part of instructional design, and aesthetic designs for learning environments and games need to be important aspect of the design process.

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