

FOSTERING 21ST CENTURY SKILLS THROUGH GAME DESIGN AND DEVELOPMENT

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ABSTRACT

This reflection paper argues that the design and development of digital games teach essential 21st century skills. Intrinsic to application and game development is design thinking. Design thinking requires iterative development, which demands creativity, critical thinking and problem solving. Students are engaged through learning by doing in both concrete and at the same time in abstract thinking. Application and game design requires systems thinking that gives context and meaning to narrative and story telling. A deep understanding of information, media (visual, auditory and performative) and technology coupled to mathematical skills is a prerequisite to success in this domain. Application and game development requires social intelligence and interpersonal skills for working in diverse teams where communication and collaboration is essential. Finally game design requires knowing oneself as a designer but also knowing and understanding perception, psychology and cognition of the user and the player.

KEYWORDS

Application, game design, 21st century skills, creativity, problem solving, cognition, story.

1. INTRODUCTION

The game design document is similar to an extensively researched term paper. It is an attempt to describe a proposed game, in its entirety and in detail before any work begins. Ken Wong, the lead designer for the iPhone game Monument Valley explains why game documents are not useful: “We find you need to make a game wrong at least two or three times before you find the right path. We took a lot of opportunity to design and explore, knowing that a lot of it would be thrown away.” The development of digital games is an iterative process that requires creativity, exploration of promising avenues, dead ends and a willingness to fail in order to make progress.

2. DESIGN THINKING

Design thinking is problem solving conditioned by learning by doing. Design begins with brainstorming and idea generation using free association where any idea is fair game. A second pass selects a subset of likely candidates. Ideas are captured as sketches and notes on paper or whiteboards making it possible to see where changes can be made and how variations can be generated by similarity, contrast or even systematic combinatorics. Iteration is a process of generation, trial and error. Errors point the way to success.

2.1 Digital Game Design Thinking

Games begin first with brainstorming out of which emerges a core concept often coupled to an activity or interaction. Once implemented in code this coupling becomes a game mechanic. However for every game mechanic the game designer must test and iterate to find the right balance between engagement, difficulty, ease of use and boredom while advancing both the storyline and the gameplay.

2.2 Learning by Doing

It is not enough to think of a game mechanic, it must be built so it can be tested. Building it requires analytical, mathematical and concrete thinking needed for programming. For example a character may have the property of health. Concrete thinking is required to determine the data type (floating point or integer) for data representation. There is a leap of abstraction with the creation of a variable to store the value. In a further abstraction a function can pass this variable to increment it or decrement it. This abstraction is taken a step further when it represents the “health” of a character in the game. As increasing levels of abstraction and representation are added in a game where the game becomes a simulation of a complex world with physics, autonomous characters and programmed entities interacting with the player.

2.3 Game Design is a Team Sport

Game design and development requires game designers, programmers, writers, artists, sound designers, composers, content experts, human factor experts, cognitive psychologists, marketing specialists and legal experts. It is by definition a collaborative process that requires clarity of written and verbal communication. Effective teams require members that have highly developed social intelligence and interpersonal skills which fosters understanding of teammates and the audience of players of diverse backgrounds and gender.

2.4 Know Thyself

Game Design teaches essential life and career skills. Team members must set goals, manage workload while working collaboratively yet independently. Self-assessment, an open mind, curiosity and self-directed life long learning are essential. With career advancement comes the responsibility to mentor and lead others.

3. CONCLUSION

Learning Game Design prepares students with 21st Century innovation skills and abilities for a rapidly changing technological world. These include critical thinking and problem solving; systems thinking; learning how to make judgments and decisions. Creativity and innovative thinking is fostered by idea generation techniques as well as cultivating curiosity and openness to different perspectives. Team work means working effectively, collaboratively and creatively with others; having clear verbal and written communication skills; being respectful of difference in the workplace and welcoming of a diversity of gender, lifestyle and cultural backgrounds. Information, Media and Technology skills are of course prerequisite to the field; life and career skills (flexibility and adaptability; time management, self-directed learning) combined with accountability sets the stage for greater responsibility and success.

ACKNOWLEDGEMENT

This paper reflects lessons learned while directing the Bachelor of Arts in Game Design and Development at Quinnipiac University, in Hamden, Connecticut.

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