A Simulation Project Addresses Multiple Intelligence

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ABSTRACT

This paper describes a simulation project done as a team assignment under the verbal guidance of a subject matter expert. The simulation project is part of a graphics for simulation class that is part of a new major in simulation, animation and gaming at Eastern Michigan University. The use of a physical security expert to identify problems associated with a particular lab facility was consistent with her role in that field. Students in the class were required develop a simulation that would accurately reflect her assessment of the conditions. Then, students were required to develop a model to simulate the room, furniture and equipment. The final product was to be a simulation that the expert could use in other locations for the purpose of visually illustrating, through a simulation, the physical security process. The application of Gardner’s original seven distinct intelligences and the development of the model are the aspects of learning that are highlighted herein. The fact that the finished product would be used, and was not simply an assignment, set the expectations higher and provided the students with a greater degree of satisfaction, as well as a portfolio piece when completed.

Keywords: Simulation, multiple intelligence, physical security, graphics for simulation.

Introduction

In 1996, Veenemea & Garner stated, “Technology does not necessarily improve education. Take a simple innovation like the pencil: One can use it to write a superlative essay, to drum away the time, or to poke out someone’s eye. The best television has educated thousands, while the daily network offerings dull the sensibilities of millions.

The same is true of interactive technology, which is getting so much ink these days: It could become a valuable education tool, but only if we use it to capitalize on our new understanding of how the human mind works” (p. 69).

Using new technology such as the simulation used in this practical application addressed the different multiple intelligence of the students. The project allowed them to gain knowledge and mastery of the material from a number of learning styles. Gardner explains that “intelligence is the ability to solve problems, or to create products, that are valued within one or more cultural setting” (1993, p. x).

Wikipedia (2008, para. 1) defines intelligence as “an umbrella term used to describe a property of the mind that encompasses many related abilities, such as the capacities to reason, to plan, it solve problems, to think abstractly, to comprehend ideas, to use language, and to learn”.

The same website source (2008, para. 1) defines simulation as “an imitation of some real thing, state of affairs, or process. The act of simulating something generally entails representing certain key characteristics or behaviors of a selected physical or abstract system”. Simulation even extends beyond this definition to include things that are not real, or that have not yet been created. “Simulation is used in many contexts, including the modeling of natural systems or human systems in order to gain insight into their functioning. Other contexts include simulation of technology for performance optimization, safety engineering, testing, training and education. Simulation can be used to show the eventual real effects of alternative conditions and courses of action” (Wikipedia, 2008, para. 4). One place where simulation is
finding an increasing popularity is in all forms of instruction or education. The ability to create, test or demonstrate intangible ideas, dangerous experiments, or visualize that does not yet exist is making a strong impact in the educational arena.

A simulation can be created of almost anything. The simulation being detailed here involves a physical security assessment. The development of this project added the dimension of working with a subject matter expert who was not involved with the actual simulation; but, rather, would be analyzing and utilizing the results. This simulation project allowed the students in the class to work in teams to accomplish a common goal. This team approach, along with the interpersonal communication (listening) skills necessary to complete the task, could further enhance the student’s ability to engage in, and successfully complete this type of problem once in the workforce. “In a world in which technology is changing rapidly, workers need to be able to think creatively and solve problems so that the United States can stay economically competitive. A primary objective of today’s teachers is to prepare students for the world of tomorrow” (Gokhale, 1996, p. 36).

**Graphics for Simulation Course at Eastern Michigan**

The new Simulation, Animation, and Gaming (SAG) program at Eastern Michigan University is unique in its approach to topic of simulation because of the visualization component. The graphics for simulation course in the new SAG program is a two-part sequence. The first course, Graphics for Simulation I, is an introduction to the development of graphics for simulation. Students develop skills involved in the principle of realistic graphics from a variety of views. The main focus is on the comprehension and creation of accurate 2-dimensional graphics for use and development of 3-dimensional models. In the second course, Graphics for Simulation II, students continue their application of graphics for construction and refinement of 3-dimensional models to develop a variety of high quality 3-dimensional objects. Students develop a number of computer simulation applications using 3-dimensional graphic and beginning multimedia software. According to Menn (1993) “we remember only 10% of what we read; 20%, if we hear it; 30%, if we can see visuals related to what we’re hearing; 50%, if we watch someone do something while explaining it, but almost 90%, if we do the job ourselves—if only as a simulation” (p. 53).

**Simulation Project – Physical Security**

In the second course, the students worked as a team, developing a simulation final project based on verbal directions from a subject matter expert. The students created a simulation of *How to Conduct a Physical Security Assessment of a Computer Room* under the guidance of a professor in Information Security/Assurance. She guided the students throughout the room regarding the security assessment that had to done, which included the following topics:

- Defining the perimeter of the room
- Identifying all entry points and type of entry controls
- Noting the location and use of security equipment
- Assessing the variety of computer assets arranged in the room

Throughout the subject matter expert’s presentation, the students took meticulous notes and created detailed sketches of the precise objects she pointed out in her assessment. Their documentation served as the working details of what had to be done to complete the simulation project. First, they needed to define the perimeter of the room by measuring and drawing it to specifications. A partial room layout is shown below in Figure 1.

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**Figure 1. Computer Room Layout**

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In addition to defining the perimeter and creating a layout of the room, the students identified and labeled the specific components the subject matter expert pointed out: the door entries, the security camera and the inventory within the room. The team leader then distributed the other drawings among the team members. Forty-one individual 3D part drawings were constructed using a 3D computer aided design (CAD) software package. Each individual piece became an element of a completed 3D model. To make the simulation models of each object in the room the students exported the individual pieces from the CAD software and imported them into the multimedia software package. Within the multimedia software the individual pieces were grouped together to make the concluding 3D model. The students also made the 3D models appear realistic for the simulation project. Shown below in Figure 2, is the actual photograph of the security camera located in the room. Figure 3, is the security camera the students created for the final project. This is just one example from the many models they created.

**Simulation Project – Multiple Intelligences**

The underlying design methodology for the *How to Conduct a Physical Security Assessment of a Computer Room* simulation is model-centered instruction. This project is suited for teaching to different learning styles because of the process, procedures and order of actions necessary to determine the tasks to be performed and the skills required to perform these tasks.

Gokhale (1996) concluded from Pogrow’s 1994 article ‘Helping Students Who ‘Just Don’t Understand’ “that if students are to be competitive in the years to come, faculty need to be able to provide their students with cognitive strategies that will enable them to think critically, make decisions, and solve problems” (p. 36). “Technology that helps students view images in three dimensions (3-D) can support a broad range of learning styles” (Anthamatten and Siegler, 2006, p. 1). The graphics course provided a classroom environment which allowed for the application of the following learning styles from Howard Gardner’s original seven distinct intelligences. Included is a minor description of how the project activity was applied to each of the learning styles.

**Visual-Spatial.** The students with this style are aware of their environment and they are taught through drawings, images and visualizing. They better utilize the tools of 3D modeling and multimedia. The team leader assigned modeling tasks to each of the team members and followed-up on the completion of the assignment. Team members interacted with one another to insure that their assigned objects integrated into other components to achieve accuracy throughout the entire computer room.

**Bodily-Kinesthetic** learners are taught through hands-on learning using equipment. They determined how to identify and define all aspects of the classroom along with identifying all components of the assessment. Finally, they measured all parts of each object and assembled the parts correctly in order to represent the 3D model.

**Interpersonal.** The students listened to a “subject matter expert” to gain information necessary to complete the project. They learned to assess and prioritize key physical security components in a learning environment. They also listened to the team leader and other team members while working toward a common goal. In addition, this project heightened their awareness of physical security issues.

**Intrapersonal.** These students know their own strengths and weaknesses. They like to work alone at their own pace. In this project, each student had the opportunity to work alone on several room fixtures they were assigned to complete the room’s assets.

**Verbal-Linguistic.** The students transformed a verbal assessment into 2 and 3-dimensional visual models through note taking of the presentation and asking questions of the expert.

**Logical-Mathematical.** This type of learner wants to form concepts before dealing with detail. In this project, the students not only were required to identify the problems associated with the project; as a team, they had to break the project into manageable steps so as to address the problem.

**Conclusion**

The educational benefit of using this type of simulation is multi-faceted. Students who are visual learners are allowed to ‘see’ a process, rather than only hear about
how it is done or how it works. According to Hubal, Helms, & Triplett (1997) “procedural knowledge is best gained … by doing” (p. 1). “The use of simulations for learning emerged from the need to provide hands-on practice. Besides, simulations promote higher-order thinking skills, such as decision-making, analytical reasoning and problem-solving” (Waller, 2007, p. 36). Simulation provides visual stimulation and feedback of the actual object. Other benefits of this type of program are teamwork and devoted listening skills that must occur in order for the students to create the finished simulation. Simulation is very likely to be the next big wave in both education and in the working world. “The goal of multimedia education is to provide a stimulating, tailored, non-judgmental environment in which children can explore their creativity and develop individual learning strategies” (Menn, 1993, p. 52). In addition, a workforce is needed that not only understands simulations, but can also work through the process of creating them.

References


