Digital Learning Tools: Experiencing Information through Multiple Senses in the Context of a Middle School

Senior Project Description
Stacie Rohrbach, Assistant Professor
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Project Description

Scientific and mathematic information, such as formulas, equations, statistics, and quantitative data is presented frequently to learners as dense bodies of text and numbers. The connectedness of information is often unrecognizable, which encourages learners to memorize details and remember them for only a short period of time. For example, have you ever memorized information for a test without understanding how each component related to one another or why you needed to learn it in the first place? As part of this senior project, we will study the emphasis of patterns (repetitions and similarities) inherent and often hidden in traditional representations of scientific and mathematic information as a means of explaining the connectedness and importance of information. Through interaction with patterns, learners will be encouraged to qualitatively compare, critically analyze, and evaluate information. We will explore the characteristics of digital media — specifically the layering of visuals, sound, and motion — as tools for representing information patterns in a manner that engages learners in enjoyable and effective learning experiences. Working in small groups, our goal is to create digital learning tools that enable learners to use multiple senses to understand information. They will experience information through interaction and exploration. During this process, we will discuss how our findings may be applied to other areas of design and education.

Background

The teaching of math and science concepts becomes increasingly abstract as students move through middle school. Therefore, we will observe course content, teaching methods, and tools used to teach math and science concepts at Falk, a local laboratory school. Falk utilizes both conventional and unconventional modes of teachings, recognizing that not all students prefer to learn the same way. This school will provide insight into the needs and desires of students. We will also examine existing educational tools such as videos, conduct readings, and participate in discussions with experts in education and cognitive science as part of our research.

Interest/Value of Project

The combination of visuals, sound, and motion enhances the communication of content by engaging students in experiences that enable them to use multiple senses to discover the meaning of information. This becomes increasing difficult to achieve on paper when a large amount of information needs to be conveyed. Print often forces a mass of complex information to be presented at one time. As a result, students are commonly inundated with detailed data which requires careful concentration for them to grasp. The same is true for the majority of educational computer programs being produced for middle school students. They are largely text-based, using imagery, sound, and motion as an entertainment layer as opposed to a vehicle for delivering content. We will discuss and compare current print and digital learning tools, asking the question, 'Can learning be both fun and informative without overwhelming students?' Some students perceive and process information adequately by reading books and doing equations. However, many do not. To respond to natural modes of learning, which engages multiple senses, there is an increasing need for research that explores the educational value of representing information by utilizing interactive digital media. And although our investigation may apply to non-digital learning tools, computers provide a great place to start.

Objectives

To assess current learning tools and determine where opportunities for improvement lie.
To gain an understanding of learner needs and expectations.
To utilize research findings in the design of digital learning tools.
To explore the use of linear and non-linear information structures as a means of communication.
To use visuals, sound, and motion as a means of engaging learners in concrete experiences while also encouraging critical thinking.
To work effectively within a group of students.
To receive constructive criticism and revise designs accordingly.

Design Artifacts

Analysis boards, communicating the key points of research conducted (current tools, methods, content, etc.)
A set of scenarios, describing the use and benefit of the proposed interactive, digital learning tools
A set of interactive, digital learning tools (one per group) in prototype form (not fully functional)
A process book (one per group), documenting the work conducted throughout the semester