Chapter 1
Cognitive Learning with Electronic Media and Social Networking

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ABSTRACT

This chapter explores the existing and potential possibilities of exchanging information through the means that exceed those relating only to a text. Discussion entails knowledge visualization and the verbal and nonverbal ways of communication in the physical and online settings. After giving some consideration to the ways we communicate, cognitive activities are discussed by examining notions of cognitive thinking, cognitive science, and cognitive learning. Then follow some remarks on cognitive learning with knowledge visualization, whether occurring in a classroom and online with the use of computer technology, carried out through the social networking, or conducted with the use of educational games. Descriptions of the visual/verbal approach to learning with communication media and a discussion about criticism and assessment with respect to digital art and graphics conclude the chapter.

INTRODUCTION

The purpose of this chapter is to discuss several areas of interest in the spirit of the STEAM movement (science, technology, engineering, arts, and mathematics) and examine how to apply knowledge visualization to support teaching and cognitive learning of particular fields of knowledge. Themes discussed include cognitive thinking and learning in a classroom and online, exploration of several science areas, social networking, educational games, and digital art,

and then analysis of what have been done and what can be done toward developing interactive, integrative learning environments. This chapter also examines how the skills of computing and programming can be applied to make them helpful in teaching and cognitive learning with the use of electronic media and social networking. Description follows, of the author's approaches to visual learning with the use of integration of art and science: (1) visual presentation of scientific concepts; (2) creating art by finding inspiration in a science-based topic; and (3) learning visually for

other courses taken concurrently by arranging data into a structured whole. Several learning projects have been developed for this purposes – some in collaboration with scientists. A short account on research studies conducted by the author on the themes under narrative concludes the chapter.

The words 'cognitive' and 'learning' might to some people seem synonymous. However we consider the rote learning to be less cognitive than for example, drawing a chart for the electric circuit distribution in a new house. More and more, the ability of abstract thinking is expected from any prospective employee. Cognitive skills such as abstract thinking ability might not be needed for successfully answering some questions in a multiple-choice test, yet they might be crucial for writing a code for an interactive novel or setting up a project based on an open-source Arduino platform.

Programming has been considered a difficult skill and many may choose not to do it. On the other hand, a product of programming with a rich visual component may become an artwork. With visualization techniques computers transform data into information, and visualization converts information into a picture form. Because of this, scientists and teachers explore ways of applying a visual language to present information with images, symbols, signs, metaphors, and allegories. The idea of going beyond the verbal implies seeking for the progressive, proactive, and inclusive ways of thinking about achieving knowledge, creating art, or providing amusement and enjoyment. Mastering computing solutions for knowledge visualization may open new venues for an ambitious or creative person working in areas such as art, design, communication, networking, writing, as well as business or computer science.

We may see computing as a common trait that defines our frame of reference both in the online social networking and the electronic media. Many emphasize impact of computing technologies using bio- and evolutionary computing, applications, robots, smart and intelligent apps, bots,

ubiquitous devices, tools for mobile apps, and smart phones that provide networked, interactive communication. The interactive or virtual encounters may refer to various configurations and appearances, involving visuals, the use of light, sound (such as music and voice including songs) , haptic experiences, touch, and gesture. Particular solutions may be also attained with the use of avatars, telecasting, TV, groupware implementations, social networking, YouTube, and any other ways of social activities such as blogosphere or wiki applications. Media employed online may include and often combine video strips, immersive virtual reality, the Web, wireless technologies, performances, art installations, and interactive presentations. The meaning of the new media art has shifted to broader understanding of the concepts beyond artistic creation. We often refer as an artwork the works aimed at entertaining, educating, or otherwise involving the audience.

Further sub-chapters comprise discussion about the ways to communicate and the notions of the cognitive thinking, cognitive science, and cognitive learning. Communication in historical perspective, enhancement of cognitive thinking coming from the sensory input and sensory perception supported by new technologies is discussed first, and then follows description of notions related to cognitive activities such as cognitive thinking, cognitive science, cognitive learning, and field independent or field dependent cognitive styles of learning. The next sub-chapter contains discussion of cognitive learning with knowledge visualization, performed with the use of computer technologies and social networking, both in a classroom and in online setting, with attention given to games for learning, visual/verbal approach to learning with communication media, and portraying in visual and verbal ways with computational tools and digital media. The chapter ends with examples of the author's research and learning projects, followed by a discussion of criticism and assessment with respect to digital art and graphics, and the assessment of time-based works.

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