Visual Complexity Online and Its Impact on Children’s Aesthetic Preferences and Learning Motivation

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ABSTRACT

In the past, when most computers were workplace tools, researchers in the field of HCI predominately focused on practical aspects of computing, such as usability and efficiency. Now, with more and more computer technologies entering the home and other areas of life, such as schooling and informal education, an increasing number of researchers are exploring subjective issues related to computing. This research explored the relationship between visual complexity, aesthetics and learning motivation with respect to children’s learning websites. It took the form of an experiment involving children aged 10 to 11 years-old viewing homepages designed for them. In the experiment, the children were divided into three groups. One group was shown homepages of a low level of visual complexity, another group was shown homepages of a medium level of visual complexity and another group was shown homepages of a high level of visual complexity. At the end of the experiment, the children were asked questions about the homepages; the questions were on the topics of aesthetics and motivation. In addition to exploring the relationship between visual complexity, aesthetics and learning motivation, the research tested Berylene’s theory of preference: a theory that purports that people prefer medium level stimuli to high or low-level stimuli. The results of the experiment showed that children preferred aesthetics of a medium level of visual complexity, Berlyne’s theory was thus supported. The results also revealed that aesthetic preference and learning motivation were correlated. These findings have implications for designers of children’s learning websites as they suggest that by manipulating visual complexity, a user’s viewing pleasure can be enhanced or depreciated.

KEYWORDS

Aesthetic Preference, Children, Learning Motivation, Learning Website, Visual Complexity

1. INTRODUCTION

As the Internet becomes more sophisticated, people are increasingly turning to it as a resource for learning. Indeed, many educational organizations now host websites. However, for these websites to be valuable, they need to be usable and appealing, in addition to being informative. Yet, while much research has been conducted into the operational aspects of cyberspace, such as web security (Dadkhah, Seno & Borchardt, 2017) and how virtual worlds can be integrated into learning websites (Griol and Callejas, 2017; Guzzetti and Stokrocki, 2013), less research has been conducted into subjective aspects. One subjective aspect that has receive some attention is visual appearance. Research in this area includes investigations into first impressions (Iten, Troendle & Opwis, 2018; Jiang, Wang, Tan

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& Yu, 2016); how online aesthetics affects people’s perceptions of product offerings (Wang, Minor and Wei, 2011); and the importance of aesthetics with respect to mode of use (Schaik & Ling, 2009). Although more research is needed in this area, a growing body of work suggests that aesthetics plays an important role in engendering user appeal online (Lopatovska, 2015; Chang, Chih, Liou and Hwang, 2014).

One factor that is well documented as having an impact on website aesthetics is visual complexity (Pandir & Knight, 2006; Michailidou, Harper, & Bechhofer, 2008). However, it should be noted that this finding is almost exclusively based on studies with adults. Indeed, few studies have involved children and little is known of the impact visual complexity has on children’s preferences towards learning websites created for them.

Another point that requires clarification is whether a correlation exists between a child’s aesthetic preference for a learning website and his/her learning motivation. Although learning motivation has been studied by numerous researchers, investigations have predominately looked at its relationship to non-aesthetic issues such as interest (e.g. Bergin, 1999; Pintrich, 2003), self-efficacy (e.g. Hidi & Renninger, 2006; Gaffney, 2011), and self-determination (e.g., Deci & Ryan, 1985; Deci, Koestner, & Ryan, 1999). Few studies have investigated website aesthetics with respect to children’s learning motivation.

To address the gap in the literature, this study investigates visual complexity, aesthetic preference and learning motivation in the context of learning websites for children.

### 1.1. Berlyne’s Theory and Visual Complexity

Berlyne was a twentieth century psychologist who made extensive experimental and theoretical contributions in the area of aesthetic preference and arousal. He argued that aesthetic preference was determined by “collative variables” (Berlyne, 1971, p. 141), one of which was complexity. He also asserted that people generally prefer a moderate level of stimulus intensity to a low or high level of stimulus intensity. Berlyne visually described this relationship with a Wundt curve (see Figure 1).

A number of researchers have tested Berlyne’s theory with respect to visual complexity. The results of these investigations have been mixed. In an experiment that looked at children’s aesthetic preferences towards websites, Wang and Bowerman (2012) found that children preferred aesthetics of a medium level of visual complexity to aesthetics of a high or low level of visual complexity. As such, their findings supported Berlyne’s theory. Similarly, in an experiment that involved the visual complexity of homepages, Geissler, Zinkhan, and Watson (2006) found that participants preferred homepages with a medium level of visual complexity to homepages with other levels of complexity; hence, Berlyne’s theory was supported. Furthermore, Sun, Yamasaki and Aizawa (2015), in an experiment that explored computational methods using visual complexity to predict human aesthetic appreciation of photographs, found that participants preference for photographs increased with visual complexity. The researchers argued that their findings supported the ascending part of Berlyne’s Wundt curve and stated that evidence for the descending part of the Wundt curve may have been found if they had included photographs of a higher level of visual complexity in their experiment. Other experiments that have supported Berlyne’s theory with respect to visual complexity include Chassy, Lindell, Jones and Paramei (2015), Mai, Hoffmann, Schwarz, Niemand and Seidel (2014) and Wang and Lin (in press).

However, a number of experiments have returned results that do not follow Berlyne’s theory. In a study that investigated participants’ preferences for homepages, Pandir and Knight (2006) found no support for the Berlyne’s Wundt curve. Although the researchers found that homepages with a high level of complexity were disliked while homepages with a medium level of complexity were most liked, they also found that homepages with a low level of complexity were liked. In another experiment involving homepages, Sohn (2016) obtained results that contradicted Berlyne’s theory. Sohn explored perceived visual complexity with respect to mobile interfaces and found that medium and high levels of visual complexity were disliked. Sohn concluded that these levels of visual complexity were...
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