Interface Design, Emotions, and Multimedia Learning for TVET

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Abstract

According to social psychology, "what is attractive is good" means that physically attractive person is perceived to be more favorable and capable. In TVET for industrial design, the interface is one of the three elements that influence users' experience with a product. For multimedia learning, does the interface design affect users' experience with learning environments? Does attractive interface enhance multimedia learning for TVET? Research in multimedia learning has been neglecting this issue. In this article, the author proposed that attractive interface design does indeed promote multimedia learning. This hypothesis is based on the review of the following theories and related empirical studies: (i) an interface impacts a user's experience; (ii) beautiful interface includes positive emotions; (iii) positive emotions broaden cognitive resources; and (iv) expanded cognitive resources promote learning. The model of emotional design in multimedia learning for TVET is proposed to highlight how emotions regulate multimedia learning. Suggestions regarding designing attractive interfaces are provided.

Keywords: Interface design, Emotions, Multimedia learning, Interface design, Positive emotions.

1. INTRODUCTION

Interface design refers to designing the interaction between a human and a machine (Raskin, 2000). The interface design induces certain emotions from users while they interact with the design. In other words, interface design is the visible surface that users experience while interacting with a design, while emotions are underlying, invisible media between the users and the design. Research on emotions indicates that emotions play as important a role as cognition dose in learning. It is widely agreed that positive emotions enhance cognitive activities, although the cognitive activities do not necessarily entail learning or multimedia learning.

Multimedia learning refers to learning from multimedia design, which is the presentation of materials both in words and pictures. Multimedia design has been widely used in educational settings. Research on multimedia learning has been looking at how to design effective and efficient multimedia environments. For example, in multimedia learning, thus far the most comprehensive research on multimedia learning, Mayer (2001) summarizes seven multimedia learning principles, that is, spatial contiguity principle, multimedia principle, temporal contiguity principle, coherence principle, modality principle, redundancy principle, and individual difference principle. All of these principles are about the design of text, audio, and video, each of which is assumed to be a multimedia design element that determines the results of multimedia learning. Unfortunately, the assumption is only partially true when the design is always for one group of learners. In reality, the idea of "one size fits all" probably never works. It is critical to consider the roles of both multimedia designers and learners when talking about the quality of multimedia leaning. Multimedia designers determine interface design in addition to texts, audio, and video.

Therefore, when talking about the quality of multimedia learning, it should must address the issue of how the interface design affects multimedia learning and should consider the emotions induced from

experiencing the multimedia design. The aim of the article is to identify interface design and emotions as influences in multimedia design that is not subsumed in TVET by the influences on efficiency and effectiveness that have traditionally been researched by multimedia learning theories. The following section of the article explains the theoretical framework of how interface design affects users' experiences as well as their emotional states, especially how positive emotions influence cognition, and how changes in cognition regulate multimedia learning. Based on the theoretical framework, the emotional design model in multimedia learning is proposed, which is the main focus of the article. Since positive emotions facilitate cognitive activities, as suggested by the theoretical framework, design features that intend to induce positive emotions are discussed. Future trends in research of emotional design in multimedia learning are also discussed.

2. BACKGROUND

It should be asked, do positive emotions promote multimedia learning? Mayer's cognitive theory of multimedia learning explains the general process of multimedia learning. One of Mayer's assumptions is that the working memory has a limited capacity, but he does not consider the possibility that positive emotions broaden cognitive resources. Does it mean that positive emotions promote multimedia learning by expanding the working memory capacity? The discussion is illustrated in Figure 1 by connecting the four theories, which are combined to form the conceptual framework for the article. The details of each theory and the connections between these theories are explained in the following section.
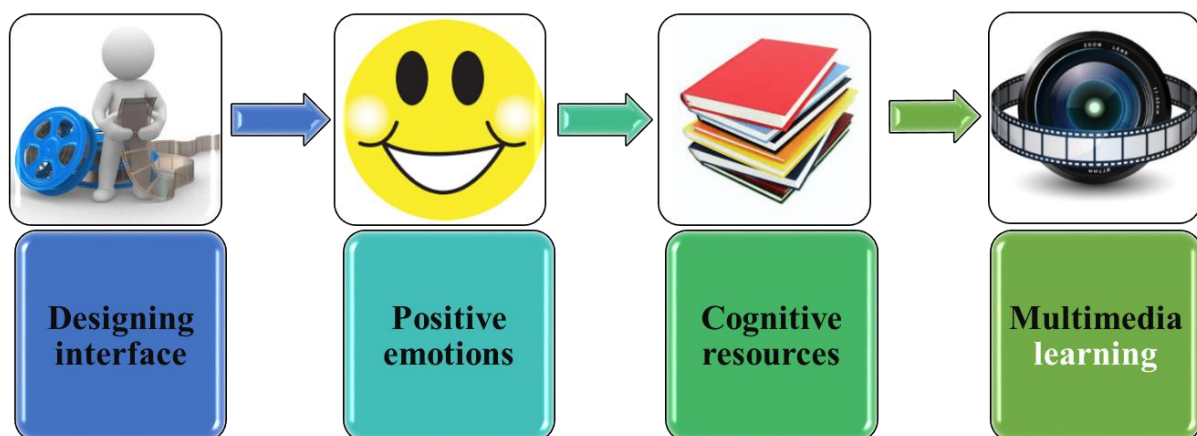

Figure 1. The conceptual framework

Interface design is the first thing users experience wen interacting with a multimedia design. Emotions are induced before initiation of cognitive activities to process in users' brains. In other words, interacting with the interface design induces emotions and also activates cognitive activities from users. Emotional change is a rapid activity, preceding the cognitive activities. Norman's (2004) theory of emotional design proposes a theoretical framework to explain how to interact with an interface design affects users' emotions, and also suggests that attractive designers induce positive emotions from users. Fredrickson's (1998) positive emotion theory elucidates how positive emotions facilitate cognitive activities. The goal for multimedia learning research is to make the learning effective and efficient.

3. HOW DOES THE INTERFACE DESIGN AFFECT USERS' EXPERIENCE?

According to Norman, a product presents three aspect to its users: its attractiveness, its usability, and reflective images. The three features induce different emotions from users. Attractiveness is a result of the visceral level activity in the brain. Visceral activity is a 'rapid, reactive response to appearance', and induces taste-based emotions from users (e.g., attractiveness or unattractiveness). Norman suggests that the visceral design be developed to match the visceral activity in the brain. Visceral design is the design of a product's appearance and feel. Usability is determined by the brain level that processes everyday behaviors. Usability induces goal-based emotions (e.g., satisfaction, distress, optimistic expectation, worry, relief, frustration, and disappointment).

Behavioural design concerns how easy the design is to use. Experimental studies (Kurosu & Kashimura, 1995; Tractinsky, 1997; Tractinsky, Katz, & Ikar, 2000) indicate that interface aesthetics could really be important and positively impact the perceived usability of a design. The reflective image is the result of reflective activity in the brain. Reflectivity induces standard-based emotions such as admiration, gratitude, pride, anger, and resentment. Ortony's (2003) theory is similar to Norman's in the sense that both are based on a framework that explains users' interaction with design. The key difference is that Ortony puts more emphasis on the factors that induce users' emotions while interacting with a product. He points out that the designers' motivation in designing a product also determines users' emotions in addition to the users' approach. He categorizes designers' motivation as indifference, prevention, and promotion. When designers are indifferent, it is possible that no emotions will be induced from users, except perhaps by accident; Ortony does not include emotions induced by accident in his theory. When designers aim for prevention, the product will probably not induce emotions from users, as these are the result of design. It is when designers aim for promotion that the product is most likely to induce emotions from users, in this case by design.

In summary, both Norman (2004) and Ortony (2003) suggest that the interface design induces emotions from users. Experimental studies are available to support the argument (Klein, Moon, & Picard, 2002; Kurosu et al., 1995; Lester etal., 1997; Tractinsky, 1997; Tractinsky, Katz & Ikar, 2000). For example, Desmet (2002) defines 41 design-related emotions and the factors that elicit these emotions. Attractiveness, one of the design-related emotions, is induced by one specific feature of the interface or by the overall appearance. The underlying assumption is that attractive interface induces positive emotions, which is consolidated in his later research.

4. WHAT IS ATTRACTIVE IS GOOD?

The dual-processing theory for visual images, the research on visual design and the implicit personality theory, collectively indicate that attractive interface design induces positive emotions in users, which is supported by experimental studies. For example, Schenkman and Jonsson (2000). Discover that people prefer aesthetically pleasing Web sites, which induce positive emotions from users. Yamamoto and Lambert (1994) investigate how a product's aesthetics impacts users' evaluation of industrial products and find that product appearance has a moderate impact on customers' preference. Jordan's (1998) study indicates that the aesthetically pleasing products induce positive emotions; participants will use more aesthetic ally pleasing products than those unattractive products. Lavie and Tractinsky (2004) suggest that "the visual aesthetics of computer interfaces is a strong determinant of users' satisfaction and pleasure". Van der Heijden's (2003) study concludes that the perceived visual attractiveness of the interface positively impacts users' attitudes and intention toward a design, which positively impacts actual usage. Demirbilek and Sener (2001) review literature on product design elements (i.e., fun, cuteness, familiarity, metonymy, and color) induce positive emotions from users. These findings are confirmed in a later experimental study by Demirbilek and Sener (2003). Attractiveness in daily language corresponds to aesthetics in philosophy, so a design that represents fun, cuteness, and includes color may be considered aesthetic if the user likes it. Since

experiencing a multimedia design induces certain emotion from users, does attractive interface design induce positive emotions from users as suggested by Norman's (2004) theory?

Positive emotions

The happier individuals process information more globally than do those in negative moods. Smith and Lazarus (1993) propose a cognitive-motivational relation theory, which claims that emotions are preceded by appraisal triggered by specific environments and related to an individual's experience. Positive emotions are not simply the opposite of negative emotions (e.g., that happiness and sadness are controlled by independent neural pathways) (George et al., 1995). A growing body of empirical evidence shows that positive and negative emotions have qualitatively different information— processing models (Gray, 2001; Isen, 1999; Kuhl, 1983, 2000). Therefore, positive emotions and negative emotions play different roles in cognitive processes, with positive emotions playing a particularly important role (Diener & Larsen, 1993; Myers & Diener, 1995).

A large amount of research has shown convincingly that positive emotions systematically influence performance on many cognitive tasks, which supports Fredrickson's (1998) statement that positive emotions promote cognitive activities. For example, positive emotions improve creative problem solving which is significant for TVET (Estrada, Isen, & Young, 1994; Greene & Noice, 1998, Isen, Daubman, & Nowicki, 1987), enhance recall of study material (Isen, Shalker, Clark, & Karp, 1978; Lee & Sternthal, 1999), and systematically change strategies used in decision-making tasks (Carnevale & Isen, 1986; Estrada, Isen, & Young, 1997). Bolt, Cogschke, and Kuhl's (2003) study indicates that positive emotions improve participants' judgments. Fredrickson and Branigan's (2005) study validates the broaden-and-build theory that positive emotions broaden the scope of attention and thought-action repertoires, whereas negative emotions narrowed thought-action repertoires. Attractive design induces positive emotions from users, but how are positive emotions define? And how do positive emotions impact cognition? Positive emotions are a category of emotions, sharing features identified by the following theories on emotions: emotions refer to mental states (Cornelius, 1996). The cognitive perspective of emotions focuses on the role that thought plays in the process of emotions (Arnold, 1960; Oatley, 1992).

In summary, positive emotions generally promote cognitive activities, and interacting with attractive interface design induces positive emotions from users. How do in particular positive emotions promote learning from multimedia? Before answering the questions, let us first review Mayer's (2001) cognitive theory of multimedia learning, which explain how multimedia learning happens.

Mayer's cognitive theory of multimedia learning

According to Miller (1956) the active-processing assumption proposed how the human brain process information, that is, selecting information, organizing the incoming information, and integrating the information with other knowledge stored in the long-term memory. Based on the three assumptions, the cognitive theory of multimedia learning proposes that multimedia information is presented in two formats, words, and pictures. Verbal information enters working memory through the ears, while visual information enters working memory through the eyes. In working memory, verbal information interacts with visual information, and the information is organized into either verbal models or pictorial models. The verbal models and the pictorial models are integrate with individual's prior knowledge of the specific topic. In long-term memory, the integrated information from verbal model, pictorial model, and prior knowledge is formed as schemata and stored in long-term memory.

Three assumptions are employed for the Mayer's (2001) theory that are, the dual-channel assumption, the limited capacity assumption, and the active-processing assumption. The dual-channel assumption states that the sensory modes for information input include two channels: ears processing verbal information and eyes for pictorial information. The limited-capacity assumption is closely related to the model of working memory by Baddeley (1986, 1992, 1999) and the cognitive load theory by

Chandler and Sweller (1991, Sweller, 1999). The limited-capacity assumption states that the amount of information processed by each channel at one time is limited.

According to Mayer (2001), the capacity of the working memory and the capacity of both auditory and visual channels are limited. Fredrickson (1998) explains that positive emotions broaden the cognitive resources. However, she does not explain whether cognitive resources are related to the capacity of working memory. Further research is needed to verify whether positive emotions expand working memory capacities and whether positive emotions promote multimedia learning like that positive emotions do with other cognitive activities. One possible interpretation is that positive emotions increases the cognitive capacity and the working memory, which results in improved learning. The second possible interpretation is that the increased cognitive resources increase the amount of information processed in the working memory, which finally promotes learning. In summary, the four theoretical perspectives indicate that an attractive interface should promote multimedia learning.

5. MODEL OF EMOTIONAL DESIGN IN MULTIMEDIA LEARNING

As discussed previously, Mayer's cognitive theory of multimedia learning explains how multimedia learning occurs through both verbal and audio channels, in working memory and in long-term memory. However, the amount of information processed by each channel at one time is limited. The capacity of working memory is also limited. Do positive emotions affect the capacity of the tow information-processing channels and the capacity of the working memory? Further research is needed to answer the question.

The four theories presented previously provide insight into the cognitive mechanisms underlying how attractive design affects multimedia learning through positive emotions. Based on the preceding discussion, the author of the article introduce the model of emotional design in multimedia learning, a framework for integrating emotions into a multimedia learning environment. Later the implications of the model for multimedia design are discussed.
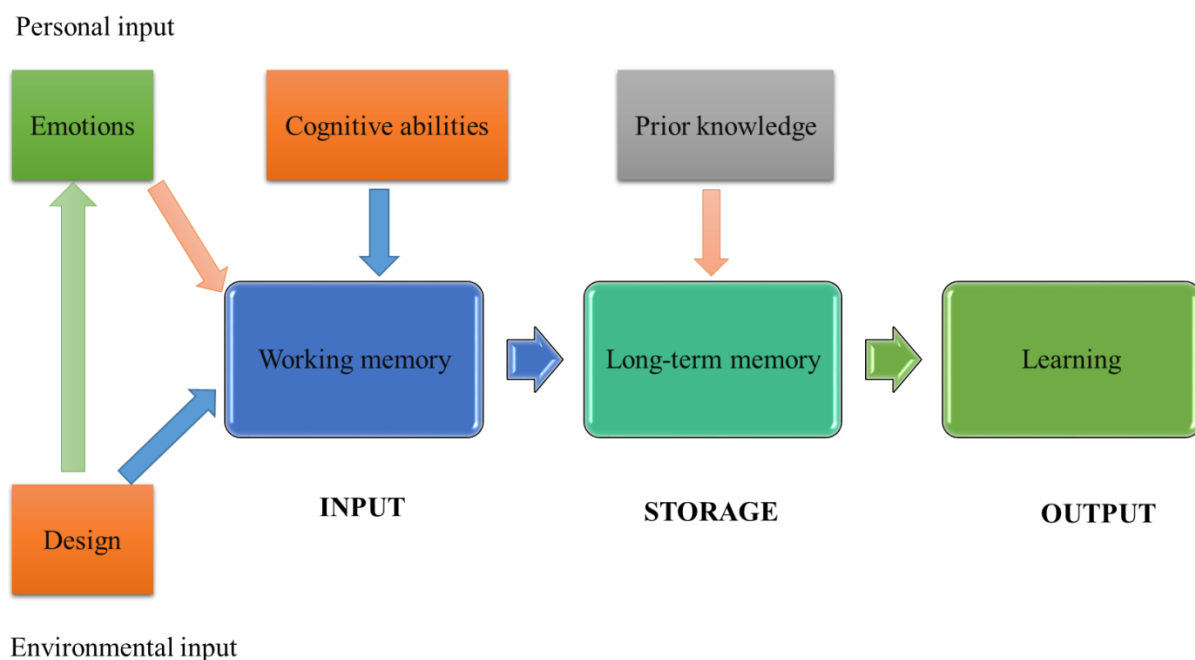

Figure 2. Emotions design in multimedia learning

The model of emotional design in multimedia learning is intended to highlight the impact of emotions on multimedia learning (see Figure 2). The model is built on three previous theories (i.e., the information-processing theory in cognitive psychology (Miller, 1956), the cognitive theory of emotions (Arnold, 1960), and the cognitive theory of multimedia learning (Mayer, 2001)).The information-processing theory proposes that the structure of human cognition includes both information input and output systems. Information input includes learners' input and environmental input. The environmental input refers to the multimedia design (Norman, 2004). Personal input includes the emotions that are induced from multimedia design, individual/cognitive abilities, and prior knowledge. Arnold claims that the sequence of emotional processes is as follows: perception ->appraisal -> emotions. Appraisal refers to the process of judging how important an event is to a person. Emotions are induced when one person encounters an event and judges how important the event is to him or her, but if aesthetic enough, need not be important. In multimedia learning situations, emotions are induced when users interact with a multimedia design.

6. SUGGESTIONS

A review of research on aesthetics and graphic design indicates the design elements related to multimedia aesthetic, including color, graphics, text, audio, and video (see Figure 3). There clearly exist individual and cultural differences regarding perceived attractiveness. However, common psychological mechanisms shared by all human beings underlie aesthetics that can be incorporated into multimedia interfaces.

Color: Colors in graphics serve informational, compositional, and expressive functions, which black-and-white designs do not possess (Zetll, 2005). Color energy refers to users' aesthetic responses to a color. The color is very important for TVET to get the real idea on the objects which is going to teaching and learning. The energy of a color is determined by "(i) the hue, saturation, and brightness of a color; (ii) the size of the colored area; and (iii) the relative contrast between foreground and background colors" (Zetll, 2005). Saturation influences color energy most. High saturation means high energy, and vice versa. High-energy warm colors generally induce a happier mood on users than do low-energy cool colors. High brightness colors have higher energy than low brightness colors. The color combination of small areas of high-energy colors against large background areas of low-energy colors is perceived as pleasant. The most pleasant background hues are blue, blue-green, green, red-purple, purple, and purple-blue (Valdez & Mehrebian,1994).
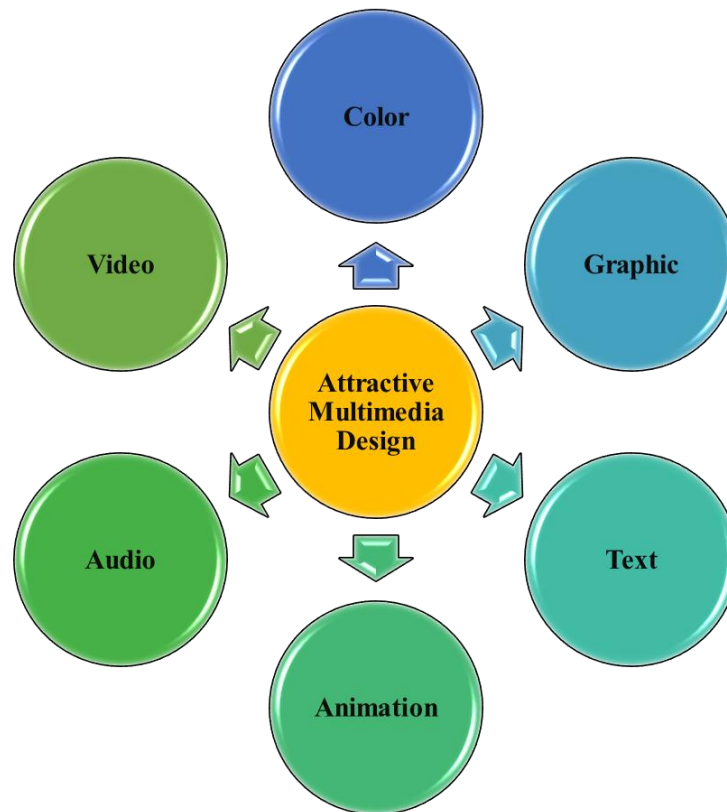
Figure 3. Aesthetics multimedia interfaces

Graphic: Gestalt theory claims that different elements, when combined as a whole, reveal more information than elements viewed in isolation (Wertheimer, 1923). The practical implication of the Gestalt theory for graphic design is emphasis on relationships between different well-designed elements. The purpose of the design is to reflect abstract scientific concepts and relationships thereby helping users to create accurate mental models of them. The ratio between an element and its context should reflect the actual ratio so that the graphics portray relationships precisely. For example, the Earth and Sun's relative sizes and separating distances should be accurately reflected in illustrated objects and their parts (Holliday, 2001). The details revealed by a graphic affects users' interpretations of the graphic. Too much information distracts users from essential information because their eyes might not know where to go. In a pace-controlled learning environment, graphics with relatively small amounts of information (e.g., simple line drawings) tend to be more effective (Dwyer, 1972). Most computer displays follow a 3:4 aspect ratio so the screen area of a design should also follow an approximate 3:4 ration.

Text: Borchardt (1999) creates a vision scheme for the design of text. The scheme includes size, locale, proportionality, color, and contrast of texts. He points out that fonts should be legible and in proportion to the graphics. Zettl (2005) emphasizes the importance of continuity, which means that the text should maintain its colors and size throughout the instruction. Contrast between the colors of texts and their background should remain the same as the contrast between the graphics and background.

Animation: It is very much needed for teaching technical subject matters. According to Holliday (2001), it is necessary to "highlight, reintegrate, reinforce, and rehearse" some parts of the graphic design to effectively explain a scientific phenomenon of TVET. For example, slow motion is used to highlight certain parts of an animation. To achieve slow motion, frame density is increased, that is, the motion is divided into more frames during the actual filming. In animation design, slow motion animation also runs through more frames per second than normal.

Audio: According to Borchardt (1999), factors that influence the quality of sounds include volume, pitch, timbre, attack and decay, rhythm, duration, velocity, acceleration, iteration, periodicity, familiarity, and predictability. Borchardt integrates these factors and creates an audio. He puts each of the factors on a spectrum. The left-hand side of the spectrum indicates low and the right-hand side for high. In general, when these factors are in the middle of a spectrum, the audio is most pleasant.

Video: Zettl (2005) proposes that sound aesthetics are determined by perspective, continuity, and picture-sound combination. Perspective means to math louder sounds with close-up pictures and far-away sounds with long shots. Sound continuity means that the sound retains its volume and quality. Another factor is picture-sound combination. Multimedia learning is more effective when corresponding audio and video information is presented simultaneously (Mayer, 2001).

7. FUTURE TRENDS

Research on emotions, including the benefits of positive emotions, has also been conducted for more than one century. However, the mechanism underlying how positive emotions stimulate cognition is not yet clear. This explains the lack of consensus among psychologists regarding the relationship between positive emotions and cognition. Fredrickson's (1998) theory is theoretically sound, but not sufficiently supported by experiments, so her theory of positive emotions requires further exploration. More experimental studies especially addressing the effect of positive emotions on learning particularly in the fast global Internet world are needed.

Research on how people learn indicates that the following elements impact learning that is, teachers, instructional strategies, learners, learning materials, learning environments, and learning strategies. As discussed in the article, interface design is a part of the learning environment that impacts users' emotions, and emotions are believed to greatly impact learning. So what aspects in the previously mentioned elements will most significantly enhance learning? This more general and essential question should be addressed in the future research.

Although interface design has been shown to impact multimedia learning by moderating users' emotions, there are many unanswered questions about how to define attractive interfaces and how to design attractive interface that account for individual differences in aesthetic perception. Philosophers have researched aesthetics for more than two centuries, so extensive literature review on aesthetics should be conducted to enlighten the research of attractive interface design. Future research is needed to combine the results from aesthetics and classroom design and, in particular, to promote attractive design in learning environments.

Educators have been training students to help them understand their emotions and to control their emotions, and researches have evaluated their success. However, educators have generally neglected to design learning materials and learning environments that promote positive emotions especially to enhance learning. In multimedia learning environments specifically, none of these issues have been adequately addressed, especially with respect to immersive, innovative technologies. Future research should also consider other aspects of learning materials and environments that impact students' emotions.

8. CONCLUSION

Multimedia development should be informed by theories tested by experimental research so that multimedia designs that predictably induce positive emotions and thereby promote multimedia learning can be developed. Mayer (1997) noted, "At this time, the technology for multimedia education is developing at a faster pace than a corresponding science of how people learn in multimedia environments". Now, 10 years later this is even truer! It is essential for researchers to understand how people learn in multimedia environments. From the instructional designers'

perspective, it is also important to understand how different designs impact users' emotions, and how the induced positive emotions promote learning.

9. REFERENCES

Arnold, M. B. (1960). *Emotion and personality:* Vol. 1. Psychological aspects, New York: Columbia University Press.

Baddeley, A. D. (1999). *Human memory*. Boston: Allyn & Bacon.

Baddeley, A. D. (1992). Working memory. *Science, 255,* 556-559.

Baddeley, A. D. (1986). *Working memory*. Oxford, England: Oxford University Press.

Bolte, A., Coschke, T., & Kuhl, J. (2003). Emotion and intuition: Effects of positive and negative mood on implicit judgments of semantic coherence. *Psychological Science*, 14(5), 416-421.

Borchardt, F. L. (1999). Towards an aesthetics of multimedia. *Computer Assisted Language Learning*, 12(1), 3-28.

Carnevale, P.J.D., & Isen, A. M. (1986). The influence of positive affect and visual access on the discovery of integrative solutions in bilateral negotiation. *Organizational Behavior and Human Decision Processes*, 37, 1-13.

Chandler, P., & Sweller, J. (1991). Cognitive load theory and the format of instruction. *Cognition and Instruction, 8,* 293-332.

Cornelius, R.R. (1996). *The science of emotion: Research and tradition in the psychology of emotion.* Upper Saddle River, NJ: Prentice Hall.

Demirbilek, O., & Sener, B. (2003). Product design, semantics, and emotional response*, Ergonomics*, 46(13/14), 1346-1360.

Demirbilek, O., & Sener, B. (2001). A design language for product: Designing for happiness. In M. G. Helender, H. M. Khalid, & M.P. Tham (Eds.), *Proceedings of the International Conference on Affective Human Factors Design* (pp. 19-24). London: ASEAN Academic Press.

Desmet, P. (2002). *Designing emotions*.

Diener, E., & Larsen, R. J. (1993). The experience of emotional well-being. In M. Lewis, & J. M. Haviland (Eds.), *Handbook of emotions* (pp. 405-415).

Dwyer, F.M. (1972). *A guide for improving visualized instruction*. University Park, PA: State College, Pennsylvania State University, Learning Services Division.

Estrada, C. A., Isen, A. M., & Young, M.J. (1994). Positive affect influences, creative problem slovng, and reported source of practice satisfaction in physicians. *Motivation and Emotion,* 18, 285-299.

Estrada, C.A., Isen, A.M., & Young, M.J. (1997). Positive affect facilitates integration of information and decreases anchoring in reasoning among physicians. *Organizational and Human Decision Processes,* 72, 117-135.

Fredrickson, B.L., & Branigan, C. (2005). What good are positive emotion? *Review of General Psychology*, 2(3), 300-319.

Fredrickson, B. L., & Branigan, C. (2005). Positive emotions broaden the scope of attention and though-action repertoires. *Cognition & Emotion*, 19(3), 313-332.

George, M.S., Ketter, T.A., Parekh, P.I., Horwitz, b., Herscovitch, P., & Post, R. M. (1995). Brain activity during transient sadness and happiness in healthy women. *American Journal of Psychiatry,* 152, 331-351.

Gray, J. R. (2001). Emotional modulation of cognitive control: Approach-withdrawal states double-dissociate spatial from verbal two-back task performance. *Journal of Experimental Psychology: General,* 130, 436-452.

Greene, T.R., & Noice, H. (1988). Influence of positive affect upon creative thinking and problem solving in children, *Psychological Reports*, 63, 895-898.

Holliday, W. G. (2001). Textbook illustrations: Fact of filler? *The Science Teacher*, 57(9), 27-29.

Isen, A. M. (1999). Positive affect. In T. Dalgleish, & M. Power (Eds.), *The handbook of cognition and emotion* (pp. 512-539). New York: Wiley.

Isen, A. M., Daubman, K. A., & Nowicki, G.P. (1987). Positive affect facilitates creative problem solving. *Journal of Personality and Social Psychology*, 36, 1-12.

Isen, A.M., Shalker, T.E., Clark, M., & Karp, L. (1978). Affect, accessibility of material in memory, and behavior: A cognitive loop? *Journal of Personality and Social Psychology*, 36, 1-12.

Klein, J., Moon, Y., & Picard, R. W. (2002). This computer responses to user frustration: Theory, design, and results. *Interacting with Computers,* 14, 119-140.

Kuhl, J. (1983). Emotion, Kognition and Motivation: II. Die funktionale Bedeutung der Emotionen fur das problemlosende Denken und fur das konkrete Handeln. *Sprache & Kognition*, 4, 228-253.

Kuhl, J. (2000). A functional-design approach to motivation and self-regulation: The dynamics of personality systems interactions. In M. Boekaerts, P.R. Pintrich, & M. Zeidner (Eds.), *Handbook of self-regulation* (pp. 111-169). San Diego, CA: academic Press.

Kurosu, M., & Kashimura, K. (1995). Apparent usability vs. inherent usability. *Proceedings for CHI'95 Conference Companion* (pp. 292-293).

Lee, A., & Sternthal, B. (1999). The effects of positive mood on memory. *Journal of Consumer Research*, 26, 115.

Lester, J. C., Converse, S. A., kahler, S. H., Barlow, S. T., & Stone, B. A. (1997). The persona effect: Affective impact of animated pedagogical agents. *Electronic Proceedings* of CHI'97, USA. Retrieved on November 21, 2016, from http://www.acm.org/

Mayer, R. E. (2001). *Multimedia learning*. New York: Cambridge University Press.

Mayer, R. E. (1997). Multimedia learning: Are we asking the right question? *Educational Psychologist*, 32, 1-19.

Miller, G.A. (1956). The magical number seven, plus or minus two: Some limits on our capacity for processing information. *The Psychological Review*, 63, 81-97.

Myers, D.G., & Diener, E. (1995). Who is happy? *Psychological Science*, 6, 10-19.

Norman, D. (2004). *Emotional Design*. Basic Books.

Oatley, K. (1992). *Best laid schemes: The Psychology of emotions*. Cambridge: Cambridge University Press.

Ortony, A. (2003). Emotion by accident, emotion by design. *Paper presented at Interaction design institute*, Ivrea.

Raskin, J. (2000). *The human interface design: New directions for designing interactive systems*. Reading, MA: Addison Wesley.

Schenkman, B.N., & Jonsson, F.U. (2000). *Behavior & Information Technology,* 19(5), 367-377.

Smith, C.A., & Lazarus, R.S. (1993). Appraisal components, core relational themes, and the emotions. *Cognition and Emotion,* 7, 233-269.

Sweller, J. (1999). *Instructional design in technical areas.* Camberwell, Australia: ACER Press.

Tractinsky, n. (1997). Aesthetics and apparent usability: Empirically assessing cultural and methodological issues: *Electronic Proceedings* for CHI'97: USA. Retrieved on November 2016 from http://www.acm.org

Tractinsky, N., Katz, A.S., & Ikar, D. (2000). What is beautiful is usable. *Interacting with Computers*, 13(2), 127-145.

Valdez, P., & Mehrabian, A. (1994). Effects of color on emotions. *Journal of Experimental Psychology: General*, 123(4), 394-409.

Van Der Heijden, H. (2003). Factors influencing the usage of Web sites: The case of a generic portal in the Netherlands: *Information & Management*, 40, 541-549.

Wertheimer, M. (1923). Laws of organization in perceptual forms: First published as Untersuchunger zur Lehre bon der Gestalt II. In *Psychologische Forschung,* 4, 301-350.

Yamamoto, M., & Lambert, d. R. (1994). The impact of product aesthetics on the evaluation of industrial products. *Journal of Product Innovation Management*, 11, 309-324.

Zetll, H. (20050. *Sight, sound, motion: Applied aesthetics* (4th ed.) Belmont, CA: Thompson/Wadsworth.