

## Research Trends on Emotional Factors in the e-Learning Context

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*Considering the increasing roles and impacts of emotional factors in the e-learning context, the current study intends to examine the research trends on emotion within e-learning and suggest implications for emotionally sensitive e-learning. To accomplish this goal, a comprehensive review was conducted. Inquiry on emotions experienced during learning, the effects of emotions and emotional strategies in learning processes and outcomes, and instructional factors or design models facilitating positive emotions were the most frequently appearing issues. However, those research approaches mostly deal with learners' aspect, neither teachers' aspect nor multiple and the dynamic interaction between learners and teachers. Considering the value of positive emotional experiences to reduce ambiguity in communication and enhance the learning experience, factors influencing emotional experience and design strategies for emotionally sensitive e-learning need more attention in research and practice.*

**Keywords:** e-learning, emotion, emotional regulation, emotional intelligence, emotionally sensitive instructional design

### Introduction

There is a wide variety of literature discussing the critical roles and effects of emotion on learning (Dirkx, 2001; Goleman, 1977; Merriam & Caffarella, 1999; Reeve, 2001) and everyday life (Callahan, 2004; Dirkx, 2006; Goleman, 1997; Lutz, 1998). Emotion in the learning process impedes or motivates learning, facilitates self-regulated processes, or produces different problem solving processes. In short, emotion plays a critical role in understanding the learning and performance of human beings. Do (2008) defines the recent research trend as an effort to understand interactive features among various factors including emotion, cognition and behavior, as well as to overcome a traditional extreme cognitive position by combining cognitive, affective and motivational dimensions of human behavior. 'Relativity of emotion', that which operates in complex relations with cognitive, physiological, self-regulatory and some other factors, has been discussed by Cappino and Gardner (1999). Boekaerts (1992, 1996) proposes a self-regulated model of interactivity among motivation, emotion, and cognition in the educational situation. Linnenbrink and Pintrich (2002) suggest a conceptual model representing asymmetrical and bidirectional relations among students' moods, perceived classroom goals, individual achievement goals, and emotion. Do (2005) presents a model showing interactions among students' affect and their cognition, motivation to discussion participation, and behavior (listening/talking) in a discussion setting. Yang (2009) identifies emotional regulation effects wherein different emotions can produce different learning outcomes.

Due to the 'relativity' and 'complexity' of emotions, as previously discussed, it appears difficult to agree how to categorize basic emotions. Feshbach and Roe (1968) classify affective states into pleasure, sadness, fear, and anger. Goleman (1995) considers the eight basic emotions as anger, sadness, fear, enjoyment, love, surprise, disgust, and shame. Pluchik (1980) proposes that basic emotions are consisted of sadness, disgust, anger, anticipation, joy, trust, fear, and surprise. Astreitner (2000) considers emotions which can appear in learning situation to be fear, envy, anger, sympathy, and pleasure, based on the basic categorization of emotion by Pluchik (1980). In a later research, Astleitner (2001) confirms that fear, envy, anger, sympathy, and pleasure are especially important to instructors and students within instructional contexts; in addition, he identifies some other emotions including sorrow, self-confidence, motivation, cognition, and stress from students. Pekrun, Gortz, Titz, and Raymond (2002), after reviewing literature from the time span of 1974 to 2000, identifies the full range of emotions experienced by students at school and university, including joy, enthusiasm, hope, relief, pride, gratitude, admiration,

sadness, anger, anxiety, hopelessness, shame and guilt, disappointment, boredom, envy, contempt, and surprise. It appears that test anxiety has continued to attract many researchers.

Learning online nowadays has been growing as a mainstream educational approach 'maximizing access to and interactions with various knowledge sources' (Lee, 2002) including contents and human resources using the Internet. Most of research emphasizes its potential and advantages, and of course, it has a range of new opportunities for learners and teachers. However, we are faced with challenges and problems at the same time. Recently, as mobile technology services and social media have been abruptly introduced into the learning and education context, the features of social interaction, collaboration and sharing have become a norm in e-learning process. Learners typically feel unprepared to deal with the social and communication skills required of online learning (Ng, 2001), and experience feeling of 'impersonal and unfriendly, less emotional and more task-oriented or businesslike' (Kreijns & Gerrissen, 1999) and various other negative emotions such as 'ambiguity', 'frustration', 'alienation', 'confusion', and 'uneasiness' in learning process. Considering the increasing role and impact of emotional factors in the e-learning context, the current study intends to examine the research trends on emotion within the e-learning context and suggests implications for emotionally sensitive e-learning. To accomplish this goal, a comprehensive review on the literature dealing with emotional issues in e-learning context was conducted.

## **e-Learning and Emotion**

### **Experienced Emotions**

According to the research of O'Regan (2003), particular emotions experienced online include frustration, fear, anxiety, apprehension, shame/embarrassment, enthusiasm/excitement and pride. Rowe (2005) identifies various emotions experienced by learners and teachers from the beginning to the end of learning online. She introduces those emotions under three metaphors: connection, balance, and movement. Those emotions should be understood in not only from an individual perspective but also the sociocultural aspect where the meanings of emotions are developed, 'discourses', so to speak. This position of Row is quite unique reflective analysis not found in other research. Three discourses of emotion either shaping or constraining the felt and expressed emotion are to be 'emotion negation', 'social uptake', and 'caring police'.

Kim (2008) and Astleitner (2000) also focus on identifying 'emotions' experienced in the e-learning context. Kim (2008) reports various emotions including frustration, resistance, pride, relief, expectation, fear, anxiety, hopelessness, confidence, envy, and complex; this confirms that emotion functions with the integration of cognition, motivation, and action. Rha and Sung (2005) suggest six domains of emotional expressions elements (pleasure, concern, disappointment, anger, pride and delightfulness) frequently experienced in an online learning community using an electronic bulletin board where one hundred and twenty elementary students were exchanging messages, writing opinions, and reading others' ones. They have also found significant relationships between the emotional factors and the message dimensions (social, interactive, cognitive, & metacognitive). That is, certain emotional factors are rather frequently used by certain dimensions of message boards. For example, 'pleasure' appeared evenly in all the message dimensions, however, 'pride' appeared strongly only in the cognitive and metacognitive dimensions, which are strongly related to 'learning'.

### **Negative and Positive Emotions**

Various studies have asserted that positive and negative emotions are the psychological bases of cognition and behavior changes within computer based learning or web-based learning and further anticipate the directions of learner behaviors (Kang & Goo, 2007; Kang, Kim, & Chong, 2011; Kim, 2008; Lee & Song, 2006; O'Regan, 2003; Park, Jung, Lee, & Song, 2007; Rha & Sung, 2005; Rowe, 2005; Sujo de Montes & Gonzales, 2000; Vuorela & Nummenmaa, 2004). As Sujo de Montes and Gonzales (2000) assert, it is important to understand emotions learners experience in the contents as much as the content and assignments.

Vuorela and Nummenmaa (2004) measured the valence scale of 'pleasant-unpleasant' and the arousal scale of 'excited-calm' during collaborative activities in the e-learning context (based on the scale of Bradley & Lang, 1994). The result shows that participants who experienced more positive affects during the course were less aroused than those who experienced more negative affects, and positive affects can facilitate participation in collaborative activity. O'Regan (2003), after a literature review and student interviews, also reports the centrality of emotion to attention, memory and decision

making, all of which are of critical importance in the learning process. The effect of these emotions was widely variable, either more negative or positive, depending on the strength and nature of the emotion involved as well as its associated learning context. Astleitner (2001) conducted an empirical study testing the applicability and consistency of the FEASP (including fear, envy, anger, sympathy, and pleasure) approach proposed by Astleitner (2000). The results indicate that teachers and students find emotions and their consideration quite necessary in daily instruction because the development of human character depends on emotions, indicating that they are as important as cognitive and motivational processes. Teachers nominated anger, fear and sympathy in order as the most important types of emotions in instruction, while students nominated fear, pleasure, and anger in order as the most important types of emotions in instruction.

### **Causes of Emotional Reactions**

Only one research regarding causes of emotional reactions in learners within e-learning context has been identified, but the related issue appears to have a direct implication for instructional strategies. Vuorela and Nummenmaa (2004) examined which events cause emotional reactions in students. In a collaborative learning environment called 'Work Mates', which provides asynchronous text-based commentary and discussions, 'the course design in general' and 'interactions within learning environment' bring about emotions more than the causes relating to the WorkMates or to the functionality of technology. This suggests that the presence of others in a virtual environment is an important antecedent of students' affective reactions in e-learning situations as in face-to-face learning situations. Further, there were significant changes in students' affective reactivity during the different periods of the course. There are at least two possible explanations for this. Firstly, negative emotions occur often in situations in which people experience events that conflict with their goals and needs. Secondly, negative emotions are likely to result in social conflicts (Frijda, 1986). In summary, the course as a whole and especially the interaction in the environment were causes of emotions more often than the technical environment.

### **Information Technology Features**

A few significant researches on emotions using IT features have appeared, especially trying to measure emotions in the learning processes. Vuorela and Nummenmaa (2004) applied an interface design asking the emotional reactions of students during learning processes. Park, Jung, Lee, and Song (2006) analyzed elementary students' facial expressions appearing in learning online and categorized sixteen significant facial expressions from collected pictures, which include as usual, showing new interest, pleased/funny/smiling, being disinterested, being observed (glazing), being observed (serious), being observed (preoccupied, positive reaction), being observed (preoccupied, negative reaction), feeling new/novel, curious, bored, becoming disappointed, becoming disinterested (decreased learning interest), sleepy, yawning, and sleeping.

### **Emotional Regulations and Intelligences**

Several researches on how emotional intelligence and regulations, as a controlling base of emotion, are discussed in this section. Vuorela and Nummenmaa (2004) examined how the emotions experienced in the e-learning context, emotion regulation strategies (cognitive reappraisal and expressive suppression by Gross and John, 2003), and computer self-efficacy are related to students collaborative activity (intensity/frequencies). They suggest that the liability of emotional reactions and their effective regulation affect learner participation in collaborative activities intensiveness. Using 'reappraisal' as an emotional regulation strategy affect increased discussion activities. However, expressive 'suppression' as emotional regulation strategy in WBLE where expression of emotions can only mediated through text-based commenting, was not negatively associated with collaborative activity, maybe due to the fact that expressive suppression is not used as much as in face-to-face situations. Gross presents such emotional regulation strategies as (cognitive) reappraisal and (expression) suppression (Gross & John, 2003) and distinguished between antecedent-focused strategies and response-focused strategies. "Antecedent-focused strategies refer to things we do before the emotion response tendencies have become fully activated and have changed our behavior and peripheral physiological responding. Response-focused strategies refer to things we do once an emotion is already underway, after the response tendencies have already been generated (Gross & John, 2003)". Based on Gross's work (Gross & John, 2003), Yang and

Kim (2010) confirmed that reappraisal increases positive emotion and decreases negative emotion in learning in a face-to-face learning environment; on the other hand, suppression increases negative emotion and decreases positive emotion. However, suppression is not related with learning strategies.

Jung (2006) found that 'empathy' has a correlation with learning achievement in e-learning settings. In the same line, Kang and Goo (2007), in a blended learning environment, demonstrated 'emotional facilitation of thinking' out of five sub types of emotional intelligences significantly predicts achievement in online team learning, but not 'online individual learning' or 'offline learning'. This finding implies that emotional facilitation of thinking would affect those abilities necessary for team learning and draw high academic achievement. Lee (in review) found that emotional intelligences, especially 'empathy' and 'perceiving emotion' among Moon's emotional intelligence categories (1997), can help to enhance learners' positive attitude toward different cultures and suggested that there is a need to support or educate people to develop emotional intelligence competencies in daily life or through learning opportunities in order to achieve more positive effects in attitudinal changes. The three researches discussed above share a commonality of using Moon's emotional intelligence categories (1997) as a research tool. Moon's emotional intelligence categories (1997), developed based on Mayer-Caruso-Salovey's emotional intelligence measurement, are comprised with five subcategories of 'perceiving emotions', 'expressing emotions', 'empathy', 'managing emotions' and 'using emotions'. Lee (2011) concludes emotional regulation strategies can facilitate a positive attitude in e-learning environment. Kang, Kim and Chong (2011), through a survey of 217 students participating in distance education courses, innovative inclination, learning presence and learning flow as part of emotional intelligence and regulation strategies have a direct impact on learning satisfaction.

Since Bar-on (1997), Goleman (1995), Mayer, Salovey and Caruso (2000), and some others had given definitions of emotional intelligence and introduced inventories and measurement scores, emotional intelligence has been widely recognized within the general public and education sector as a critical variable in the learning process and achievement along with cognitive intelligence. Even some research demonstrates that emotional intelligence is often a more accurate predictor of success than the individual's IQ. Emotional control strategies and intelligence by oneself helps to acquire new information (Graziano et al., 2007) and has a direct relationship with learning achievement (Eisenberg, Sadovsky, & Spinrad, 2005; Hill & Craft, 2003; Howse, Calkins, Anastopoulos, Keane, & Shelton, 2003). Pekrun (2006) also introduces the needs for emotional control in order to enhance the positive impact of emotion in learning. Basically, the researches on emotional regulations and intelligences in e-learning setting also speak along the same lines as the ones in face-to-face learning settings.

### **Emotionally Sensitive Instructional Strategies**

Some research is interested in inquiring instructional strategies for enhancing positive emotions. Park et al. (2008) developed an e-learning system recognizing facial expressions into specific emotional states and providing appropriate feedback to learners. The test results demonstrate significant improvement in interest and learning achievement. Lee and Song (2007) developed an e-learning system integrating emotional feedback messages and delivery method in order to examine the effects of emotional feedback for the emotional state of learners in elementary schools. A self-reporting button for recognizing learners' emotional state was used while learning, and the test results prove affective feedback responding to specific emotions of learners positively influence to learning achievement.

The use of emoticons along with humor and self-disclosure has been suggested to have the potential for positive emotional environment in computer conferencing by Rourke, Anderson, Garrison, and Archer (2001). Kim and Kim (2003) suggested an emotional bulletin board design focusing on emoticon, color, and sound to support learning motivation of community of practice in web-based learning environment. The suggested bulletin board allows learners to add emoticons and background colors showing their emotion below the title of messages. This function is expected to ease readers in apprehending writers' feelings and meanings in the message more accurately. Moreover, writers' perception of social presence and learning motivation are increased through readily expressing their own feelings and emotions housed in their messages.

The research of Rha and Sung (2005) suggests 4 different emotionally sensitive strategies in e-Learning, based on their findings of six emotional expressions elements including pleasure, concern, disappointment, anger, pride and delightfulness. (1) Communication tools that enable learners to deliver their emotion effectively should be considered in online learning community instructional design, as for example, the use of 'emoticon'. (2) Appropriate emotion delivery strategies should be developed and

instructional design should design based on those strategies. (3) The online learning space should be designed to facilitate ‘pleasure’, what is called an environment learners perceive familiarized and comfortable. (4) The online learning community should contain learning motivation factors that can stimulate emotional elements of pleasure and pride. Especially, pride should be noticed to appear the most in cognitive and metacognitive dimensions of messages that are related to learning.

### **Systemic View of Emotionally Sensitive Instructional Design**

The literature review reveals four studies in systemic view of emotionally sensitive instructional design. Astleitner (2000) and Astleitner and Leutner (2000) present a systemic view of instructional design for making instruction more emotionally sound. The framework of ‘Emotional Design of Instruction’ presents five major dimensions of instructionally relevant emotions including fear, envy, anger, sympathy, and pleasure (called FEASP). Astleitner suggests that instructional designers analyze emotional problems before and during instruction, together with audience and situation analysis and the evaluation of instructional results. Primary emotions, instructional strategies and examples are introduced. The introduced primary emotions and instructional strategies are as follows. Instructional strategies to reduce ‘fear’ are (1) ensure success in learning, (2) accept mistakes as opportunities for learning, (3) induce relaxation, and (4) be critical, but sustain a positive perspective. Instructional strategies to reduce ‘envy’ include (1) encourage comparison with autobiographical and criterion reference points instead of social standards, (2) install consistent and transparent evaluating and grading, (3) inspire a sense of authenticity and openness, and (4) avoid unequal distributed privileges among students. For anger reduction, the following strategies are suggested: (1) stimulate the control of anger, (2) show multiple views of things, (3) let anger be expressed in a constructive way, and (4) do not show and accept any form of violence. The instructional strategies for sympathy increase, the followings are suggested: (1) intensify relationships, (2) install sensitive interactions, (3) establish cooperative learning structures, (4) implement peer helping programs and let students adopt children in need. And for pleasure increase, (1) enhance well-being, (2) establish open learning opportunities, (3) use humor, and (4) install play-like activities are suggested.

Glaser-Zikuda et al. (2005) present five educational guidelines (self-regulated, competence, social interaction, structure, and value) differentiated in ten teaching strategies (student-centered instruction, activation of students, differentiation and transparency of demands, individual feedback, cooperative activities, play-like activities, clearly structured instruction and instructional material, authentic tasks, transfer to everyday life) called the ECOLE-approach (Emotional and Cognitive Aspects of Learning). The combination of specific teaching strategies constructed with both student-centered and direct instructional methods is expected to have a positive impact on emotions and achievement (enhanced well-being, enjoyment, and satisfaction; enhanced interest, reduced anxiety and boredom, and enhanced achievement). The effect of the ECOLE approach on learning achievement in teaching units of biology, German, and physics with 8th and 9th grade classrooms in southwestern Germany were validated. Yet, the effects on emotions seem to have been weak compared to achievement and more closely related to specific subjects than was the case with achievement. As for the ability of learners to disclose themselves socially and emotionally into a community of inquiry, so to speak, ‘social presence’ is ‘key to promoting collaborative and knowledge building’ (Rowe, 2005). One aspect of social presence is learners’ affective interactions including ‘the expression of emotions’.

Rowe (2005) presents ten suggestions for ‘creating a positive emotional e-learning environment to facilitate deep connection between learners and teachers to foster deep learning’ as follows.

**Connection strategies.** (1) share a teacher biography with online learners to humanize the online learning environment; (2) remember the humanity of the online learner, and respond to the person, not just words on a screen; (3) provide an option for synchronous interaction with learners on a weekly basis if possible (face-to-face, phone, chat, computer conferencing); (4) provide individual comments on all assessments; not just a grade in an electronic grade book; (5) to model consistent, caring communication, provide a weekly update for all learners in an online class; (6) provide meaningful opportunities for learner-to-learner connections to reduce the sense of isolation experienced by some online learners.

**Balance strategies.** (7) address life/school balance issues as part of an overall program and/or course design; (8) be structured, but flexible, providing alternative activities or an opportunity to create an alternate schedule to meet learning objectives.

**Movement strategies.** (9) clearly communicate an expectation for when learners will receive feedback and honor it; (10) initiate contact with struggling or absent learners to find out more about their situation.

## Trends and Issues

The majority of e-learning related research focuses on technical or cognitive characteristics, but academic discussions on emotion appear relatively rarely. The literature review shows that the most frequently appearing issues include inquiry on emotions experienced; the effects of positive and negative emotions and emotional strategies in learning process and outcome; and instructional factors or instructional design model facilitating positive emotions experienced during learning. However, those researches deal with mostly learners' perspectives, rather than teachers' or multiple and dynamic interaction between learners and teachers. Considering its direct implications for instructional strategies, we need more research on factors influencing emotional experience.

The literature review on emotions in e-learning context confirms the complexity of 'relativity' and 'complexity' of emotion by demonstrating various ways of classification of emotion depending on research context and interest. Various studies have asserted that positive and negative emotions are the psychological bases of cognition and behavior changes in the e-learning context and further anticipate the direction of learner behaviors. The relative lack of consideration of emotional factors has been discussed as a partial reason for high drop-out rates in the e-learning context (Im, 2007; Rowe, 2006).

The findings support the idea that emotional intelligence and regulation can help to enhance learners' positive attitudes. This suggests a need to support or educate learners to develop emotional competencies and intelligences. In addition, learning experiences through individual learning and discussions in the e-learning environment can promote positive attitudes and sensitivity, as well as the cognitive process and eventually knowledge. However, those researches on how emotional regulation strategies function mostly focus on cognitive learning domains. In addition, there is still a great deal of need for examining what kinds of emotions appear in different e-learning processes, how specific emotions affect learning processes and results, and how e-learning programs should be designed to support learners' positive emotions through the learning processes.

There is still very little emotionally sensitive instructional design research in learning online. Furthermore, emotion instructional design still lacks validation through empirical study. Considering the value of positive emotional experiences to reduce ambiguity in communication and enhance the learning experience, design strategies for emotionally sensitive e-learning needs more attention in research and practice.

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