

Analyzing Emotions in the E-Learning Process

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ABSTRACT

The present research investigates emotions in the e-learning process from several perspectives: variations of emotions and related emotional triggers within the e-learning environment; affective approaches in choosing content and actions; and how emotions influence self-regulation in learning in a computer-based environment. The research study was conducted at the iDTV lab at MediaCity, Åbo Akademi University in Vasa, Finland. Multiple methods were used to collect data. The results presented in this paper are based on video-stimulated recall interviews. Pros and cons are discussed regarding the various methods for testing emotions in e-learning, and how methods could complement each other. The analyses show that training in the workplace was consistently seen from a pragmatic perspective by all participants. This was a key factor in influencing affective states in the e-learning process of the participants.

Author Keywords

e-learning, emotions, learning process, research methods

ACM Classification Keywords

UX (user experience), evaluation/methodology, user interfaces, user-centered design,

INTRODUCTION

The aim of this study is to investigate e-learning as a pedagogically sound method for learning. The main target is novice workplace e-learner's learning process, and their user experience. According to [1] and [2] the dynamics of the factors within the frame of learning determine the nature of the learning process. From a socio-cognitive view of learning (and our self-regulation within this process) there is a triadic reciprocal relation between the environment, the learner, and his/her learning behavior. Changes in any of these three factors will alter the conditions for learning [1; 4].

From analyzing the research data inductively, three categories emerged as essential factors for describing the e-learning process: learners' actual behavior in the e-learning environment, their cognitive reasoning regarding content and their affective/emotional states influencing their decisions and learning process. These three categories are investigated separately in different analyzing phases as part

of my dissertation work. In this paper, emotional aspects of the e-learning experience are presented as an integrated part of the learning process as found from the test population's coursework (their e-learning process).

The research questions guiding the analyses of emotions and affective states were: 1) which were the positive and negative emotions that the course gave rise to, and which were the trigger factors for these emotions? 2) How did emotions influence how learners chose content and actions in their coursework? 3) How was their self-regulation for learning related to emotions and affective states?

METHODS

At two test periods (2003 and 2004) two groups (N=10; 7) of male, workplace e-learners, novice to e-learning, were individually tested at iDTV lab (Åbo Akademi University, Vasa, Finland) while taking an e-learning course related to their workplace. The groups were confronted with slightly different course version. The most substantial difference was increased feedback given to the second test group.

A mixed methods approach was used to collect data (observations, video recordings, screen recordings, pre- and post-questionnaires, interviews, psycho-physiological measuring, and eye-tracking). Analyses and results reported in this paper are based on data from video-stimulated recall interviews conducted immediately after each test person's coursework. During the interviews, screen recordings served as a stimulus for discussion. The interviews were recorded and transcribed by the researcher.

While analyses of data from observations gave an idea of how the test population managed the environment as such, and their needs on a more technical level, it revealed nothing about the learners' inner world [7]. On the contrary, interpreting their affective and cognitive standards based on observations proved to be misleading in many ways. This could be noted from making an integrated worksheet of data collected per person, in which the interviews, interview interpretations, narrative of coursework based on observations, and observation interpretations were all lined up for each screen in order to get an overview of a person's total learning profile. Therefore, it was evident that the interviews were critical for investigating their emotions and cognition related to their learning process.

An inductive approach was used to analyze variations of qualities of the 17 interviews. All 17 interviews were treated equally, regardless of group belonging, since the aim was not to find differences between the two groups, but to illuminate variations of learners' affective states. The interviews were coded in NVivo, which is a well-suited computer program for approaching qualitative data inductively.

RESULTS

Variations of Emotions Triggered by the Coursework

In analyzing e-learners' affective states during their coursework, one question focused on the variations of positive and negative emotions that was triggered by the e-learners' coursework, and the reasons for these emotions. According to [3] it is reasonable to make a differentiation of positive emotions by separating joy, interest, and activation. Thus results would point to whether there were factors in the course environment that provided a hedonic quality to the e-learning experience. However, the negative emotions were also interesting in the sense that it was presumed that they would highlight what was lacking in the environment.

Triggers and Inhibitors of Positive Emotions

The interviews focused on what they were doing and why, in relation to learning. During these discussions there was nothing mentioned about *joy* in relation to the coursework. However, there were some comments about *excitement* about taking the e-learning course as a new format of learning, which for some felt exciting to be a part of. Another comment was that the *feeling of freedom* e-learning provides is positive; when you can choose your own time, space, and pace for learning.

The feeling of *interest* is similar to being motivated for something. In the data, both layout-based and content-based factors were found to either increase or decrease interest in the coursework. *Layout-based factors* discussed by participants as increasing their interest were: colors, animation, simulations, as well as images, graphs, links, and video in combination with text. These were either features within the course itself, or visualized by participants as factors that would have helped them to keep up their interest. Another thing mentioned was that interest is increasing if the look-and-feel of the layout is pleasing to the user. Especially the first page is important as an interest-builder. Layout-based factors decreasing their interest were: scroll-down feature (they feared that there would be too much to read, and therefore made them apprehensive of what was to be found when scrolling down), plain text in a box with white background, as well as slow-functioning and complicated layout.

Content-based factors discussed by participants as increasing their interest were: clear objectives, schemata, formula, pictures, graphs, examples, and exercises. Content-based factors decreasing their interest were:

irrelevant data in tables or graphs, too many details displayed at once, or too much information.

There were also a number of *external factors* that were mentioned as important for keeping up interest. Among these was the most frequently discussed factor the fact that the information presented in the course should be related to their own work situation in order to be regarded as interesting. Examples of this fact highlighted during interviews were for instance: the need for the information in your own work, new information in relation to your work, information that is close to your own work but presenting a variety to what you already know, or that the course gives you a concrete advantage in improving your ways of working. In contrast to this they also mentioned that confronting information irrelevant for your own work situation decreased interest for the course. Another example mentioned by participants was that it is easier to devote interest in something if you have to make some sort of personal investment in the course, or if you get some kind of reward (certificate, higher salary, etc).

Activation was mentioned as an essential factor for maintaining interest, keeping up concentration, as well as regulating effort in the coursework. The opposite was also discussed, as one person said that if the course does not activate him to a certain degree, there is a risk that he will not take the course seriously and/or lose interest in it. Triggers of activation were pictures, real life visualization of content, simulations, feedback dialog generated by own actions, content that stimulates you to move forward, content that stimulates you to think, practice opportunities and challenges, as well as interactivity-based features. In contrast to these triggers, users were less activated if there was too much text to read, and if the content did not feel relevant to learn for the participant.

Triggers and Inhibitors of Negative Emotions

Feelings of *frustration* were triggered by: computer problems (hardware, software), content (lack of transparent content overview, ambiguous content), features of the web-based environment (scroll-down feature, disturbing animations, limited link-possibilities between final test feedback and content), lack of feedback and assistance (live teacher/trainer, feedback on actions), and the need to adapt cognitive learning style in accordance with test requirements (e.g., questions that require memorization of details). Feelings of *confusion* were triggered by both content (indistinct headings, superfluous details in images, density of information to memorize, lack of prior knowledge of content,) and instructional design of the environment (lack of navigational instructions, ambiguous instructions, and ambiguous navigational features). Feelings of *anxiety* were triggered by: confronting a new format for learning (e-learning), lack of transparent navigation structure, lack of transparent content overview, error message while navigating the environment, time pressure in the final test, as well as answering wrong in practice question section.

Affective Approaches in Choosing Content and Actions

The second question guiding the affective analyses focused on emotions in relation to how e-learners chose actions and content within the learning environment. These affective approaches are defined as learners' intentions on an affective or emotional level; why we choose to take certain actions. Four affective approaches were found. With a *Safety-Based Approach* learners take actions aiming for trying to avoid anxiety evoking scenarios. They want to feel safe, and stick with familiar content and stay within environmental structures they have experienced before. An *Interest-Based Approach* is the opposite of a safety-based approach. Learners choose actions based on interest in content or curiosity for the environment. With a *Convenience-Based Approach* learners take the easy road, because it is more convenient for them. With a *Motivation-Raising Approach* learners take certain actions to raise motivation in order to manage the learning situation [7].

Self-Regulation for Learning in Relation to Emotions

The third question for the affective analyses was to focus on emotions in relation to internal facilitators for learning, where self-regulation was the key factor. Self-regulation deals with our inner world. It is about how learners constantly modify and regulate their thoughts, emotions, and behavior based on their introspective input from the situation at hand and the sum of who they. Many factors work together in this mill of self-regulation [5; 6]. Six variations of self-regulation were found in the data [8]: interest and motivation, attitudes, effort and persistence, concentration, goal-directedness, and metacognition. Some of these are more cognitive than emotional. However, the focus here is on the emotional self-regulation, but also how emotions are linked to cognitive and behavioral self-regulation.

The learner's *interest* in the content and the *motivation* level for taking a course help him regulate effort, affection, and cognition for learning. Because the target group consisted of corporate learners, the approach to learning the content was pragmatic [7]. It was obvious how their motivation differed depending on how closely the content related to their own work situation. One person said: "*This felt like reading a brochure ././ I would like the content to be about something that you have to do at work – something you have to learn. [02-03]*"

Regulation of *attitudes* works on an emotional level. The learner regulates how he feels about the content. The ability to regulate attitudes towards content is an integrative part of motivating ourselves for learning something. One participant said: "*It's good to have some guidance in your mind, what you think in advance what would be the content of the whole course, then you know it in your mind when you go through the whole text, and ... so you know what should be your attitude of this, what they would like you to*

learn, and if you need to raise some questions in your mind to yourself, to make it easier to understand [04-3]."

Effort and persistence has to do with our ability to keep going until we reach our goal. This dealt with the effort learners put into their coursework. A few learners put in a lot of effort and struggled to pass the final test. They used extensive manipulating of the course environment in order to do so, whereas others took a more convenient route through the material without caring too much about achieving a good test result, or learning the content. Regulation of effort and persistence is closely related to regulation of motivation and interest; for instance, skipping content that felt irrelevant was one strategy used by the participants. Using a motivation-raising approach for choosing content is all about effort regulation.

Concentration deals with a person's ability to focus on the content. Therefore it has a physical aspect to it. Most of the test persons commented on the quiet surroundings in the test laboratory, and how this helped them concentrate. It was obvious that their own work place did not provide similar circumstances for learning. Factors negative for keeping up concentration were: being alone and self-paced in a computer-based environment, time of day, irrelevant content to the learner, sitting for too long, too many details displayed at once, text with small font, difficult language, and long sentences. Concentration was also discussed in relation to a person's motivation for taking the course.

To be *goal-directed* in learning is to know why and what we want to learn. The learner might be goal-directed because he needs to learn the content for his own work. One person stated clearly "*One should learn the main principles of the subject matter. The details should be put in ././ a table to be checked when you need it. [15-04]*" He saw no point in memorizing detailed information related to the subject matter of the course. In his opinion learning should focus on principles, not on memorizing detailed information. He chose to learn that which had relevance to his own job. Hence, he was goal-directed in choosing what to learn within the course. In other words, he regulated his learning to target his own work demands. Another form of goal-directedness is to aim at learning or memorizing content according to the form of assessment. The learner figures out what it takes to pass the course, and then approaches content according to these demands, whether he feels that he learns something relevant or not. One participant said: "*I learned from the corrections [feedback on practice questions] ././ it was no learning. It was only temporary [memorizing] for taking the test. [15-04]*" This person learned about the demands of the final test, and memorized the practice questions in order to pass, although he was aware of not actually learning the content as such.

CONCLUSION

Although this study tries to illuminate different perspectives on emotions and affective states in the e-learning process, it

is evident that the emotional factors for learning work both integrated and simultaneously in this process. The analyses pointed to the fact that joy was not an emotion that the test persons associated with their course work. Perhaps, because they did not expect a course related to their work to be fun, and hence, they did not express any joy in relation to their coursework. Training in the workplace was consistently seen from a pragmatic perspective by all participants. Another reason might have been that the course itself contained compact, fact-based information, and the tests, in many cases, required memorization of detailed information. These factors were seen as decreasing positive emotions by the participants.

The participants all had their individual thumbprint in their way of learning and how they expressed their emotions in relation to their e-learning experience. What triggered positive emotions for one person, triggered negative emotions for another. An example can be taken from how participants discussed animations. These were mentioned as sometimes disturbing concentration or being confusing to some participants, while it was a factor for keeping up interest for others. From an instructional design perspective this points to the importance of giving the user control of the features as far as possible and providing a flexible environment where there are possibilities to manipulate, for instance, animations yourself, instead of having animations activate on their own by default. This gives the user control of adjusting the environment to suit his/her own preferences for learning.

These emotionally focused analyses of the e-learning process once again point to the fact that activation of the learner is important to build interest, motivation, concentration, effort regulation, etc. But also that content and the demand for information is aligned in workplace learning.

Regarding the choice of methods used to collect data, it can be noted that observations and video-stimulated recall interviews supported each other in the sense that the combination of them gave an overview of a person's total learning profile during his coursework. This was done through the combined worksheet of both interview transcripts, and observation transcripts, as well as the researcher's interpretations of both of these. The eye tracking supported the video-stimulated recall interviews as the interviewee could see how his eyes had moved during his coursework. The pros of this was that the discussion could be more focused on what he had actually spent his

time focusing on within the course and why. Whereas the cons of it were that the moving circles on the screen were quite hypnotic for the interviewee to watch, and it made it more difficult to concentrate on the discussion of his actual coursework and thoughts about that. The eye tracking circles point to what they have been looking at, but neither why from an intentional perspective, nor why other things where not looked at.

The question remains how psycho-physiological measuring could complement the subjective data regarding affective states of the e-learners. For future research, perhaps one solution would be to have an integrated tool that presents recordings of the screen simultaneously with charts of a person's psycho-physiological reactions and eye tracking. This would enable a greater focus on reactions triggered within a course. However, based on this research study, I would suggest combining such objective measuring with a video-stimulated recall interview, as objective data cannot substitute for a person's subjective experience.

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