

E-Learning Platforms and Lacking Motivation in Students: Concept of Adaptable UI for Online Courses

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Abstract. Current trend of facilitating education for masses through MOOC (Massive Open Online Course) does not much respects different individual specifics influencing success rate of users during the learning process. This paper focuses on issues of MOOC user interfaces from the viewpoint of users' individual needs. It deals with the question of motivation of users depending on an interface, with the question of persuasive design and its potentials in a given context. The paper analyzes effects influencing the user along the learning process, the aim being to specify evaluation criteria for adaptable interface formulation. EdX, Coursera and user interfaces of e-learning courses of the largest Czech universities serve as examples.

Keywords: Persuasive technology · User interface · Motivation · Massive online open course · E-learning · Learning machine · Human computer interaction · Semiotic

1 Introduction

In face to face teaching, a lecturer has a number of possibilities of instructing and motivating her or his students. Classroom conditions make direct social connections possible. Methodical leadership and personality of the lecturer are foundations of motivation process. In online environment, it is necessary to delegate this supportive process on system processes and algorithms, whose aim it is to enable the lecturer to lead arbitrary number of students across time zones and cultures. User interface (UI) thus becomes a deputy of the teacher in relation to the student. This state of matter can be described with the help of semiotics [20]. In such a number of students and multitude of differences among them, maximal use of available tools and manners of UI customization becomes inevitable. Use of new media can be associated with creation of influential learning space. Acquiring of knowledge and skills and support of learning meaningfulness is possible there. New media is capable of supporting learning as an active and creative process, mediating realistic learning situations, and transforming of learning into an interactive process [1].

In recent years, learning has changed from a collection of procedural and factual knowledge into process that springs from what people already know and, according to

the context, expands their knowledge. It is therefore necessary to explore and get to understand users' behavior as to effectively exploit the learning process. Aaron Marcus's research and his Learning Machine are a good starting point for the requirements of teaching and the learning process. Using digital technologies, Marcus combines learning theories with user experience, information design, and persuasive techniques [4]. Research, which he carried out at the University of California at Berkeley, implies that majority of students have similar study habits: they have limited experience with online learning, but their relationship towards it and expectations are overall positive. The research has shown that the in the students' view the key part in the learning process is not only the social interaction "student – teacher" but "student – student" as well. An interesting indicator of their perception of the quality of online learning was information about approximately half the price students were willing to pay for online courses in comparison to face to face teaching [4]. Similar research was carried out by the Institute of System Engineering and Informatics, Faculty of Economics and Administration, University of Pardubice; it dealt with introduction of e-learning into the education process and its influence on the students' study outcomes. The results of the research showed quite clearly that introduction of electronic learning influences positively students' study scores and therefore can be a strong motivation factor for studies [10].

If we discover main motivation in a people and respect their individuality, we can effectively influence their behavior and coach them. Interactive technologies whose aim is to influence users' attitude and actions are known as persuasive technologies [2]. They can influence users' attitudes towards themselves as well as to others in a positive way. Being able to use positive characteristics of interpersonal and mass communication, these systems and applications purposively affect human behavior. Well known are applications that can indicate potential health issues as well as those that motivate a person towards better care of her or his physical condition (the application monitors person's physical activity, records physiological processes in the body, assesses results in a longer term, and finally compares the results with known facts). According to Oinas-Kukkonen et al., there are three basic processes of influence on human behavior that need to be taken in account when defining a persuasive system. In the first instance, we reinforce current behavior and make it more resistant towards changes. In the second case, we shape person's reaction to a common problem or a situation, and in the third case, we form a pattern for a new situation. Different aims thus mean use of different strategies and persuasive techniques [3].

2 Theory of Motivation

Motivation is an integral part of human behavior which influences the learning process. Strength and course of motivation are agents of decision making and orientation of every human being. The loss of motivation is the most occurring hindrance on the journey to success. If the term motivation is understood as process of actuation and organization of behavior in order to change positively the existing situation or state of matter, then it is necessary, in the research process, to comprehend especially the roots of human behavior. Over the course of history, attempts have been made to describe

and classify the incentives of human behavior, e.g. Maslow [12] or Murray [11]. Human motivation can be generally divided according to the source that brings it about: internal and external motives or combination of both. Inner motives rise from basic biological or social needs. According to Weinschenk, people are generally more motivated by inner than outer rewards. Inner rewards are subconscious and less time dependent [7]. It is therefore necessary to weigh the effectivity of the reward system and other matters that influence the strength of motivation.

2.1 Learning Motivation

Combination of learner's internal and external motives is projected into the learning process. This combination depends on the learner's nature, health state, well-being, and current life situation. Intensity of motives changes along the course of study, and it is therefore necessary to confront them individually. Good example can be Self-Determination Theory (SDT) that focuses on free human decision making and conduct. Does Self-Determination Theory apply to e-Learning? According to Wroten, it is sufficient to satisfy a learner's need for competence, autonomy and relatedness. Learning content should be adequately demanding, allow for individual choice of solution, and should make possible the collaboration among students, which enhances contextual perception [6].

As already mentioned, social aspect of learning is one of the most important requirements in online environment. Social motives influencing interpersonal relationships and experience of these relationships come into play here. Good accomplishment might be therefore determined by effort to achieve success or avoid failure. The strength of achievement motivation effects the difficulty of exercise or ability of working in a team [5]. Another strong motive implemented in learning is the need for affiliation that makes the learner form necessary social contacts and become integrated into social groups. Earlier research has shown that effective management of the social presence in user interface design can improve user engagement and motivation. Enhancing social presence in an e-learning environment seems to instill the learner with an impression of a quality learning experience. One benefit is to induce and sustain the learners' motivation. The enhancement of social presence can create a successful learning experience in situations involving learners and instructors in online environments [4]. That is why is social network module is one of the main five pillars of information architecture in Marcus's Learning Machine.

2.2 Motivation in MOOC Students

In MOOC environment, meeting of large numbers of students from different cultures and with different motivations occurs. As observed in Frequently Asked Questions at Openculture.com, one of the prominent kinds of motivation for passing the course is a prospect of a better job or stronger position at the labor market. Although it is difficult to prove causal relationship between getting a new job and finishing an online course, passing of the course might be viewed in learners as a positive initiative to "update their

skill set, acquire new skills, or simply extend their knowledge base” [13]. Characteristics of open courses is a broad offer of highly valuable content to a large audience together with high time and space flexibility. Their feature is connecting people from all parts of the world [8]. Whereas individual learning suits people who prefer their own learning pace, social aspect of MOOC gives opportunity of social interaction to those who need it for reaching their goal. According to Yesil, there are four basic groups of students, when it comes to observing their course participation: There are those who fulfill most of assignments in the course, those who watch videos only, students who fulfill all the assignments at the beginning of the course and resign after three weeks, and finally the occasional visitors, who view the videos only in the assessment period [8]. What might be an important finding is a fact, that the most social interaction and activity in the discussion forums is carried out by the first mentioned group. It is possible to stipulate that there is a certain connection between social interaction and passing of the course [8]. Thus it is appropriate to focus on the support of students’ social motivation through external motivation agents, such as variable awards, contests, competition [7] or tools, which are commonly used in outside classroom sphere of social media, such as the option of sharing, approving comments and likes, that increase social presence [4].

3 Interface in Learning

“Everybody is a genius. But if you judge a fish by its ability to climb a tree, it will live its whole life believing that it is stupid.” –Albert Einstein

User interface specifics for learning purposes are dealt with by Marcus. The Learning Machine’s primary objectives are the following: Combine information design/visualization with persuasion design; persuade users to adapt their behavior and lifestyles to include better understanding of engagement, exploration, explanation, extension, and evaluation in the learning process; and apply user-centered design along with persuasive techniques to make the Learning Machine highly usable, useful, and appealing, thereby increasing the efficiency and effectiveness of users’ efforts of knowledge-acquisition and retention behaviors [4]. Due to the fact that mental load on the user is considerable during the learning process, further load, caused by inappropriately designed interface, is not desirable. From ergonomics point of view, mental load is much more demanding on the user than the motoric load, and that is why the key demand on the learning interface is intuitiveness and simplicity [7]. That way, it is not necessary to concentrate on absolute minimum of operations connected with certain action, but on agreement of the concept with mental model of the user. This is the reason why use of design patterns, that observe the cognitive consistency, is advisable.

From the point of view of content, it is important to realize in which way and form the information will be distributed. In this respect, asking the following questions is useful: Is arrangement of information linear or is it interconnected? Is information processed dynamically, as in case of simulation? Is it administered in a parallel way, is it possible to transform information of one type into another type of information? In this case, selection of solution, which well reflects student’s preferences according to

How would you prefer to learn online?

Item	Score	Overall Rank
Video-recorded lecture	males 84	1
	females 91	
Online textual materials	males 35	2
	females 7	
Video conference	males 21	3
	females 35	
Textual chat/forum	males 14	4
	females 21	
Slides (PPT)	males 14	5
	females 21	
Conference call	males 7	6
	females 0	
Sound-recorded lecture	males 0	7
	females 0	

Fig. 1. Students’ preferences in the learning form context (Brejcha et al. 2014)

learning typology, should be made [14]. Outcomes of 2014 research carried out by Brejcha et al. at Sino-European Usability Center can be used as an example [15] (Fig. 1).

User interface of e-learning systems must be, on the top of all the requirements mentioned above, highly motivational. Keeping to several general principles that influence users in a positive way is advisable, according to Weinschenk. She works on the assumption that the closer the users are to the goal, the more motivated they are, and that is why she suggests the goals be visualized and kept visible during the whole course of the learning process. Furthermore, she emphasized reward variability – with regard to the time interval as well as to the number of reactions –, progress monitoring, control over performed activity and last but not least adequate competition environment [7]. Apt example of implementation of plausible reward system is Open Badges Veriod system [9], independent platform for issuing and collecting of digital verification badges. They work as a certificate, universal manner of recognition, documentation, and sharing of life achievements.

4 Ergonomics of E-Learning User Interface

User interfaces of EdX and Coursera MOOC as well as the interfaces of online courses of the largest Czech universities (Charles University Prague, Technical University of Ostrava, Masaryk University of Brno, University of Pardubice, and University of West Bohemia Pilsen) are being analyzed within “Concept of Adaptable UI for Online Courses” framework. For the interfaces of above mentioned courses, highly specialized content is typical, which is being offered to the wide public. In case of MOOC, we speak about tens of thousands of users, in Czech environment, it is more likely thousands of users. Whereas e-learning environment of Czech universities is meant

especially for Czech users (with the exception of several hundreds of foreign students who study at Czech universities within the frame of ERASMUS exchange program), which means quite homogenous group of users with low age variability, MOOC EdX a Coursera turn to users from all over the world, thus facilitating education to everyone, independently of age, previous education, age or nationality. The only precondition is adequate language knowledge (Figs. 2, 3).

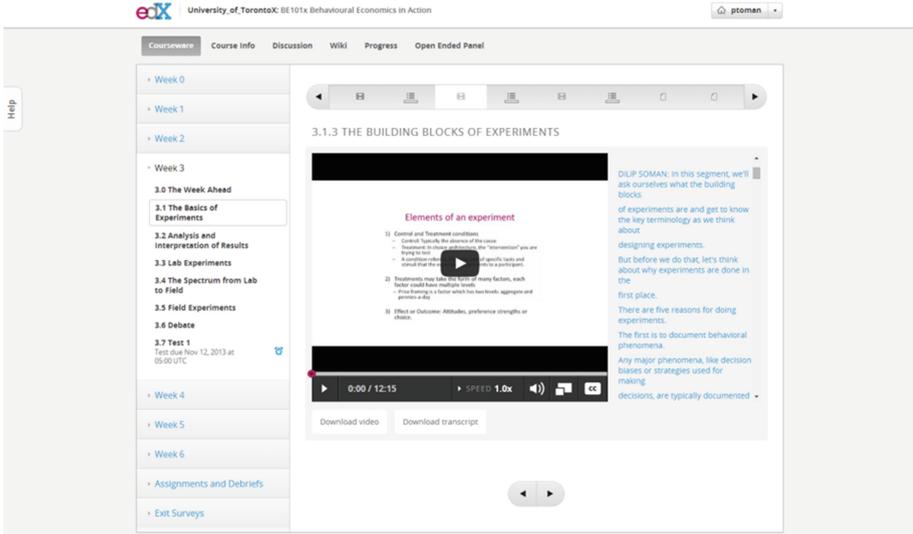


Fig. 2. EdX University of Toronto (retrieved Feb 7, 2015)

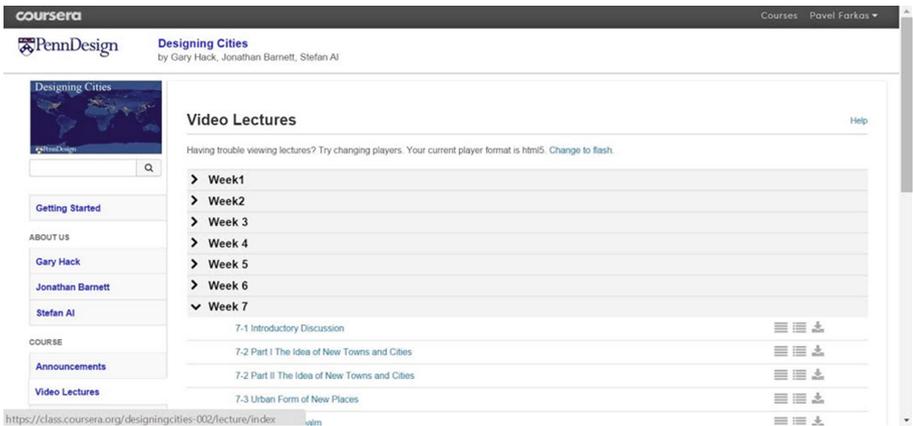


Fig. 3. Coursera University of Pennsylvania (retrieved January 23, 2015)

Outcome of the analysis will be definition of evaluation criteria for UI of online courses and putting together of methodology of UI design for e-learning platforms, furthermore concept of adaptable UI for MOOC e-learning platforms and comparative testing of users (Fig. 4).

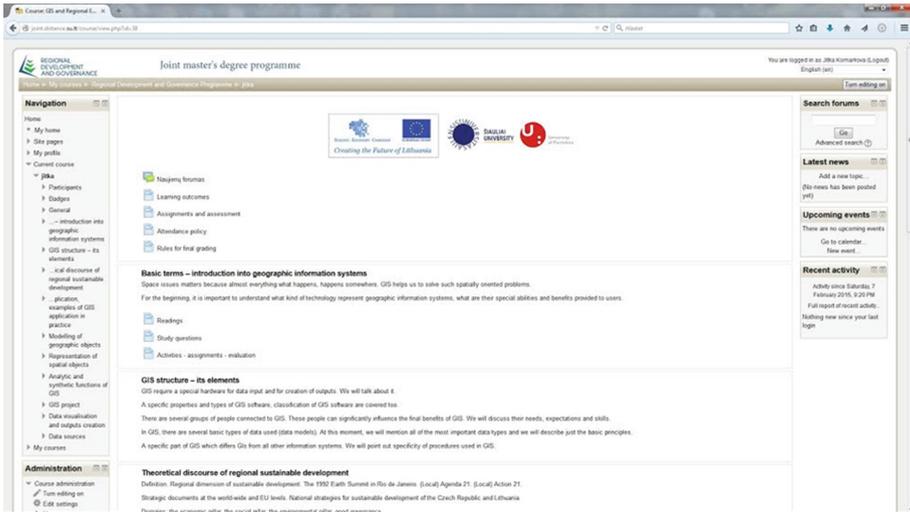


Fig. 4. Moodle University of Pardubice (retrieved February 9, 2015)

4.1 Starting Points for UI MOOC Assessment

Main starting points for UI of e-learning courses examination rise loosely from general evaluation rules and are complemented with aspects related directly with learning process.

In the field of semiotics and information architecture, we base our research on works by Aaron Marcus and Jan Brejcha [16]. In the field of graphics design, we proceed from basic rules of typography and composition, from theory of colors and their psychological and esthetics context, as well as from general marketing strategies. Methodology for Text Creation in Open Internet Space serves as basis for methodological processing of information [18]. In the field of social networks, we draw inspiration from Etienne Wenger's research [19]. Following five fields were defined:

A User Interface Grammar.

Looking at the UI components from the language perspective, we can structure them organically to create a UI grammar. UI grammar is composed of basic elements: interaction sentence, interaction games, rhetorical tropes, interaction phases, and patterns. The grammar elements concern both the noun and verb phrase in a sentence. Discrete elements are the smallest elements to have a meaning. The interaction sentence is a meaningful unit describing a task in a user's interaction. A set of interaction sentences with the same goal form an interaction game. The narrative in UI is made

both by the designer's metacommunication and the temporal aspect of perceiving UI elements. Rhetorical tropes are devices of persuasion and emphasis, often presented as metaphors. Patterns are typical configurations of UI language components in different settings [17].

B Information architecture.

Meaningful interconnection of all UI components maintains consistency and contributes to "making smarter decisions faster" [4]. These UI components are: metaphors (essential concepts in words, images, sounds, touch), mental models (organization of data, functions, tasks, roles of people at work or play, static or mobile), navigation (movement through mental models via windows, dialogue boxes, buttons, links, etc.), interaction (input/output techniques, feedback, overall behavior of systems and people) and appearance (visual-verbal, acoustic, tactile qualities) [4].

C Look and Feel.

Graphical design induces desirable positive emotions that support learning activity. Design includes respecting of typographical rules, use of suitable composition solutions for individual types of display, and use of appropriate graphical elements supporting understanding and amount of their simplification (ranging from simple pictograms to realistic images or 3D models). Furthermore it includes system of visual hierarchy of individual UI elements and also use of color schemes that respect sensory effects of colors and cover individual culture specifics. Global design must support visual comfort of the user – mental condition in user when visual tasks are being solved with minimal eye fatigue and the user feels pleasant.

D Methodology of information processing.

A form of mediated content depending on user styles typology - visual (spatial), aural (auditory-musical), verbal (linguistic), physical (kinesthetic), logical (mathematical), social (interpersonal) and solitary (intrapersonal) [21] - which respects the student's choice and supports new information contraction. Moreover inclusion of gamification elements that help reach users' goals through incentives, loyalty programs, collections, status strengthening, needs fulfillment etc.

E Social Network.

Social environment and the possibility of engagement (social environment, social media, virtual environment). For current users, social media is a natural environment, which supports teamwork and peer learning. Moreover, social media is connected to positive emotions and offers wide choices of motivation agents. Furthermore teaching support, role of the teacher or lector consisting of feedback provision, encouragement, and learner's support.

5 Conclusion

Current e-learning platforms of courses in Czech university environment propose to extend their role from mere support of full-time classes to fully-fledged online courses for wide public. To realize successfully their role, the courses must be prepared and

created with great care. Inspiration can be drawn from current MOOC, even though user interfaces of these courses do not respect learners' individuality, their needs nor cultural manners, which play substantial part in the learning process. The aim of the project is a design of adaptable MOOC user interface, which will support the students in active work, motivate them to progress, influence them in a positive way and make the process of learning easy on them. A set of evaluation criteria for online courses UI creation will also be the result of the research.

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