The failure of e-learning: why should we use a learner centred design

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Key words: learner centred design, learner model, e-learning, usability, accessibility.

Abstract

Why do many e-learning courses fail? Distance learning is generating remarkable changes both in learning and teaching due to knowledge commercialisation and freedom from both spatial and temporal constraints. In spite of this success the educational software and environments did not help students to learn more and better than in traditional training contexts. Studies on human learning process via cognitive models are few; and this results in a more difficult investigation on how human-machine interface features adversely influence cognitive factors in the educational process. Namely several forces act in the complex scenario of the new formative settings, where the users try to simultaneously control the attention both for the lesson and for the interface manipulation. We claim that we must resort to Learner Centred Design principles, which establish a bridge between usability, accessibility and distance learning tools: if the user is involved in every phase of design, this will help to learn and to apply the Human Computer Interaction principles and reduce the evaluation costs. The aim of this contribution is to highlight a specific strategy that could guarantee a good web-based educational design, based on the utmost importance of learner centred design, while helping to solve the problem of assessment of educational process.

1 Introduction

Distance learning is generating remarkable changes both in learning and teaching due to knowledge commercialisation and settings which are free from both spatial and temporal constraints. For this reason many organizations have developed and implemented e-learning courses that are not only independent of geographic and time contexts, but also endowed with versatility and convenience (Miller 2005).

In spite of this changes and the hope to create an improvement of learning and teaching processes as well, the technology innovation did not help users to learn more and better than in traditional training contexts (Najjar 1996, Hansen 1998, Tselios *et al*. 2001, Costabile *et al*. 2005).

Why do many e-learning courses run into failure? Probably, there are different reasons such as the quality of courses, the relevance of content, the level of comfort with the technology, the availability of technical support, the ability to interact with peer learners (Miller 2005), as well as a lack of deep knowledge about the complex interrelation between cognitive factors and the special nature of human-machine interfaces in educational process.

The difficulty in achieving such knowledge results so far in an underestimate of the role of User Model in e-learning design. This is due mostly to the fact that this field is characterized by quick technological changes and high costs for design. Moreover, a reliable assessment methodology for e-learning applications does not exist yet (Costabile *et al*. 2005). On the other hand, User Centred Design plays a fundamental role in determining the success of e-learning: if the system is not usable, students are forced to spend time and cognitive resources to learn its functions and the involved attentional resources are lost without any content elaboration, (Costabile *et al*. 2005).

We claim that, to solve this problem, we must resort to Learner Centred Design principles, which establish a bridge between usability, accessibility and distance learning tools (Squires *et al*. 1999): if the user is involved in every phase of design, this will allow to learn and to apply the Human Computer Interaction principles, as well as to reduce the assessment costs.

The aim of this contribution is to highlight, in this regard, a specific strategy that could guarantee a good web-based educational design, based on the utmost importance of learner Centred design, while helping out to solve the problem of assessment of educational process.

2 Usability, Accessibility and E-learning

Learner Centred Design is deeply interrelated with the concepts of Usability and Accessibility currently employed in User Centred Design. The motto of

the latter is: “Design for All”. It emphasizes the importance of understanding human attributes and needs, and involves the development of products satisfying people requirements.

Usability, according to ISO 9241, is a complex outcome of effectiveness (the user’s ability to achieve specific goals in the environment), efficiency (the minimization of resources used, such as time, money and mental effort), and satisfaction (the user’s comfort level and acceptance of the system). These features are present also in the Formative Evaluation where effectiveness is the achievement of instructional objectives, efficiency represents how quickly learning objectives are achieved and satisfaction describes the user’s interest and desire in learning. Lohr (2000) tries to integrate the basic of ISO 9241 with the formative evaluation, by introducing the “Instructional Interface Design Process”.

In this special context effectiveness describes how much the learner interprets correctly the instructional interface functions, efficiency defines the learner’s experience of a minimal frustration in using instructional interface elements, and, at the end, satisfaction concerns how much learners feel comfortable in the overall environment.

How could usability help e-learning quality? User Centred design begins with the premise that people should be the focus for design activities, and that technology is a secondary issue. If e-learning must put the user at the centre of every design framework, it would be possible to approximate the human model, not only the model of the user and of the person who plans the specific course, but also the model of the person who implements the platform. In this regard it is to be remarked that the adoption of such a point of view entails a number of problems whose correct management should, in turn, require a deep change of educational structures, as well as of their role within society. Namely in most cases practical demands force to introduce a standardization of educational activities, with large numbers of students and small numbers of available hours. No doubt that in such situations traditional e-learning, or even traditional lesson, already constitutes the best available resource. However, we claim that situations of this kind are *per se* unsatisfying and, in a better society, should not exist. While this can appear, at present, as a sort of utopia, it is to be recalled that such an opinion doesn’t entail that we must be content with the actual situation and stop any attempt to improve it. Within this perspective, the introduction of learner centred design framework, while raising a number of practical problems, can induce the need for new targets. And, in turn, this can give rise to small improvements which, perhaps, without a utopian goal would have not been reached.

Moreover, we underline that learner centred design cannot be implemented without a concomitant analysis of the motivations which induce the learner to

learn, or to oppose any educational process. Namely, while in some cases the designer must meet the demands of a user which wants to learn, in other cases the user (typically in highly standardized situations such as the ones quoted before) is not interested in learning. In the latter situation, the problem is rather the one of rousing the curiosity of the student and of inducing new learning goals. We acknowledge, again, that in a number of cases such an individual analysis is not practically feasible. However, this is a deficiency of actual educational structures, which needs to be remedied (and at present there are many attempts in this direction).

We now continue our analysis of requirements for a better quality of e-learning by underlying that course's effectiveness depends on the contents, but also on user's understanding about how to "handle" them in his/her own knowledge management. The platform planning phase is therefore the fundamental link between a good outcome of the overall information architecture and the choices made while defining links, icons, search engines and the various multimedia devices; these choices will determine the effective dialogue level between instruments and the customer.

Usability could help to improve e-learning quality while involving assessment methods.

An ancient problem of every formation basic technology is the quality assessment of efficient service and the effective attainment of instructional goal. Maybe the usability could be, to this regard, the basic parameter for the evaluation of e-learning technologies and systems (Zaharias 2002) but it is necessary to know first what is its actual role within the context of e-learning design even if, unfortunately, we lack usability studies related to distance education.

This is due to three main reasons: time constraints and low perceived importance of usability, focus on the technology rather than on efficacy, efficiency and satisfaction, little sensitivity, at the decision making level, to usability issues.

According to Feldestein (2002) heuristic usability testing techniques probably could just be a starting point to integrate usability in e-learning context. The purpose of the heuristic evaluation is to identify potential usability and ease of use issues to resolve them before final implementation.

In this regard, an adaptation of Nielsen's heuristics by Squires and Preece (1999) suggested that, to meet usability requirements, e-learning design should provide a match between designer and learner models, navigational fidelity, appropriate level of learner's control, prevention of peripheral cognitive errors, understandable and meaningful symbolic representations, support to personally significant approaches to learning, strategies for cognitive error recognition.

In spite of these requirements, they do not produce a de facto standard neither for usability itself nor for distance education. If this situation does not

change, e-learning could not support formative aims in a different way with respect to traditional education, and therefore would not allow for freedom from both spatial and temporal constraints.

The evaluation of e-learning tools could start also from a careful assessment of accessibility issues. Through W3C1 guidelines, WAI (Web Accessibility Initiative) explains how to make Web content accessible to people with difficulties or disabilities. However, while following them, we will also make Web content more easily accessible to all users, whatever be the user agent or whatever constraints they might be operating under. The guidelines address two general themes: ensuring graceful transformation, and making content understandable and navigable. They stress the need for respecting three main priorities: 1) a Web content developer must prevent one or more groups of users from finding it impossible to access information in the document; 2) a Web content developer should prevent one or more groups of users from finding it difficult to access information in the document; 3) a Web content developer may prevent one or more groups of users from finding it somewhat difficult to access information in the document.

Usability and Accessibility should be the basic parameters for the evaluation of e-learning technology and systems if they work in synergy in the Learner Centred Design (LCD) approach. This is the aim of Learner Centred Design: know how learners prefer to learn, understand their motivation or stimulate the engagement in online learning, what are their needs or how they feel comfortable when using online applications (Miller 2005).

3 Learner Centred Design

Soloway *et al*. (1994) were the first who identified the need for a LCD courses and technologies. A LCD approach is based on the knowledge of the users and their different characteristics: how learners prefer to learn, how they are learning the information, under what pressures the learners operate in their day-to-day life, their motivation or incentive to engage in online learning, what constraints they face, what special accommodations they need, how they feel comfortable the online applications used, what experience they have with e-learning (Miller 2005).

In parallel, we are convinced that it is necessary to analyze learner's attitudes towards technology that could be key determinants in predicting student motivation and success. We call these attitudes *cognitive representation of technological tool*, that is the opinion on the potentialities that the user forms when interacting with the machine as well as the knowledge acquired about its

1 The World Wide Web Consortium (W3C) develops interoperable technologies (specifications, guidelines, software, and tools) to lead the Web to its full potential.

functioning. The importance of this opinion stems from the influence it produces on the human-machine interaction: several papers (Correard, 2001; Becker *et al*., 2002) showed that a negative opinion on a technology has significant impact on users in inducing incomplete or ambiguous concepts of the related tools. This means that approaches to a tool and its usage are strictly related to the particular image that users have according to personal experiences, expectations, thoughts and stereotypes.

Every tool is endowed with features which make its operation evident and easily understandable, that is all actions that can be performed through it as well as their meaning. In general, tools do not carry only information on these latter, but are often associated with uses and believes mostly determined by practice, including difficulties and problems arising when interacting with them, allowed and denied opportunities and skills required for a correct usage. These variables can have a substantial influence on the ability in finding out the correct way of using the tool under consideration (Todman 2000; McIlroy *et al*. 2001).

Understanding learners' profiles is the best way to create useful designs, styles and tones, but, when delivering training via online learning, there are some special design concerns that represent other potential benefits in planning. They start from a common step: select a delivery technique or combination of techniques in order to define, a priori, a user interface design. Design of course's interface is critically important (Jones 1994), because it has a positive or negative impact on user performance (Tselios *et al*. 2001).

Then it should be desirable to use screen-friendly fonts and web-safe colours in order to create a standard consistent look and provide quick download times and help users by providing printer-friendly pages. According to Norman (1998) the interface should be also interactive and provide feedback, have specific goals, motivate, communicating a continuous sensation of challenge, provide suitable tools, avoid any factor of annoyance interrupting the learning stream.

LCD should take into account that: learners are sensitive to the readability of on-screen text. Therefore formatting and spacing of the text as well as colours are important. Moreover a common look helps users to distinguish course pages from external linked hyper-pages. People do not like studying texts from the screen and they do not want to go more than three clicks far from the main page, so they need a navigation frame always available. Learners are always in search of something new inside the web. It is therefore important to update frequently contents and news and also give a direct indication of what is new as soon as possible (Van Rennes *et al*., 1998).

So far we have discussed some important issues in generating LCD user friendly applications, but we stress that LCD is primarily a process to integrate unbiased user feedback into each step of the planning phase. According

to Murphy (2004) a LCD-based design procedure should follow the phases described below:

- define the target audience to produce a general descriptions of the users. This information is used to identify a useful design;
- conduce a user task analysis to understand the users' goal and their mental models;
- generate a prototype to define how the system works from the user interface perspective and to test it on real users;
- test the prototype with real users using the evaluation methods available;
- create a beta version of the system and give out it to a restricted number of users for evaluation. Unlike the prototype this version incorporates all the functionality available in the final system;
- the UCD process continues to evaluate the system after it is launched improving it from the users' perspective.

As regards the last point it is to be taken into account that in most contexts this improvement cannot occur by following a "thrust and parry" strategy based on an immediate interaction with users. Namely, software engineering is characterized by a number of demands, and often they can be better meet by resorting to a careful experimentation, performed offline, whose aim is to investigate the cognitive processes of the users after a suitable period of interaction with a prototype software.

4 Conclusion

E-learning is generating fast and deep changes both in learning and teaching, but, nevertheless, the educational software and environments actually in use in this domain did not help students to learn more and better than in traditional training contexts. This circumstance leads to a failure of many e-learning courses. What is the reason? It could be found both in user's information processing strategy, and in a lack of evaluation studies concerning cognitive models of human learning process underlying the design of software actually in use.

Starting from the experience made by people dealing with usability and accessibility issues it is possible to identify a synergic strategy to solve the problem of e-learning failure: the Learner Centred Design approach.

Investigation in LCD could provide an interesting output in the direction of learning optimization, assure accessibility to every user, grant for the fruition of a useful product to all recipients and assure a perfect integration between the knowledge content and the different devices employed. It is just in this delicate field that Human Computer Interaction, educational experts and designers must collaborate to understand how to design a successful tool.

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