Lifelong learning and e-learning 2.0: the contribution of Usability studies

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Abstract

Usability assesses how easy and efficient the use of ICT interfaces is, its measurement may show if and how much a tool allows its users to accomplish their tasks with profit and without an excessive load, according to the designer's goals and expectations. Therefore Usability tests with users can help in designing web interfaces, which are efficient and easy to use. In the current development of web environments one sees the emergence of the RSS, blog, wiki, podcast technologies and the diffusion of web 2.0 interfaces. In this paper we pose the question of how to ascertain the role of Usability of new web 2.0 interfaces by testing a personal learning environment, LTEver, which allows document sharing and discussion within a community of learners. Results obtained with 10 novice users show that Usability problems within LTEver, related to web 2.0 interface, are similar to those commonly found within web interfaces, but do not affect the perception of utility and potentiality of these new tools and of new web 2.0 environments.

1 E-learning 2.0 and lifelong learning

It is expected that in Schools and Universities will soon appear students belonging to the *net generation.* That is, students who will not need instructions to be able to find a paper in the internet, to use software for document sharing or for communication and discussion with their peers or with teachers.

As they will be expert in navigating and in using social software tools they will profit of the new media so to reshape the old tasks (writing, expressing, and finding) in new exploratory learning situations.

They are coming, even if the majority of present students and users are not yet able to use the new technology with confidence.

Furthermore, the portion of population which cannot use the new technology is decreasing. Soon we will have a population of less young users who have acquired in the past the ability to use the computer, who use it daily with an expert approach, who browse confidently to find information and can use complex systems. These are new users, who are autonomous, motivated and responsible. And demanding, because learning is only one of the sides of their life, one of the activities they have to accomplish, and often it is not the most important. They have to race with other responsibilities: work, family.

Therefore, even if they appreciate the new teaching and learning tools, they want to be sure of their advantages. They can discard these tools and replace them with others which allow accomplishing similar activities with a lower effort, in a shorter learning time. These are the reasons why it is advisable to keep in mind that a tool may be difficult to use, that in some respects it may be not completely satisfactory, that it can be improved so to make its use easy and pleasant.

We shall list some criteria for the evaluation of software, starting from a more general inventory, which define some of the macro-areas to be examined. Then we will describe the criteria which belong to Usability studies, which will be used to analyse a specific personal learning environment: *LTEver*. This is a community for educators, students, researchers and guests who ask for an environment which allow sharing and collaborating in a permanent way.

1.1 Criteria for the evaluation of social software

In a recent paper Giacoma (2007) suggests some criteria for the evaluation of social software that might be useful to detect some of their weaknesses.

The first of these criteria asks to assess whether the program satisfies a “primary” need of the users, that is if it carries out a task useful for the user: the need for collaborative writing will give form to a *wiki*, the need to write documents will give rise to a word-processor, the correspondence between need and function will favour use and diffusion of the program.

In the second place, there is the need to assess if the program can easily fit in the flow of the necessary daily activities of the user, or else, if it interferes with them. A program may allow performing an important activity, or it can be so friendly that it doesn't interfere with other tasks, or it may be tied with other more relevant activities and be processed by "contiguity". Those who use *Myspace* or *igoogle* may give such a relevance to those virtual spaces that they frequent them more than once a day; a similar fate can concern also a personal learning environment like *LTEver*.

Finally, it worth considering whether the program takes into consideration affective, social, emotional needs of the individual, and between these curiosity and aggregation needs. If yes, it is very likely that a sort of "addiction" will take place, which will lead to an extended attendance.

A program will have high chances to be used only if: a) it will allow performing useful tasks, b) it doesn't interfere too much with other daily activities, c) it creates the need to be used, to contact one own community, otherwise it will be easily replaced by programs better suited according to these criteria.

To these general criteria it is useful to add those indicated by Web and Software Usability studies. These studies investigate if a user succeeds in performing the activities implemented by designers, with ease and satisfaction. These are factors which can contribute to fidelity to and dissemination of a certain software or web site, or else if lacking, may cause their decay and dropping out.

2 Usability value into web interfaces vs. web 2.0 interfaces

The quality of a computer product is usually defined as usability. Usability is "the capability to be used by humans easily and effectively" (Shackel, 1991, p. 24); and "the effectiveness, efficiency, and satisfaction with which specified users can achieve goal in particular environments" (ISO, 1998, p.2) Within the area of Human-Computer Interaction (HCI), usability is one of the most investigated aspects of computer systems, since usable systems allow to shorten the distance between technology and humans (Hornbaeck, 2006).

The transfer of HCI knowledge to the web-based technologies led to the development of fundamental principles, methods and hints to improve the quality of the web environment. In order to facilitate the access and the navigation, the web interfaces should provide a user-friendly context that does not cause interaction troubles and idiosyncrasies (Gerbino & Rigutti, 2000). If a web site does not allow getting information in a simple and immediate way, to clearly predict the position of the link-buttons, or to use the available resources without uncertainties or doubts, this may cause confusion or frustration in the user or strain his patience. One can state that the usability of web interfaces has a fundamental value since that the user tests the web site's usability before performing any action (like a

business transaction, file downloading, using any service or joining a mailing list). This marks a difference with software packages, which usually are first bought by customers and, only afterwards, tested (Nielsen, 1999).

An Internet user has more power than a shop customer; he can test and use a web interface before deciding for a long-term use. He shall be more selective, in choosing, among similar service offers, the web sites that guarantee an easy interaction.

Within such an environment, which provides the users with a potentially unlimited freedom of choice, the growing availability of web 2.0 tools has recently determined the development of tools characterized by their social dimension (social networks).

The new opportunities of use, production, diffusion and sharing of web 2.0 contents is changing the user from being a passive watcher into an operative actor (within social environments and communities).

Contrary to standard web interfaces, web 2.0 interfaces are not an exclusive prerogative of computer scientists and web-developers, but can be handled by ordinary users/actors. In such an emerging form of Internet, the user/actor uses the web environment as a platform within a open access world based on online free software. *RSS* technologies, blogs, wiki, podcasts spread like wildfire. In January 2007, the 56% of Italian web users, (11 millions and 380 thousand people), has visited at least once a web 2.0 site (Nielsen//NetRatings).

The current issue of web 2.0 is the quality of the interaction in terms of the ease of use rather than in terms of contents produced by the user. Given that any user/system interaction can be supported by the design and development of user-friendly interfaces, we claim that the usability value is fundamental for this new collective modality of communication/action. A web 2.0 user should be offered usable tools to perform different types of actions (like publishing a *blog*, working with a *wiki*, accessing to a social network) without running into usage barriers nor needing a tiring adaptation to the system.

The power of web 2.0 stands on the promotion of the contents' sharing among users and the development of new forms of relationships and socialization. However, the potential of online collaboration-production-diffusion activities can be hindered by factors regarding the design of the user interface. The interface (Hammond, Barnard, Morton e Long, 1987) regardless of the interaction typology, being it mediated by web or web 2.0 technologies, should be both physically compatible, (with the characteristics of human perception and actions), and cognitively compatible (with the characteristics of human communication, memory and problem solving). Although this assumption is widely acknowledged, several web 2.0 sites do use excessive graphics, hindering usability and accessibility (Nielsen, 2007), and violate the most common rules of web design (Nielsen, 2005).

3 LTEver: a web 2.0 usability study

It is largely agreed that, in order to better understand the web experience as a whole, we should study the users, identifying the usability requirements of the different solutions implemented by the interfaces. Starting from such an assumption, we conducted a usability testing of the *LTEver* platform.

LTEver (fig. 1) is a *learning landscape* of the LTE community (Laboratorio di Tecnologie dell'Educazione, University of Florence, Italy), that is a system of *social networking* based on tags. Users can make a personal blog, memorize RSS resources and use a file repository. *LTEver* is a participation environment that allows the development of communities and knowledge building. As such, this platform can be considered a tool for informal lifelong learning.

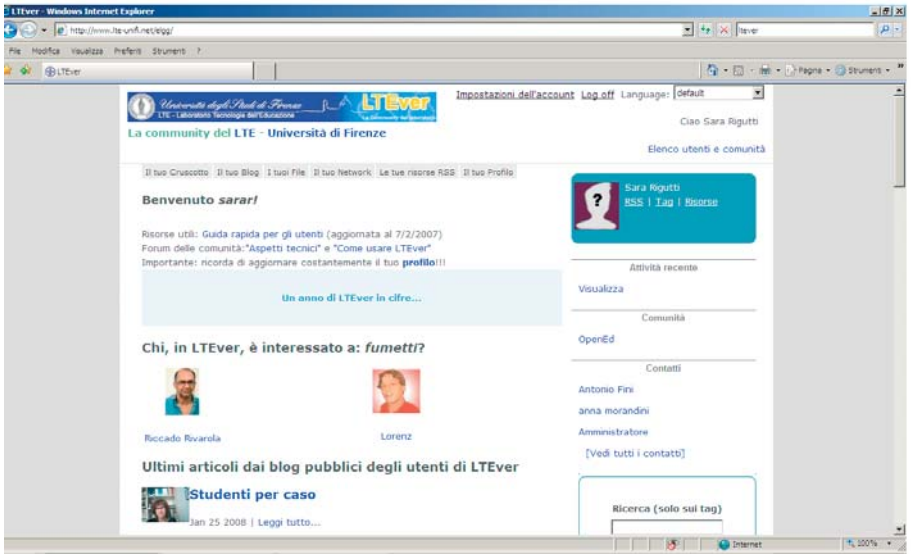

Fig.1: LTEver Homepage, web 2.0 platform

3.1 Method

Usability testing is based on a combination of empirical methods ranging from psycho-social to psychological techniques. The organization of a usability test requires the participants' selection, the presence of an experimenter, the identification of the user tasks. Tasks' selection is carried out considering specific problems that user might encounter while interacting with the system under examination (Nielsen, 1999). During the test execution, the experimenter observes how the participant solves the tasks and takes notes of the user actions, the buttons he used and the pages he visited. The analysis of the cognitive processes

underlying the interaction is performed by the *thinking-aloud* technique (Ericsson & Simon, 1984). Users are asked to verbalize all their behaviors during the test. The experimental sessions are recorded and submitted to protocols analysis. The main advantage, specific of such a technique, is that it allows for collecting qualitative measures of problem-solving strategies, of the interface capability to enable the target achievement and of user satisfaction.

3.2 Research plan

Our *LTEver* usability test was run, according to the rules developed in the relevant literature (Nielsen e Landauer, 1993), with ten participants, who have never visited the platform before. They were administered a paper presentation of the research and an auto-evaluation questionnaire on web 2.0 usage. Next, they were asked to perform with *LTEver* three specific tasks: (1) to build a *blog*, (2) to search for documents about "e-learning", (3) to join a community.

The experimental session was followed by an interview on web 2.0. Results shall be reported in terms of "usability problems" so to emphasize the aspects of the platform that need to be reconsidered in order to reduce the impact of the design errors of the interface. Only those usability problems that have been reported by the majority of our participants hall be discussed

3.3 Results

The observed participants/*LTEver* interaction has revealed different usability problems as related to the navigability, the efficiency, the easy to learn and remember the investigated system. However, all observed *LTEver* usability problems can be ascribed to design obstructions of the interface. None of the participants expressed negative opinions about *social networking* as well as about the opportunities of a collaborative online space such as a participation knowledge building web environment. These social aspects, that are a prerogative of web 2.0, were explicitly accounted for as the intrinsic value of the examined system. The positive attitude of participants for web 2.0 tools (blogs and forums) was corroborated by the interview's data, where they generally reported appreciation of the active role and the utility of these tools in the academic and didactic world.

With regards to *LTEver*, participants referred that the use of the platform was not easy to comprehend but required a phase of learning. Interviews' data showed that the *LTEver* tools were perceived as adequate and sufficient.

3.3.1 Navigability

The tests showed some gaps in the *LTEver* navigation system. The lack of links' predictability, the lack of buttons to perform basic actions (i.e., "back to the

Homepage"). The lack of available links' predictability hindered the information recovery during the experimental sessions, given that participants were not able to predict at a glance the destination page. An example for this usability problem concerned the task in which the subjects were asked to search for "e-learning" documents. Participants searched them by using the *tag cloud* or the search engine available in the Homepage. When they used the *tag cloud* they judged negatively the superimposition of the words and their scattered arrangement. This type of visualization prevented an easy identification of tags. When the participants utilized the search engine the system visualized pictures as results, while the participants expected for textual links.

The *LTEver* navigation system did not provide a "Homepage" button. The link to the "Homepage" was hidden within the logo in the heading area. Participants expressed frustration derived from their inability to identify this main button. Moreover, both the *persistence* and the *competence* of *LTEver* could be improved. We recall that an interface provides *persistence* cues when it allows comprehending what it offers and what is the system mission, while it provides *competence* cues when it makes easy and understandable the interaction of expert and novice users (Visciola, 2006). In the specific case of *LTEver* Homepage, the vast majority of our participants expressed the impossibility to unambiguously identify the offer of services, tools and contents on the base of visual cues of the interface.

3.3.2 Efficiency

Results on system *efficiency* - defined as a function of the amount of resources involved when achieving a target - are more positive than those obtained for *LTEver* navigability. The actions requested to make a blog and to interact with other users were judged to be effortless and intuitive. However some usability problems were observed during the action of registration for a community (*OpenEd* in the test). Indeed, the specific link to the list of the communities was judged to be barely visible and the registration procedure resulted to be not clear. The participants showed confusion aggravated by the absence of a feedback for the end of the registration procedure.

3.3.3 Ease to learn

According to the usability guidelines (Nielsen, 1999) the functioning of a system should be *easy to learn* and the required information to operate on commands and controls should be immediately available. In *LTEver* the building of a blog satisfied this requirement being judged to be *easy to learn*. The label *Your Blog*, within the top of the Homepage, was detected promptly and promptly understood. Analogously, the actions to complete a blog were easily

learned. By contrast, the registration for the *OpenEd* community required a long sequence of actions that the users generally failed to learn.

3.3.4 Memorability

The functioning of a system should be *easy to remember* even after a long time since the last access. In *LTEver* we observed that, during the testing session, the participants showed trouble in memorizing the different interaction procedures involved in the interface. For instance, when the participants needed to go back at a visited page, they generally failed to remember the navigation path.

4 Conclusions

New online e-learning tools are, or soon will be, available, to new, more and less expert, users. Such new users will enter communication and sharing networks, joining communities. The persistence of this participation shall depend on the features of the interfaces within which the users shall interact. How to analyse such interfaces? In this research we used the Usability studies. We asked what happens when less expert users happen to interact with a complex web environment and whether we can identify those aspects that mainly affect the navigation difficulties. We expect that such results may be useful towards the improvement of the functions of such systems, in order to offer easier use also to the fewer experts.

The subjects involved in this research expressed their positive attitude towards community web tools, and reported some problematic issues of the examined platform, whose content and functions were evaluated interesting and noteworthy. Specifically, some difficulties appeared in handling some interaction functions, due to the absence of a Homepage button, the unpredictable placement of links, the complexity of certain operations and the lacking of clear feedbacks.

It appears that only some, amendable, weak points in the system usability, comparable to those of many usual software and web interfaces, have negatively affected the quality of interaction.

In conclusion, Usability of web 2.0 shows a landscape similar to the one typical of previous computer technology. Also for web 2.0 a continued effort is required in order to accurately undertake the user's viewpoint.

Current knowledge on human perception and cognitive processes, when appropriately applied to innovative design stages, shall allow to achieve increasingly higher quality standards which will enable an even wider and faster diffusion and acceptance of web 2.0.

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