

**PROFESSIONAL EDUCATION**

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**Abstract.** Usability has been a hot topic for many years, adding a new dimension when the World Wide Web was introduced and adopted. Many studies have been made on usability evaluation methods in many specific areas, however not so much in E-Learning systems. This study is a report of the latest results review obtained during the scientific research of the author. This is a report on the use of combined both usability evaluation method for E-learning systems and ergonomic expertise. The main purpose of the review is to draw a picture for further researcher who is going to look into the field of usability evaluation for E-Learning systems and its ergonomics.

**Keywords:** e-learning tools; ergonomic criteria; ergonomic expertise; usability evaluation; usability evaluation method.

**1. Introduction**

Organization and Educational institutions have been investing in information technologies to improve education and training at an increasing rate during the last two decades. It makes learning from “far away” and “life-long” become possible thanks to Information and Communication Technology.

Electronic learning (e-learning) is identified as an enabler to achieve such goal and receiving considerable interest from software development industry. Just like “e-learning” is a compound word comprised of the abbreviation for “electronic” and the word “learning”, e-learning system blends new information techniques into teaching-learning process.

Comparing to traditional face-to-face education, not only can e-learning be as influential as the traditional teaching and learning style, but also does it provide a more flexible way of training and learning services to learners with the nature of “any time, any place”.

There is a need to focus on an appropriate evaluation of e-learning tools because in recent years e-learning technology is increasingly join in the learning process.

But along with this it should be noted that to achieve maximum results it is necessary to add to the evaluation of e-learning tools more and ergonomic expertise of “conditions” under which this learning is taking place.

As mentioned previously, consolidated methodology for usability evaluation of e-learning tools doesn't exist yet, but there are many methods you can use to perform an appropriate evaluation of the usability of these tools.

This issue is the subject of many works of foreign and local researchers.

As for questions of ergonomic expertise, there are also many works.

Most important of them are relevant standards that regulate and establish appropriate requirements.

A key place is given to the International Ergonomic Association and the International Organization for Standardization

But on the parallel conducting of usability evaluation of e-learning tools and ergonomic expertise, in this context, are not mentioned.

Therefore, the author raises the question of conducting usability evaluation of e-learning tools and ergonomic expertise together.

And also the author notes that only joint evaluation of usability of e-learning tools and ergonomic expertise can provide the highest level of training, because there are not only talking about user interaction with computers, such as electronic learning tools, as well as with the environment in which this user is.

## 2. Analysis of research and publications

Questions relating e-learning tools, their quality, evaluation and methods by which this evaluation can be made, raised many foreign researchers, as well as domestic.

In particular, [1, 8] defines the very concept of usability.

However, despite widespread use of e-learning, the critical examination of its usability is a newer field [18].

For example, some higher education institutions have developed web-based learning applications and tools without adequate consideration of usability [20].

Other studies [9, 19] show that although there are many reasons for high attrition from e-learning programs, such as irrelevant content and inappropriate use of technology, the major factor is poor usability of e-learning applications.

There are various UE methods and selection of appropriate UEMs depends on various factors [2, 6, 7, 10].

There should be an integration of usability, didactic effectiveness and learning issues in such evaluations [2, 5, 11, 13].

This is a fairly small sample of researchers of human-computer interaction and usability evaluation methods and their works.

As for the ergonomic requirements of work on PC and most ergonomic expertise, it is, first of all, a large number of state standards and sanitary norms that regulate them.

The most complete regulations to ensure the safety of PC users are State sanitary rules and norms of work with computers video display terminals [16].

Also the organization of the workplace must ensure compliance with all elements of the workplace and their location to the requirements of SS 12.2.032-78 "SSBT. Workplace when sitting. General ergonomic requirements" [14] and SSRaN 2.09.04-87. "Administrative and domestic buildings" [15].

Also a huge number of authors paid their attention to the question of ergonomic requirements for the organization of work on PC.

But despite the large number of papers on how usability evaluation of e-learning tools and ergonomic requirements when working on the PC, they are not considered jointly, but singled out.

## 3. The purpose of the study

To analyze the usability evaluation of e-learning tools and ergonomic expertise, and show the

importance of them holding together in order to achieve the highest level of training.

## 4. Evaluating the usability of electronic learning

For the usability evaluation has been given considerable attention, as mentioned above. In particular, key aspects concerning the usability of e-learning and evaluation of them have been highlighted by the author in [3, 4, 17] as well as in printed materials and abstracts of international conferences.

Usability was identified as the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context.

Usability of e-learning applications significantly affects learning, since learner interactions with e-learning interfaces should result in true learning rather than in successful completion of tasks.

As well as being a computing system, an e-learning product is also tutorial matter.

The effectiveness of learning and users' satisfaction with a resource are therefore part of its usability.

Usability evaluation is concerned with gathering information about the usability or potential usability of a system, in order to assess it or improve its interface by identifying problems and suggesting improvements.

Usability evaluation plays a fundamental role in a human-centered design process.

Numerous different approaches to the assessment and measurement of interaction between users and systems are known.

Every one of them considers usability in terms of a number of criteria which formalize the user behavior to be supported, and provides usability objectives at an appropriate level.

These different usability evaluation methods have been studied according to all requirements and terms.

And as was mentioned in [3] the author chose for usability evaluation of e-learning applications for educational purposes the survey evaluation.

A questionnaire survey and interview were selected, for the evaluation among learners.

But also, in the process of working on this issue and during the study of usability evaluation methods, different techniques and appropriate requirements the author decided to take as a usability evaluation method a combination of questionnaire survey and heuristic evaluation.

Questionnaires are one of the most established techniques of collecting users' opinions.

They generally consist of closed or open question structures.

Open questions are those where the respondent can express his/her own answer freely, whereas closed questions require him/her to select an answer from a choice of options provided.

Though open questions provide a rich source of data, the data is more difficult to analyze than that from closed questions.

Before carrying out a survey, questionnaires should be prepared, reviewed with colleagues and pilot-tested.

The design of how the data will be statistically analyzed and presented should also be done, before the survey is conducted, if the study is to be successful.

Questionnaires are a good query method of collecting information for evaluating a system, they have the disadvantage of being less flexible in comparison to some other methods, such as interviews.

This is because questions are predetermined and fixed for all users, and not customized to individuals.

However, questionnaires have the advantage of reaching a wider subject group as compared to interviews, and are cheap and easy to use.

Heuristic evaluation is an informal usability inspection technique where experts, guided by a set of usability principles, evaluate whether a user interface conforms to these principles.

These principles, or criteria, are referred to as heuristics.

Heuristic is a guideline or general principle, or rule of thumb, that can guide a design decision or be used to critique a decision that has already been made.

Heuristic evaluation is one of the most established and cost-effective technique for usability evaluation of systems.

After analyzing these two usability evaluation methods, the author offers as a method of usability evaluation using a combination of these two methods. Evaluating the advantages and disadvantages of both methods, we can conclude that combining them, you can get the most complete assessment of the usability.

## 5. Ergonomic requirements for work on PC and ergonomic expertise

The goals of ergonomics are to decrease risk of injuries and illnesses (especially those related to the

musculoskeletal system), to improve worker performance, to decrease worker discomfort and to improve the quality of work life.

The quality of the design and efficiency of operation of "human – machine – environment" system is largely dependent on ongoing monitoring of system's ergonomics parameters and factors influence its functioning. Such a monitoring and analysis of the data referred ergonomic expertise.

The purpose of ergonomic expertise – improving the socio-economic efficiency of the system "human - machine – environment", its comfort and determine compliance with rules and standards adopted for these systems.

The object of ergonomic expertise can be both system as a whole and its constituent elements, can be explored like the real prototype systems and their models (the projects).

You can divide the workstation requirements of PC operator into several categories:

- workplace ergonomics;
- requirements for the production environment: the level of illumination, noise, vibration, electromagnetic radiation, climate;
- requirements for visual display of information (displays);
- requirements for peripherals (printers, scanners, audio equipment, etc.).

All these requirements are regulated by the relevant state standards and sanitary norms. And, according to them, compose so-called "control sheets" or "questionnaire" to assess conditions at work on a PC or other words of ergonomic expertise.

## 6. Combining of usability evaluation

The importance of combining usability evaluation of e-learning tools and ergonomic expertise of workplace, where is the interaction of the user (the learner) directly with e-learning tools using a personal computer, is obvious given the above.

If the importance of usability evaluation of e-learning tools is obvious, to improve learning, facilitate the study of the e-learning tool by the user, reduce the time of training and other criteria.

If the importance and necessity of ergonomic expertise of workstation with PC is obvious, for consideration and providing the necessary ergonomic requirements from anthropometric and physiological directly to the arrangement of the workplace and all facilities (monitor, peripherals, etc.).

Then, implementation of these procedures in combination can increase the desired result in

several times in achieving the goal of improving the quality of education. It's precisely, increasing the quality of education is the main objective of usability evaluation of e-learning tools and ergonomic expertise.

## 7. Conclusions

The characteristics of usability evaluation of e-learning tools and ergonomic requirements when working with computers, and features of ergonomic expertise were considered in this paper.

A brief overview of selected earlier in [3] method for usability evaluation was given.

The strengths of questionnaire and heuristic evaluation was given.

And the arguments in their favor was given too.

Main groups of ergonomic requirements, which should proceed when planning an ergonomic expertise were submitted.

The importance of usability evaluation of e-learning tools and ergonomic expertise as independent procedures that improve the quality of education was shown.

Also the importance and necessity of conducting them together, in order to ensure the maximum increasing in the quality of education were shown.

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**О.Ю. Буров<sup>1</sup>, О.Р. Царик<sup>2</sup>. Поєднання оцінки юзабіліті електронних засобів навчання та ергономічної експертизи**

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Проведено аналіз оцінки юзабіліті електронних засобів навчання та ергономічної експертизи. Дано визначення поняттю юзабіліті систем електронного навчання. Наведено критерії, за якими потрібно проводити оцінку юзабіліті та ергономічну експертизу. Обрано метод оцінки юзабіліті. Доведено його придатність у даному контексті. Проаналізовано основні ергономічні критерії. Описано необхідність ергономічної експертизи.

**Ключові слова:** електронні засоби навчання; ергономічна експертиза; ергономічні критерії; методи оцінки юзабіліті; оцінка юзабіліті.

**А.Ю. Буров<sup>1</sup>, А.Р. Царик<sup>2</sup>. Сочетание оценки юзабилити электронных средств учебного назначения и эргономической экспертизы**

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Выполнен анализ оценки юзабилити электронных средств обучения и эргономической экспертизы. Дано определение понятию юзабилити систем электронного обучения. Приведены критерии, по которым нужно проводить оценку юзабилити и эргономическую экспертизу. Выбран метод оценки юзабилити. Доказана его пригодность в данном контексте. Проанализированы основные эргономические критерии. Описана необходимость эргономической экспертизы.

**Ключевые слова:** методы оценки; оценка юзабилити; электронные средства обучения; эргономическая экспертиза; эргономические критерии; юзабилити.

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