

# Usability evaluation of Tesys e-Learning platform

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## ABSTRACT

Currently, e-learning platforms are increasingly used tools in universities to easily and efficiently achieve the proposed educational goals. Students and teachers can choose from a variety of learning platforms that differ both in structure, function and facilities they offer. Under these conditions, usable platforms have much greater chances to be integrated into longer-lasting educational activities than less usable ones. This paper presents the evaluation of the usability of the Tesys e-learning platform developed at the University of Craiova. The results of the evaluation revealed several important usability problems that have to be fixed.

## Keywords

Usability, usability inspection, usability heuristics, e-Learning platforms.

## INTRODUCTION

Nowadays, e-Learning platforms tend to be used more and more, allowing the efficient use of material and human resources in order to lead to the successful accomplishment of educational goals in an entertaining environment. These tools designed to help the teaching and learning process are also called Learning Management Systems (LMSs). Learning Management Systems are specialized platforms that provide educational content by digital means [3].

E-learning platforms are software tools that can have multiple benefits when integrated into educational programs. These learning management systems can be used individually or can be integrated into more complex blended learning programs. Also, e-learning platforms are tools that should meet the requirements to reach educational goals and at the same time respond to the learners' educational needs.

At the same time, e-Learning platforms support the individual or collaborative learning process and allow users to access a range of resources and debates on current educational topics. These learning environments, usually provide tools for synchronous and asynchronous communication between teachers, learners, tutors and even parents.

The Tesys platform has been implemented at the

University of Craiova with the purpose to support the needs of distance learning students.

The purpose of this study is to evaluate the usability of Tesys platform, and to investigate up to which extent this portal is supporting the teachers and students of other study programs.

The rest of this paper is structured as follows: the following section presents some related work in the area of usability evaluation of e-learning systems. Next, the case study and evaluation results are presented. The paper ends with conclusion and future work.

## RELATED WORK

The objective of the usability evaluation of e-Learning platforms is to identify usability problems, to help developers fix these problems and thus improving the usability of the platforms. Davids et al. [2] consider that combining heuristic evaluation and user testing, with each involving a small number of participants, may be an effective and efficient way of improving the usability of e-learning materials. Heuristic evaluation should ideally be used first to identify the most obvious problems and, once these are fixed, should be followed by testing with typical end users.

The study of Ventayen et al. [13] aimed to identify the usability evaluation of the Learning Management System (LMS) Google Classroom, its functionalities, features, and satisfaction level of the students. Google Classroom is one of the free services by Google in Gsuite for Education plan. A standard questionnaire for usability was used to determine the usability based on the perception of students. The results show that Google Classroom is extremely useful in understandability, attractiveness, and operability.

Another study [9] concentrates on the empirical evaluation of the SUS questionnaire in the context of LMSs' perceived usability evaluation. Eleven studies involving 769 students were conducted, in which participants evaluated the usability of two LMSs (eClass and Moodle) used within courses of their curriculum. The results show that the perceived usability of the evaluated LMSs is at a satisfactory level. Analysis of the results demonstrated the validity and reliability of SUS for LMSs' evaluation, and that it remains robust even for small sample sizes.

Harrati et al. [4] also used System Usability Scale in an empirical-based study in order to explore how lecturers interact with an e-learning environment based on a predefined task model describing low-level interactions. Data analysis was conducted to infer the usability degree from the estimated usage metrics together with further exploratory analysis from user feedback via System Usability Scale. Experimental results reveal that the System Usability Scale score is not a sufficient measure to express the true acceptance and satisfaction level of lecturers for using the e-learning systems. The recommendation is that evaluation should be performed in tandem with analyzing the usage metrics derived from interaction traces in a non-intrusive fashion

The study of Kiget et al. [6] aimed to evaluate usability attributes that affect e-learning systems in Kenyan universities. The research took a case study of one of the public universities which has implemented Moodle e-learning system. The study used questionnaires and interviews to collect the information from the respondents. The usability attributes evaluated were user-friendliness, learnability, technological infrastructure and policy.

## CASE STUDY

### Tesys platform

Tesys is a custom build e-Learning platform that was entirely developed at the University of Craiova. There are four roles for the users of Tesys e-Learning platform: student, teacher, secretary or administrator. Most of the users are students, then the role of professor has the next number of users and then secretaries and the administrator [7].

When e-Learning platforms became mandatory for distance learning programs at the University of Craiova the ones available on the market were implementing many unnecessary functionalities. Tesys has been developed incrementally, by adding functionalities while keeping it simple and easy to use. Another important feature is the access to the code which makes Tesys easy to integrate with other information systems available at our University facilitating users to migrate from applications like the one that keeps the students' records to Tesys without a new login.

Tesys offers two different login pages, one for students and one for professors, secretaries and administrators. This approach adds an extra layer of security to the back-end permission set and it allows login from other platforms.

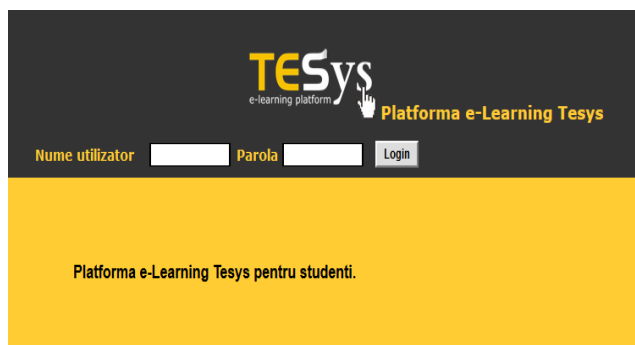


Figure 1. Login page

The platform is currently used at the Faculty of Letters for the distance learning program which was successfully accredited and deployed since 2011.

The main facilities provided by Tesys are learning resources management, possibility to take tests and exams, communication and videoconference. The communication module puts in contact students, secretaries and professors. Each of them has a specific interface that allows them to select other users from a restricted list based on their actual context. For example, a professor can send messages to one, a selection or all the students available to a discipline and a student can contact one or more professors that teach a specific discipline. This pipeline allows users to easily send a message to the desired interlocutors and also it is easy to find them.

Teacher's homepage (Figure 2) provides direct access to the available courses along with several modules that offer information regarding the students enrolled at courses, online students, their logs and their tests results.

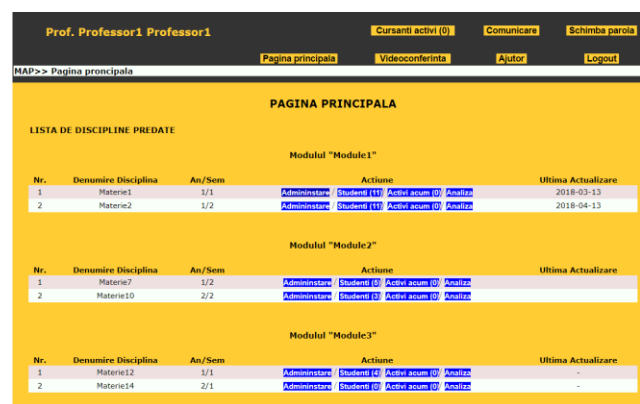


Figure 2. Teachers' home page

On this page there is an analysis module, where professors can see what the results of the students and the tests and their actions are. Communication link offers the possibility to send messages to one or more students or groups of students assigned to one discipline. This module is different from the videoconference module which was designed for live streaming and presentation.

Student's homepage (Figure 3) offers access to courses, personal data, auto testing/exams, videoconference, the year structure and communication module.



Figure 3. Students' home page

The header offers access only to the help module along with a button that returns them from any other page to this

one and the logout button. The personal data link offers the possibility to change some of their data along with their password.

On auto testing module, students can take training tests on one or more courses at their choice or as professors indicated, which is different to the exam module where they take only the test they were supposed to perform.

### Method

Usability inspection is carried out taking into consideration a set of widely accepted usability principles that experts use when evaluating the user interface. Inspection methods can be applied in the early stages of the development process and are less expensive (depending on the evaluator's expertise) [1, 14].

Nielsen [8] has defined the usability problem as an aspect of the user interface which might create difficulties for the user. The usability inspection provides two kinds of measures:

- Quantitative: the number of usability problems in each category;
- Qualitative: detailed description of individual usability problems.

Regarding the severity levels, the usability problems are rated as it follows: major (failure to accomplish the task goal or a significant loss of data or time), moderate (has an important impact on task execution but the user is able to find a solution) and minor (is irritating the user but the impact on the task's goal is not important).

Usability evaluation of Thesis is a case study of task-based usability inspection that resembles the heuristic walkthrough [12]. A set of 14 usability heuristics are used to explain and document each usability problem and to train evaluators [10].

Table 1. The set of usability heuristics

User guidance	
1	Prompting
2	Feedback
3	Information architecture
4	Grouping / distinction
User effort	
5	Consistency
6	Cognitive workload
7	Minimal action
User control and freedom	
8	Explicit user actions
9	User control
10	Flexibility
User support	
11	Compatibility with the user
12	Task guidance and support
13	Error management
14	Help and documentation

The evaluation implied four experts that tested the platform in a task-based approach with the purpose of anticipating the difficulties of a real user. Before starting the evaluation, the evaluators received the evaluation tasks and the set of usability heuristics. Table 2 presents the

evaluation tasks that have been used in the present case study.

Table 2. The evaluation tasks

Teachers' tasks	
1	Adding a home work
2	Adding a new course / document
3	Sending a message to students
4	Verifying a student homework
Students' tasks	
1	Changing personal data in the user profile
2	Downloading a course
3	Sending a message to a teacher
4	Performing a test

The evaluation was performed in two steps:

- Individual evaluation: each evaluator tested the application independently and recorded the usability problems for each task;
- Collaborative consolidation: removing the duplicates, removing the false usability problems, agreeing on a list of unique usability problems, agreeing on the severity rate and finalizing the description.

The consolidation per task of each usability problems was based on the "similar changes" principle [5]. For each usability problem the following information has been recorded: problem, context, anticipated difficulties, cause and suggestions for fixing, usability heuristic violated, and severity.

### Evaluation Results and discussion

#### Teachers' user interface

The number of problems detected by each evaluator varied from 10 to 23 and the number of hits between 10 and 17 with an average detection rate of 29.17%. In the second step, the individual problems have been analyzed in order to eliminate the duplicates and the false problems, agree on the severity, and produce a common problem description.

The collaborative consolidation resulted in a total of 42 usability problems out of which are 20 important (major and moderate), as shown in Table 3.

Table 3. Usability problems per task and severity

Task	Total	Major	Moderate	Minor
1	12	0	6	6
2	8	0	4	4
3	9	0	5	4
4	13	1	4	8
<b>Total</b>	<b>42</b>	<b>1</b>	<b>19</b>	<b>22</b>

Most of the usability problems have been identified when adding and verifying a home work for students. The important usability problems are mainly related to the poor design of the home page, especially to the unclear separation of the title page and menu in the upper part of the page.

#### Students' user interface

The number of problems detected by each evaluator varied from 7 to 24 and the number of hits between 6 and 17 with an average detection rate of 50%. The collaborative

consolidation resulted in a total of 34 usability problems out of which 13 are important (major and moderate), as shown in Table 3.

Table 4. Usability problems per task and severity

Task	Total	Major	Moderate	Minor
1	8	0	4	4
2	8	0	2	6
3	9	1	3	5
4	9	0	3	6
<b>Total</b>	<b>34</b>	<b>1</b>	<b>12</b>	<b>21</b>

The major usability problem was the fail to send a message since the command button was not found. As in the case of the teachers' user interface, the important usability problems are mainly related to the poor design of the home page.

#### Discussion

An analysis of usability problem descriptions shows that the main issue is the user guidance, especially prompting and grouping / distinction. Table 5 shows the usability heuristics that have not been respected per severity (both user interfaces).

Table 5. Number of problems per usability heuristic

Heuristics	Total	Major	Moderate	Minor
Prompting	19	1	10	8
Feedback	8	0	6	2
Info Architecture	5	0	1	4
Grouping - distinction	15	0	8	7
Consistency	2	0	0	2
Workload	10	0	1	9
Minimal actions	6	0	2	4
User control	3	1	1	1
Flexibility	1	0	1	0
Compatibility	5	0	0	5
Task guidance	2	0	1	1
<b>Total</b>	<b>76</b>	<b>2</b>	<b>31</b>	<b>43</b>

Most of the important usability problems are related to prompting (11), feedback (6), and grouping / distinction (8). Overall, the poor user guidance account for about 65% of the usability problems (49 usability problems, out of which 26 are important problems).

#### CONCLUSION

The user interface has a rich functionality and, most important, is actually used by the teachers and students from one faculty. This evaluation revealed several important usability issues that have to be fixed prior to generalize the access to other faculties and / or departments. The priority for developers is to improve the user guidance.

This work was the first usability evaluation of the application. The next version should reconsider the design

in order to improve the information architecture and provide adequate prompting and grouping / distinction of the visual elements.

In the next future the inspection will be repeated on the improved version and a user testing will be carried on.

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