

Outcomes from a SCORM-based course in dotLRN accessible platform

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Abstract. ALPE project (Accessible e-Learning platform for Europe) is currently using dotLRN 2.3.0a2 and delivers accessible SCORM-based courses. This paper presents the accessibility and usability evaluation results as of today. Those evaluations were conducted by both experts and end users and will provide basis for future developments and improvements of the platform.

Keywords: disabled students, accessibility, SCORM, basic skills, market validation, educational standards, e-learning platform, LMS, dotLRN

1. Introduction

The ALPE project, Accessible e-Learning Platform for Europe (EC-029328) is a market validation project partially funded by the European Commission through the European Community Programme “eTEN”. The ALPE project targets European disabled adult citizens who want to improve their basic skills, and hence their employability levels through an accessible e-learning platform.

For this purpose, the ALPE project has set up an open-source, standard-based and accessible e-learning platform. This platform uses dotLRN, the most widely adopted enterprise-class open source software for supporting e-learning and digital communities.

This platform delivers courses from a repository of accessible, multilingual, SCORM-compliant courses on basic skills, which draws on the practical lessons learned on pedagogical and organisational issues relating to accessible e-learning. Basic skills are defined as “the ability to read, write and speak in the respective language and to use mathematics at a level necessary to function at work and in society in general”.

ALPE offers a web portal to end-users through which they will be able to search and select the most appropriate basic skill courses for their needs, most of the time with the support of their tutors or mentors. Currently no service exists to support disabled and adult learners in improving basic skills through a repository of accessible, reusable courses. ALPE service implemented a methodology to produce accessible and standard-based contents. [1] This paper presents the evaluations done by users and expert as of today. As part of the project iterative process, each evaluation resulted in recommendations for modifications and/or and technical requirements. Those are evaluated and prioritized and them implemented whenever possible with the next release.

2. End User Preliminary evaluation

Before going through the evaluation with end-users, it was necessary to check the accessibility of the course. We detected several issues generated by the tools used to package the course. The contents were cleaned and repaired in order to comply. The related issues are being investigated.

Objective

- The objective of this evaluation with end-users was to detect potential issues in accessibility and adaptability for the courses and the platform, as well as to estimate the satisfaction level of the users.

Participants

- According to the target user group for the ALPE project, the participants in the evaluation had the following characteristics:
 - They are adults
 - They are visually impaired or hearing impaired
 - They use various technical aids
 - They use various browsers
 - They have different levels of experience with the Internet
 - They have different levels of experience with e-learning
- Since it was a preliminary end-user study regarding platform and courses still in their development process, this study was based on 3 users only.

Test Course

- A course with controlled characteristics and pedagogical objectives was specially prepared for this evaluation, in order to observe the student's interactions with the course.
- The course was created from an existing course 'Teaching to Learn through Internet' being taught at UNED since 1999. The course covers the usage of Internet resources, a Google case study and the Web 2.0. It contains textual content (e.g. plain text, titles and subtitles, internal and external links, numbered lists, definition lists, etc.), as well as graphics, images, subtitled video, etc.

Evaluation

- Two questionnaires were prepared for before and after the test.
- The 1st questionnaire (before the evaluation) aimed at identifying the user profile and the user general expectations regarding e-learning. The questions addressed:
 - personal data
 - type of disability
 - type of technical aids
 - experience with Internet
 - experience with e-learning
 - state of mind regarding e-learning
- The 2nd questionnaire (after the evaluation) aimed at identifying accessibility issues and their cause (platform accessibility issues, course accessibility issues, low level of experience of the user, etc.). The questions addressed
 - “technical” points regarding the course and the platform accessibility. We included in the questionnaire the questions on the twelve more common accessibility failures, according to recent studies ordered by the Disability Right Commission (DRC) of the United Kingdom and by the United Nations [2]. But since end users are not supposed to know the Web Content Accessibility Guidelines (WCAG) [3] neither to understand the technical terms related to accessibility, the questions were formulated in a clear understandable wording.
 - user perception of the contents (rather than technical points). Again, the WCAG were translated into clearer language
 - the pedagogical objectives of the course
 - overall level of satisfaction

Results

- There are been no surprise as far as user’s expectations regarding how the content was/should be adapted to their disability.
- A couple of notes:
 - There is a need in adapting the language and provide glossaries for better understanding of the course
 - All users agreed that the course most important information should stand out more.
 - Users with low Internet experience are not familiar with the options offered within their user agent (browsers) and can also easily get lost on the web.Those three points show a need to address accessibility from the course design stage, for example by building and providing guidelines to the courses’ authors. As part of the iterative design process, this was added to the process of delivering accessible and SCORM compliant course (process detailed in [1])
- Overall students were satisfied with the e-learning platform and expressed a positive impression and confirm the usefulness of the ALPE project and its uniqueness. (Details in [4])

3. Expert evaluation

Next we present the evaluation of the platform, regarding accessibility and usability.

3.1 Platform Accessibility

The first and most well known movements to coordinate a set of guidelines for accessibility for the web is the Web Accessibility Initiative (WAI), which is part of the World Wide Web Consortium (W3C). This organization developed the Web Content Accessibility Guidelines (WCAG) 1.0. The WCAG is separated into 3 levels of compliance, A, AA and AAA. Each level requires a stricter set of conformance guidelines and techniques.

Objective

The overall objective is to improve accessibility for the collaborative platform (dotLRN). The focus is on the packages used for the collaborative work (e.g. forums, file storage, calendar, etc.). Other dotLRN packages such as LORSM (SCORM delivery), IMS-LD, XoWiki, are not targeted in this activity. The specific objective is that the ALPE platform (and hence the .LRN platform) becomes compliant with WCAG 1.0, AA level and with as many WCAG 2.0 criteria as possible.

Methodology

The W3C Conformance Evaluation methodology (W3C, 2006) will be applied. It focuses on technical assessment and does not include involving users with disabilities. Methodology in summary:

- Determine the scope of the evaluation
- Use Web accessibility evaluation tools
- Manually evaluate representative page sample
 - Apply accessibility checklist to page sample
 - Examine pages using graphical browsers
 - Examine pages using specialized browsers
 - Read and evaluate page content
- Summarize and report findings

Tools

- Web Browsers: Firefox 2.0, IE 6.0, Opera, Lynx.
- Web Accessibility tools: TAW (Spanish Ministry of Labour and Social Affairs), HERA (Fundación SIDAR).
- Web Developer 1.0.2 plug-in for Firefox.
- Colour Contrast Analyser: JuicyStudio.
- Screen reader: Jaws.
- Navigation with keyboard.

Results

- Priority 1 checkpoints (level A compliance) : all issues have been identified, fixed and launched with the latest release (2.2.1), or scheduled to launch with the next release (2.3.0).
- Priority 2 checkpoints (level AA compliance): some issues have been identified, fixed and launched with (2.2.1); some other issues have been identified and are being investigated.

ZEN THEME (still under development)

The improvements for ALPE platform have been achieved with the direct participation of UNED in the dotLRN community. The Zen theme has a main objective: that the dotLRN platform in general meets the accessibility standards. Implementing the Zen theme within the ALPE project improved even more the accessibility. A deep redesign of the user interfaces resulted in the compliance with WAI AA level, including: layout completely based in CSS and validation of HTML code (4.01 transitional). A colour contrast validation, level 2 (WCAG 2.0), was also concluded. The new release will be available shortly.

3.2 Platform usability

Objectives

The overall objective is to improve usability for the collaborative platform (dotLRN).

Methodology

There are different methodologies for evaluating the usability of web applications, falling within two main categories: usability inspection methods or expert review methods, and empirical testing methods, or user-based methods.

Expert review methods include a set of methods based on having expert evaluators instead of final users inspect or examine usability-related aspects of a user interface. For this specific project, we started with an expert review, including 2 experts, performing a heuristics evaluation.

Nielsen [5] defines heuristic evaluation as “a discount usability engineering method for quick, cheap, and easy evaluation of a user interface design”. Heuristic evaluation is done as a systematic inspection of a user interface design for usability. Heuristic evaluation involves having a small set of evaluators examine the interface and judge its compliance with recognized usability principles. Several heuristics checklists are available. The “Heuristic Evaluation - A System Checklist” (Pierotti D. [6]) offers a checklist based on the Ten Usability Heuristics Nielsen [5], declined in 250 checkpoints. This checklist was followed in the first place by 2 usability reviewers.

Results

There were 291 checkpoints distributed in 13 categories. The heuristics used here are not specific to e-learning, therefore a significant number of checkpoints (average of 40%) were considered irrelevant. Amongst the remaining checkpoints, the 2 reviewers came to very similar results:

- The platform complied with an average of 65.5% of the relevant checkpoints - average of 67% and 64%
- The platform didn't comply with an average of 34.5 % of the relevant checkpoints - average of 33% and 37%

The platform complied particularly well on the following categories:

- a) Aesthetic and Minimalist Design (94% of relevant checkpoints)
Dialogues should not contain information which is irrelevant or rarely needed. Every extra unit of information in a dialogue competes with the relevant units of information and diminishes their relative visibility.
- b) Pleasurable and Respectful Interaction with the User (81% of relevant checkpoints)
The user's interactions with the system should enhance the quality of her or his work-life. The user should be treated with respect. The design should be aesthetically pleasing- with artistic as well as functional value.
- c) Visibility of System Status (70% of relevant checkpoints)
The system should always keep user informed about what is going on, through appropriate feedback within reasonable time.
- d) Recognition Rather Than Recall (69% of relevant 39 checkpoints)
Make objects, actions, and options visible. The user should not have to remember information from one part of the dialogue to another. Instructions for use of the system should be visible or easily retrievable whenever appropriate.

The platform didn't complied so well on the following categories:

- e) Match Between System and the Real World (59% of relevant checkpoints)
The system should speak the user's language, with words, phrases and concepts familiar to the user, rather than system-oriented terms. Follow real-world conventions, making information appear in a natural and logical order.
- f) Help and Documentation (36%)
Even though it is better if the system can be used without documentation, it may be necessary to provide help and documentation. Any such information should be easy to search, focused on the user's task, list concrete steps to be carried out, and not be too large.

Conclusion

It appears essential to focus on improving the usability related to e) and f), even more considering the target users - adult learners with disabilities - and the overall specificity of the platform: its accessibility.

Heuristic data provided quantitative estimate and indicated a lot of tangible improvements for the platform. However heuristics data must be used with caution because:

- they don't address the integration issue between the course and the platform
- they don't address the specificity of the end user profile
- they don't address the specificity of the tasks for an e-learning platform

Therefore, it is essential to pursue usability study with task scenarios and real end users.

4. Conclusions and future works

The results so far have proved that ALPE service can provide an accessible e-learning platform and accessible courses that are SCORM compliant and adapted to disabled adult learners. The results of the several evaluations have already improved greatly the service and pointed towards the issues. It is a work in progress that will be complemented by further evaluations.

The expert evaluations will expand to scenario-based evaluations in the fields of usability and accessibility, hopefully involving more experts to get a variety of views and ideas. The initial end-user evaluation described in this paper provided the first input for the market validation to be performed for ALPE service, and it will be followed by a series of iterative evaluations. Apart from the UNED Spain-based users, UK students from further education (post-16) colleges or Open University Access or Foundation Level (equivalent to preparatory or first year undergraduate) courses will participate to evaluations. Also in Greece, members of non-profit organizations that support visual and hearing-impaired adults will participate. In total, 300 users will be involved in that large-scale evaluation, 100 from each country.

Moreover, ALPE project will also benefit from the Computer Training Program that PAB will undertake with more than 700 visually impaired users. This program is funded by the Greek government and aims to give a certified training in Computer Basic skills to 750 blind and partially sighted Greek people.

Results from both expert evaluation and user evaluation will be compiled into a report and translated into design recommendations and technical specifications to be implemented as part of the iterative design process. Within the recommendations, priorities in the need for improvement will be set based on the success rate of each task performed. It is worth mentioning that in case of antagonist recommendations between accessibility and usability, accessibility requirements will always have priority over usability requirements, since "ALPE is a project targeted at European disabled and adult citizens who want to improve their basic skills, and hence their employability levels through an accessible e-learning platform."

Acknowledgments. The authors would like to thank the European Commission for partly funding ALPE project (eTEN 029328). We would also like to thank SIDAR Foundation, and among end-users, special thanks to Martín Baldassare, Pedro Novoa and Enrique Gutiérrez for their useful comments from the evaluation.

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