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Acceptability Evaluation of Computer-Based Distance Learning Courses

Anastasios I. Economides ***Charalampos Karagiannidis*** ***Andreas C. Georgiou***

Department of Business Administration, University of Macedonia
156 Egnatia Street, Thessaloniki, GR-54006 Greece
Tel: +30-31-891569, Fax: +30-31-891202, E-mail: {economid, ck, acg} @uom.gr

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This paper reports on the summative evaluation of web-based distance learning courses that have been recently developed with the aim to improve existing classes of our institution. The paper focuses on the set of *acceptability criteria* that have been selected, after the initial requirements analysis phase, for driving the evaluation process. These criteria can be classified into the following categories:

(a) Quality of Educational Content

Each course should present *all* the educational content that is necessary for a particular subject, without overloading the student with unnecessary information, should be in accordance with the curriculum, and should comply with the general rules that apply to every educational material. Examples include:

- ✓ scientific quality: the material should be complete, accurate, should contain objective information and be easily understandable, etc;
- ✓ quantity of information: only the necessary (according to the curriculum) information should be presented, so as to avoid overloading the student;
- ✓ language and vocabulary: the language should be carefully selected; it should be consistent, and avoid, when possible, technical terms that are not widely known in the target audience (i.e. students);
- ✓ structure and organisation of information: the educational material should be carefully structured into units, sections, etc, according to the curriculum; the transition from one unit to another should be easily understandable;
- ✓ further sources of study: several sources for further study should be contained, such as web links, books, journals, etc; also, it would be helpful if these sources are categorised according to different levels of expertise, interests, etc;
- ✓ media independence: the material should be available in several media, in order to meet the preferences of different student groups, as well as to be accessible by people with disabilities; for example, the whole material should be available in pure text, so as to be accessible by blind users utilising text-based browsers, or by sighted users, when, for instance, utilising a slow network connection.

The evaluation of the quality of the educational material is performed by the experts in the educational domain (i.e. instructors themselves), as well as by experts from the fields of psychology, pedagogical sciences, etc.

(b) Quality of the Educational Process

The presentation of the educational content should be acceptable from an educational point of view. To this end,

- ✓ each unit should have a clear and indicative title, and include a short introductory paragraph, presenting the scope and expected outcomes; the relation between the different units should be clearly presented (e.g. prerequisite units, related units); also, each unit should include "educational" suggestions and advise, e.g. concerning the issues that usually prove to be difficult to understand;
- ✓ it is very important for the educational material that it can be presented at different levels of details and difficulty, so as to meet the requirements of students with different levels of expertise and interests;
- ✓ examples and questions: the educational material should contain several examples, which help students understand the different aspects of the educational domain; also, questions of different types (e.g. true/false, multiple choice) should be included, to enable students assess their understanding of the subject; the answers to these questions should be "constructive", so as to encourage the student in case of mistakes;
- ✓ multimediality: the educational material should be available in multiple media and modalities, according to the nature of the information presented (specific types of information can be better presented through respective media and modalities);
- ✓ interactivity: the student should be encouraged to actively explore the educational domain, rather than being passively receiving information;
- ✓ type of response: the response provided to the student, e.g. in cases of quizzes, should be understandable, consistent, and encouraging.

The quality of the educational process, i.e. the presentation of the educational material, is evaluated by the experts in the educational domain, as well as educational, psychology and pedagogy experts.

(c) Functionality of the System

The system should provide access to all the tasks that are considered necessary in educational applications. Examples include:

- ✓ support of different modes of work: the system should support personal and cooperative work (e.g. conversations, cooperative projects), linear and non-linear navigation, etc;
- ✓ navigational support: since the courses under discussion are accessed through a web browser, specific navigational support should be provided, so as to prevent disorientation of the student; to this end, the system should provide graph-like maps of the educational material, where the visited nodes are clearly identified; bookmarking and annotation facilities; etc;
- ✓ the selection of different "course structures" should be possible, according to the student's expertise and interests; for example, the student might be offered the choice of an "introductory" course and an "advanced" one, which include selected units of the educational material;
- ✓ previewing facilities: it is important that the system provides a table of contents, list of figures, links, and references, glossary, terminology index, etc;

- ✓ searching facilities: the system should provide search facilities concerning the educational units, keywords, figure captions, etc;
- ✓ statistical facilities: the system should provide statistical functions, which can be used for the assessment of the progress of each student, as well as the assessment of the course as a whole; for example, the instructor should have access to the average score of each student over the questions of each unit, and over the whole set of questions; to the average score in the questions of a specific section; to the average score of all students over the same question; etc.

The functionality of the system is being evaluated educational software developers and human-computer interaction experts.

(d) Usability of the System

The user interface of the system should facilitate easy access and high quality of interaction, so as to enable the student focus on the educational subject itself, without spending much time on learning the use of the system. To this end, specific emphasis should be placed so that the general guidelines and recommendations for user interface design are followed. Examples include:

- ✓ intuitive and seamless interaction: student should interact naturally with the system, so that all their cognitive capabilities are put on the educational material itself;
- ✓ metaphors of interaction: the metaphors of interaction should be carefully selected, according to the nature of the educational subject, as well as the target student group;
- ✓ interaction media and modalities: the selection of appropriate media and modalities to convey specific information types should be carefully designed (see also above);
- ✓ interaction techniques: the use of interaction techniques should be carefully designed, so as to ensure consistency, and minimise the cognitive and physical load posed to the student when interacting with the system;
- ✓ on-line help: the on-line help system should provide meaningful information, concerning both the educational material itself, as well as the user interface of the system; also, it is important that different levels of help are provided, according to the expertise and interests of different student categories (e.g. "novice help" and "expert help"); moreover, specific help facilities should be provided concerning navigation in the educational hyperspace (e.g. "where am I?", "how can I go to a specific unit?");
- ✓ documentation: a simple, complete and easily understandable on-line manual should be provided with the system;
- ✓ other user interface issues: the user interface should be consistent and provide meaningful feedback; it should be error tolerant, and enable error recovery; etc.

The usability of the user interface is evaluated by user interface experts and usability engineers.

(e) Technical Quality of the System

The system should comply with the technical criteria that apply to computing systems in general, including:

- ✓ response time: the response time should be reasonable; to this end the selection of specific media should be carefully designed; for example, if the system is to be used by users who utilise slow network connections, then specific media types (e.g. video clips) should be avoided, where possible;
- ✓ interoperability: the system should be portable to different machines, operating systems, etc, so as to be accessible by the broadest possible student population;
- ✓ maintenance and openness: the system should be easily maintained and modified; the addition or modification of educational material, quizzes, etc, should be easily performed, even by people who are not experts in computing (as the case of the instructors may be);
- ✓ security: access to different aspects of the system should be granted to specific user categories; for example, students should not have access to other students' records.

The evaluation of the technical quality of the system is performed by software engineers and application developers.

Future Work

Our current and on-going work in this direction involves the consolidation of principles and guidelines for the development of educational applications (mainly web-based distance learning courses) which are *acceptable* by (groups of) students and instructors with different skills, interests, background, etc; as well as the design and development of tools which facilitate the (semi) automatic incorporation and evaluation of these guidelines into the educational software development lifecycle.

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Dr. Anastasios Economides received the Diploma degree in Electrical Engineering from the Aristotle University of Thessaloniki in 1984, and the M.Sc. and Ph.D. degrees in Computer Engineering from the University of Southern California, Los Angeles, in 1987 and 1990, respectively. He is currently an Assistant Professor of Computer Networks at the University of Macedonia, Thessaloniki, Greece. His research interests include high speed network optimization and control, quality of service and tele-education.

Dr. Charalampos Karagiannidis is currently a Research Scientist at the Department of Business Administration, University of Macedonia, Thessaloniki, Greece. He holds a B.Sc. in Mathematics from the Aristotlean University of Thessaloniki, Greece, an M.Sc. in Information Technology from the Queen Mary and Westfield College of the University of London, UK, and a Ph.D. in Electronic Engineering from the University of Kent at Canterbury, UK. His research interests include human-computer interaction and web-based education.

Dr. Andreas C. Georgiou received the Diploma degree in Mathematics from the Aristotle University of Thessaloniki in 1984, and the Ph.D. degree in Operations Research from the same University in 1989. He is currently an Assistant Professor of Operations Research at the University of Macedonia, Thessaloniki, Greece. His research interests include mathematical human resource planning, locational analysis and applications of simulation.