On e-Textbooks Quality Model and Evaluation Methodology

Eugenijus Kurilovas, Institute of Mathematics and Informatics, Vilnius University, Vilnius, Lithuania & Vilnius Gediminas Technical University, Vilnius, Lithuania
Silvija Serikoviene, Panevezys Institute, Kaunas University of Technology, Panevezys, Lithuania

ABSTRACT

The paper aims to analyse and propose e-textbooks and other learning objects (LOs) quality evaluation methodology, i.e., quality model, and simple and effective expert evaluation methods, thus improving solution of educational tasks using informatics engineering methods. Qualitative learning material is one of the main factors of learning quality. Therefore, evaluation of e-textbooks and other LOs quality is one of the most relevant education problems. The problem is relevant for all participants of the educational sector – for educational institutions (e.g. schools) that have to select qualitative learning material for their needs, for education policy makers who need clear quality criteria while implementing e-textbooks and other LOs tenders, for authors of learning material (e.g. publishers) who need to know quality requirements to create e-textbooks and other LOs etc. It is obvious that some e-textbooks and other LOs could be very qualitative against some quality criteria, and the others – against the other criteria, and vice versa. Therefore, e-textbooks and other LOs quality evaluation is a typical case where one should apply multiple criteria decision analysis (MCDA) theory. In the work, MCDA principles are applied to create an objective rank of LOs alternatives according to their quality, and to evaluate each alternative’s quality against "ideal" quality. In the work, e-textbooks and other LOs reusability and quality criteria system (i.e. model) is presented, as well as created expert quality evaluation method based on fuzzy numbers theory.

Keywords: e-Textbooks, Learning Objects (LOs), Multiple Criteria Evaluation, Personalisation, Quality Model

1. INTRODUCTION

Learning Object (LO) is referred here as any digital resource that can be reused to support learning (Wiley, 2000). E-textbook is referred here as LO of high aggregation level (LRE AP, 2011). Therefore, in this paper, we’ll use the term “e-textbooks and other LOs”.

LOs are the elements of a new type of computer-based instruction grounded in the object-oriented paradigm of computer science. Object-orientation highly values the creation of
components (called “objects”) that can be reused in multiple contexts. This is the fundamental idea behind LOs: instructional designers can build small (relative to the size of an entire course) instructional components that can be reused a number of times in different learning contexts.

E-textbooks and other LOs should be qualitative i.e. suitable for learning but at the same time they should fit reusability requirement. Therefore, reusability of e-textbooks and other LOs (or their ability to ‘travel well’ between different contexts and education systems) is considered in the work as a part of its overall quality. This means that any high quality e-textbook or other LO has some reusability level (or potential to ‘travel well’), but this does not mean that any reusable e-textbook or other LO is qualitative one. Therefore, in the work, the problem of e-textbooks and other LOs quality is analysed paying special attention to its reusability aspects.

E-textbooks and other LOs creation is complicated, expensive, and time-consuming process. Therefore, small countries (e.g. Lithuania) have no possibilities to create a lot of LOs in Lithuanian language and fitting their education systems. Thus, it is very relevant for them to find LOs that could be applied for their learning goals in the other countries content repositories. Such LOs are named reusable.

Currently, there are millions of LOs stored in international repositories. Majority of those LOs could be used many times in different countries and in different educational situations. Those LOs could be easily modified, localised, and applied for particular educational context. Thus, reusable LOs are usually considerably cheaper (since they could be used in different systems and different educational situations) and considerably qualitative (since a broad group of experts and practitioners can contribute to their refinement).

Therefore, evaluation of the quality of reusable e-textbooks and other LOs is a problem that should be solved constantly by all participants of educational sector. They should refer scientific LOs quality systems (i.e. models) and practically applicable (i.e. simple and effective) evaluation methods.

Additionally, e-textbooks and other LOs are generally understood to be digital entities deliverable over the Internet and any number of people can access and use them simultaneously. Moreover, those who incorporate e-textbooks and other LOs can collaborate on and benefit immediately from the new versions.

When teachers first gain access to the instructional materials, they often break the materials down into their constituent parts. They then reassemble these parts in the ways that support their individual instructional goals. This suggests one reason why reusable instructional components (i.e. LOs) may provide instructional benefits: if instructors received the instructional resources as the individual components, this initial step of decomposition could be bypassed, potentially increasing the speed and efficiency of instructional development.

Examples of e-textbooks and other LOs can include multimedia content, instructional content, learning objectives, instructional software and software tools, as well as persons, organizations or events referenced during technology supported learning.

The various approaches to e-textbooks and other LOs attempt to meet two common objectives: (1) to reduce the overall costs of e-textbooks and other LOs, and (2) to obtain better e-textbooks and other LOs.

Both these objectives agree with the notion of e-textbooks and other LOs reusability (see Table 1). Reusability is one of the main features achieving the high e-textbooks and other LOs effectiveness and efficiency level. The need for reusability of e-textbooks and other LOs has at least three elements (McCormick et al., 2004; Lytras et al., 2008a,b,c; Kurilovas & Serikoviene, 2012).
Knowledge-Based Development for Cities and Societies: Integrated Multi-Level Approaches
www.igi-global.com/article/knowledge-based-development-cities-societies/70218?camid=4v1a