Educational Resources as Digital Products

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Abstract. In the paper educational resources are treated as regular digital products. The problem of the production, distribution and sale is addressed, especially concentrating on the production effort, cost and price. An original method of estimating development effort of e-learning resources is described and experimental results are presented. The paper presents also two extensions of the existing structure and implementation of learning objects. The structure of a learning object, although flexible, focuses on reuse, which is insufficient for independent learning. Therefore the first extension is the concept of a teaching object that contains all parts of the educational process, from knowledge presentation, through examples and exercises to final examinations. A teaching object is proposed as an independent subject of sale. Addition of data access methods to learning objects is the second proposed extension that creates a learning component. A model of learning object distribution based on Web services and learning components is proposed.

1 Introduction

Education is a part of global and national economy with its products, markets and competition and also with overproduction and pricing problems. The use of Internet in education has resulted in a development and globalisation.

E-learning supports traditional education on the primary, secondary and university levels, while finding its place in some areas like re-education and self-training. The learning process placed in the Internet causes concentration on educational resources, as teacher and learner are distant in time and place. To act as digital products, educational resources must conform to three rules: must be divided into structured units, that can be an independent subject of sale, must have precise calculation of cost and price and must be represented in a technology that allows for effective Internet distribution. The three areas are addressed by the research presented in the article. The use of new Internet technologies is proposed to increase interoperability and usability of educational resources. The presented solutions apply to digital educational resources production, distribution and sale. The paper is organized as follows. Section 2 introduces a model of e-learning market, which allows to define unsolved problems in the addressed area. Section 3 deals with educational resources production. Section 4 concerns educational resources cost and price, while the next one provides a model for distribution.
2 Characteristics of Educational Resource Market

The e-learning market is not growing as fast as it was expected to, partly because of payment problems in distance education and other Internet-based domains. The Internet supplies extensive and free of charge data that can be used for education. Unfortunately, the data is often unsuitable in its contents or presentation, which results in the development of chargable educational resources. The learner demands fast and effective methods of education that cope with the changing work market.

Currently, universities are main e-learning centres. Although Internet is used as the learning environment, the education process has not changed. One institution is responsible for resources production, delivery, examination and certification. The evolution of markets usually results in specialization, which can also be expected for e-learning. In the future, the separation of educational resource production, delivery and certification is expected [1]. The vision of future e-learning market is shown in Fig. 1. The Internet based architectures for e-learning commerce introduce the roles of learning services requester, provider and service broker as the intermediator [2].

Fig. 1. Characteristics of future e-learning market

Five roles on the e-learning market can be distinguished: the learner, the domain expert, the educational resource distributor, the resource search centre (broker) and the certification institution. The process starts with the domain expert, who produces educational resources and delivers them to a resource distributor. The resource distributor checks the curricula given by the certification institution and calculates the educational resource price. The domain experts are paid for their work.

The learner, who is the final customer, searches for the resource with the help of the search centre and purchases required resource from the distributor. When the