An Eco-System Architectural Model for Delivering Educational Services to Children With Learning Problems in Basic Mathematics

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ABSTRACT
A large diverse amount of educational content can dynamically contribute to the construction of basic knowledge for elementary school children. These contents can be used to develop or expand such knowledge and this becomes different when it needs to be applied to children with learning problems in basic mathematics. Then, it is necessary to manage effectively educational resources. The current work proposes the use of an architectural model in order to support teaching activities of a multidisciplinary group of specialist in inclusive education. A case study presents here some examples of teaching activities such as the specification of context and the management of educational resources according the learning problems of children at elementary school.

KEYWORDS

1. INTRODUCTION
Education is considered the engine that drives the economies of a world so competing today. Thus, a country with high education rates among its population has higher expectations in economic, political and social development. However, some of the problems we have in the delivery of knowledge in our country, are based on the exact sciences specifically in mathematics, this affects both people who don’t have a learning disability and those who have.

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A learning problem consists of problems not associated with severe motor or cognitive disability such as acalculia, dyscalculia, dyspraxia, dyslexia or any language disorder, but it takes care of all those factors such as the difficulties of calculation, difficulties in the solution of mathematics problems or related to personal aspects, some of these problems are deficits of sustained attention, deficit in the use of the work memory, deficit in the coherent representation in the work memory of the problem components, etc. (Romero-Pérez & Lavigne-Cerván, 2005).

According to UNESCO (s.f.), information and communication technologies (ICT) can contribute to universal access to education, equality in education, quality teaching and learning and professional teachers´ development, as well as the efficient management and administration of the education system, it is for this reason that it applies a broad and inclusive strategy regarding the promotion of ICT’s used in education. Access, integration and quality are among the main problems that ICT’s can approach. Today exist a lot of educational resources in the network, which is being used as a new way of obtaining knowledge, so it is necessary to sort, classify and manage these resources (Chuang & Shen, 2008) with the support of a group of experts in educational and pedagogical topics called “the multidisciplinary group” in favor of children with mild learning problems in basic mathematics, this multidisciplinary group will help to distribute educational resources through services, using learning paths, workflows and user tasks to model the knowledge of each of the communities, all this within a software architecture. This architecture offers open educational resources through services to the communities of children with learning problems according to the community’s needs both general and specific, these resources are cataloged according to the specialists about learning acquisition, they can give the guidelines for different learning levels.

Nowadays, e-learning has been more widely accepted as a new form of learning and it is growing at an accelerated rate (Zhen et al., 2013) This generates an abundance of educational products that help to generate knowledge among students, who use those tools, but there isn’t order of use, so that knowledge can be generated but not necessarily in the most optimal forms or at least not close to the most optimal, so it is necessary to organize and produce applications according to the needs of children with learning problems that can be managed through a software architecture, this architecture contains among its characteristics the administration of services using knowledge adaptability modeling, which according to (Chuang & Shen, 2008) are one of the best ways to manage the large number of technological tools that exist today, giving it an organization and management to resources using the experts’ knowledge in pedagogy for children with learning problems.

Current work considers the use of an architectural model (Pressman, 2002) in order to identify learning paths integrating services, each service as such, can be integrated into a “composition of services”, i.e. the packaging of all those educational resources necessary to mitigate a specific mathematics problem, services will take educational resources from repositories that will store all those educational resources and deliver them to the communities’ individuals according to the needs specified by the multidisciplinary group, which will generate feedback about the applications’ use by the communities to improve learning paths and develop more specific applications according to the communities’ needs.

Otherwise, the structure of this work begins with the introduction section in order to identify some definition such as basic education, software architectures and new methods of teaching for educational skills. The second section presents the problem-based in the lack of architectural models that help to mitigate the problems of learning in basic math for children. The third section shows the proposed contribution through the description of an architectural model. The fourth section shows a case study with two children of basic education who belong to a learning community called (USAER). In the fifth section, the related works show a comparative table of works identified in the literature and from that comparison it shows the advantages that our work proposes for the problem resolution. Finally, the conclusions are presented, and some future works are proposed.
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