Computer-Aided Design Platform For Educational Software

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Abstract – The paper describes a proposal a new platform whose main objective is to assist in preparing of the author's guide and the development of educational software. This platform has support the X-TEC (Techno- Didactical Extension for Instruction/Learning based on the Computer) model. It's composed for two parts: a graphical tool and a code generation tool. The graphical tool makes possible the edition of diagrams of Techno-Didactical Extension for Instruction/Learning based on the Computer (X-TEC) model. The code generation tool will be responsible for the automatic creation of author's guide and construction of Educational Software prototypes.
This platform encourages the style of incremental development, iterative process, which in each/every phase models are built or enriched

Keywords: X-TEC model, Instructional strategies, Data Repository

I. INTRODUCTION

The evolution of Information and Communication technologies gave the opportunities for educators to apply in the teaching and *learning process*. The main role of these technologies integration in education, it is help students in disseminate information, create new skills and share knowledge efficiently with others students. However, some Educational Institutions of our country have difficulties in its implementation, mainly due to two fundamental problems:

- lack of financial support that government provide to the Community.
- most teachers do not have a great dexterity in the use of these technologies and has a low Know- How. They have lack the necessary skills to effective use technology in their classes

In order to address these lacks, we decided to design a platform that allow to help teachers in development of their author's guide and create the educational software , based on in the specifications of the domain of the problem, internal specifications of X-TEC model [1] and in a set of templates. Thus, we will have a platform supported with a method, which provides a special notation (graphic and literal) and a set of criteria of software quality. It's possible to have resources that allow a fast and simple creation of educational contents.

This paper is organized as follow: In section two will be presented the X-TEC model. Section three presents the platform and its components explain; finally, draws some conclusions.

II. X-TEC MODEL

The X-TEC model was development by Paula Escudeiro in 2006 [1]. The main objective of this model is to create high quality of educational software. It covers all the phases of development of software.

This model presents two overlapping extensions: instructional design and learning environment. The instructional model is related to the instructor/educational software and the learning environment is associated with the student/educational software, allowing the deployment of a common development and allows the student to choose their learning behaviour according to pedagogical model.

The techniques required to implement the model X-TEC, are based on a principle that assigns primary responsibility for teachers. The model uses the following diagrams:

- Use Case Diagram- to describe the scenario that shows the features of the system from the point of view of the user. This diagram facilitates the communication between the different elements of the development team. The use cases describe a set sequence of actions that the system performs for an actor. The actor represents a coherent set of roles that users of use cases play when interacting with these use cases [5].
- Action table – the content of action table is related with activities that will be developed by each participant in the program, but not necessarily follows a sequence of activities through the program. The participants are students, program and teacher.
- Interaction diagram - the main groups of information, are defined in a structured way, giving them a hierarchy. This hierarchy is organized through the model EER (Extended Entity Relationship)
- Function Diagram - Displays the functionalities of educational program, identifying all parts of the skeleton of the Project, through to the simple scheme. The designer of educational software only needs to sketch his idea.

The X-Tec model was created to support the student learn behaviour.

III. DESCRIPTION OF PLATFORM

This platform will work with a set of models and it is called a Project. The Project is stored in a distinct directory.

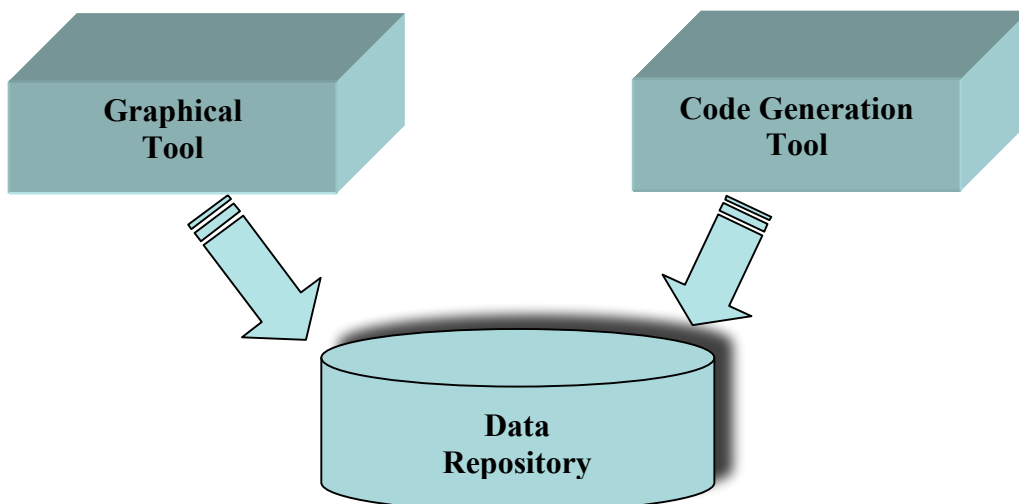The platform will be composed by several components, as shown in figure 1.

Figure 1. Components of Platform

A.   *Graphical Tool*

The graphical tool contains some graphical publishers who support the different diagrams that compose X-TEC model. All the specifications of the diagrams will be stored in a Database. With this tool we could create the diagrams, which have constructors and stereotype suggest by the X-TEC model. These diagrams are: use case diagram, action table, functional diagram, and interaction diagram.

Before the graphical edition we will have an interface where the designer answers a set questions about problem domain specification.

The specifications are:

+ **Instructional strategies** defined by Alessi and Trollip [3]. The instructional strategies are tutorials, drills, test, simulation, and educational games.

+ **Learning** Environment: learning activities and learning profiles [2].

Graphic palettes on the basis of these specifications, which contain the constructors of the X-TEC model, related with the previous points will to be presented; these diagrams will be stored in the called data repository.

B.   *Code Generator Tool*

The code generation tool make the process automatic, using the information stored in the database to generate author's guide and prototype of the system.

 Here we can publish an author's guide and generate prototypes educative software. It's based internal specifications that had been stored in data repository during the different phases of development cycle.

A code generate tool is easy to use, and we can:

+ Publish   our work by extracting information from our model and creating the necessary HTML and related files needed to view it in a browser(It's the author's guide).
+ Create prototype education software.
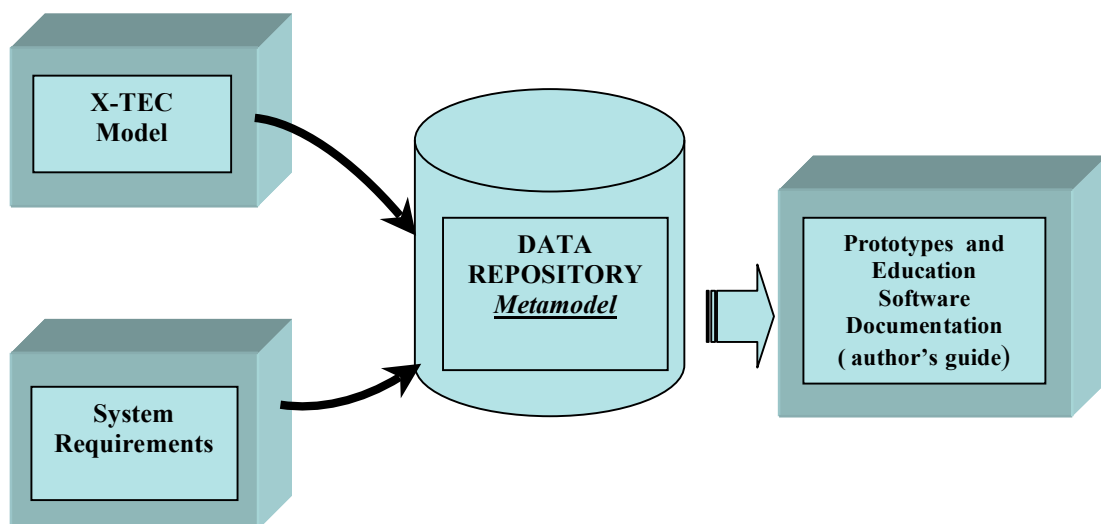
The code generation process is shown in figure 2.

Figure 2. Code generation process

If the developers want to create the author's guide, it must to specify the application requirements and draw the diagrams of the X-TEC model.

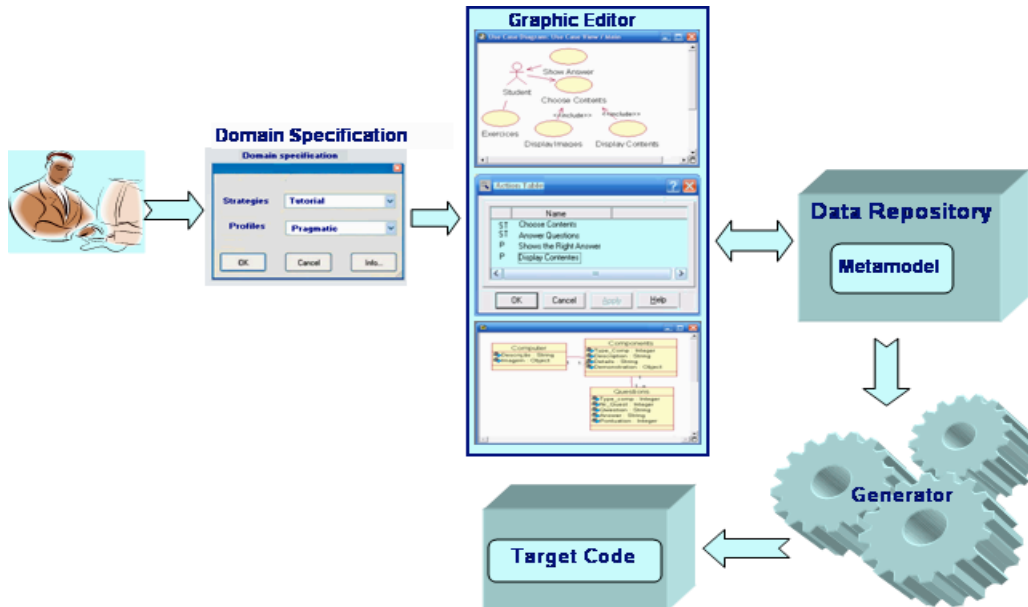The figure 3 shows the process of building the author's guide.

Figure 3. Process for create the author's guide

Figure 3 illustrates the four modules that are required for this process

+ **Domain Specification,** allows the developers writes the type education software and the desired learning profiles of the student., for example a tutorial and pragmatic learning profile.
+ **Graphical editor,** allows the design the diagrams of the X-TEC
+ **Data Repository,** once described the specifications of the domain and the diagrams the X-TEC model, these are stored in the relational database. There we have a metamodel [4].
+ **Generator** allows the transformation of the conceptual schema stored in the data repository into a logical schema.
+ **Target code** is a program described in HTML language that can be accessed by a browser.

C.   Data Repository

The Data Repository contains the project of data created by the teacher. A Project has two types of data , the graphical data (drawing) and the semantic data. The semantic data are stored in the repository in a metamodel and the graphical data in a file.
The designer is able at any time recover the diagrams and reuse them in others applications.
The data repository is the base of the development the platform; all the information that is defined through the different phases of the development cycle meet stored here. It will be

supported by a SGBD relational and presents a complex model of data to support in a flexible form the storage and management of a variety of elements, namely: (1) the constituent elements of metamodel; e (2) the elements to support the proper process of generation.

IV. CONCLUSION

The presented work proposes a new platform for support the construction of the author's guide and the development of the prototypes   of educational software. That will serve as support to the education learning process of any tutor with or without great knowledge of computer science,
The main difference between the tools existing in the market is the graphic tool that possessed the builders and the stereotypes have of the X-TEC model. So, the designer will be able to communicate in an easier way with the team. It makes possible to teachers to create environments that support the education activities and planned learning situations through the use of the resources of contained work in the environment. So, the classes taught by teachers through the use of educational software make that students increasingly like to participate on their own initiative and not as an obligation.

Through interfaces the system makes possible to the teachers' access the tools of work that support specific activities of the educational trial (educational process), such as: the construction of educational software and the educational planning.
The system is presently in the phase of conception and analysis and as future work intends to develop a prototype.

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