Development of software for educational activities

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October, 1999

Master of Science thesis abstract

This work is centered on the idea that no given software or technology, by itself, is able to educate a person. If we believe that education is the result of a set activities that create favorable conditions for learning and teaching, then computational systems will be more or less "educational" depending on the kind of support that they offer to these activities.

In other words, educational software should not be analyzed or developed without considering the educational activity where it is going to be used. A text editor used by a group of students in the creation of the school newsletter will probably have a different educational result from the one achieved by the same students when they use the same editor to copy parts of books.

The challenge is how to describe educational activities in such a way that, on the one hand, would allow software engineers to understand what has to be done and, on the other hand, would consider the ideas and needs of educators. This is the major goal of the present work.

To deal with this problem, an approach to software development is proposed based on Activity Theory, a theory that studies how culture, social interactions, tools and other elements affect the development of human activities. Recently, Activity Theory has gained broader attention in the field of Software Engineering, mainly in the consideration of human factors.

As a domain of application and reference for the proposed approach, we focused on Constructionism, a theory that studies the use of technology in the creation of educational environments. The most well known pragmatic result of Constructionism is the Logo programming language which, for the past 20 years, has been used by millions of students as a fertile soil for the development of critical reasoning and the construction of mathematical concepts.

Based on the analysis of constructionist education, the development of an activity using the Cocoa software is discussed in full detail. Results indicate that the proposed approach models relevant characteristics of the educational context and allows the identification of several aspects to be considered in the analysis and development of new software for education.