USING LEARNING BLOCKS TO PREPARE E-CONTENT FOR TEACHING MATHEMATICS

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ABSTRACT

A new role of the teacher for the 21st century is here. As stated in numerous papers, this new role means that teachers should be primarily oriented towards guiding the students through the learning process. In this process information and communication technology (ICT) plays a significant role. So it is not surprising that more and more e-resources are available and can be used in the learning process. But the analysis of the existing resources often reveals that the authors of the resources do not use the opportunities offered by the new technologies. Namely, all too often e-resources are monolithic blocks (or at least their main part is). This demands that the educator takes them as a whole, precisely in the order they were written in. Is that really necessary? Do all educators need the same form of resources, do they want to use them in the same order, and do they want their learners to see the same examples, do the same tasks? Why not use the possibilities that new technologies offer and at the very least give the teachers the chance to adapt the materials to their own and their learners' needs. Those resource authors namely forget (or neglect the fact) that most of those resources are used with a teacher as the students' guide. The teachers are the ones who should personalize the content towards the specific student and the didactical situation in question. Therefore, selection, adaptation and combination of resources are among the major teacher's tasks. Resources should be prepared so that they can be easily adapted according to a particular didactical situation.

So there is a conflict between the possibilities technology provides, the teachers' wishes and the e-materials available. Many projects focusing on the development of e-resources are complete portals where navigation, the way of working through the resources, etc, must be followed in the exact way the author(s) had imagined. Even when the teachers get the opportunity to combine and adapt the learning content, that is too often quite a difficult task requiring non-basic technical knowledge…

This new role of the teacher as a pedagogical guide introduces several demands towards resource authors. Among the first ones is the "openness" of a resource. Any resource should be easily changed and used in many different situations. For example instead of speculating the precise ratio of both the procedural and the conceptual approach that would make a resource suitable for all students, the fact that this ratio is different for each student and each particular set of circumstances, should be considered. Therefore, the resources should be designed in such a way that this ratio can easily be adapted to the needs of the user.

The resources are too often supposed to be used within a closed environment, for example from the perspective of a specific CAS. Resource designers too often wish to stick with the same tool at any cost. Several didactical situations could be seen in a different light if another tool was to be used. So instead of arguing about the best way to cope with problems a specific tool introduces into a certain resource, the resource itself should be designed in such a way that students are actively encouraged to choose the most suitable tools. Resource design should exhibit the appropriate use of tools. And we should also not forget the fact that "appropriateness of a tool" changes with the didactical situation as well as the individual needs and abilities of different students.

So teachers need e-learning content they can easily adapt and reuse for their own purposes. Why are similar principles not applied to the preparation of teaching materials as those used in writing software code? E-materials should be designed in a flexible way. Teachers should be given an opportunity to change the order of individual parts, to drop or add some parts and to change the content as well. This means that lessons should be made of small learning blocks or, as they are also called, "knowledge objects". The selection of proper technologies and tools for managing e-learning content, for creating and modifying e-learning content, is essential to ensure basic support and popularization of e-learning.

In this talk, we present guidelines for preparing e-materials based on the idea of the "modular, interactive e-content" concept, using open-source solutions and open standards as well as some projects where e-materials have been prepared primarily in terms of ease of adaptation, modification and guidance to the target group. Some preliminary resources can already be seen at http://www.nauk.si.