Abstract

In Germany a conceptual change from strong emphasis of procedural programming to object-oriented modeling (OOM) is on the way within the field of secondary Informatics education. Though recommended and emphasized by Informatics didactists and already embodied in some of Germany’s federal Informatics curricula, the change has not yet reached the majority of schools. A seeming change was carried out from procedural to object-oriented programming. As part of the thesis at hand, based on a literature analysis of the status of didactics concerning OOM, a lack of available teaching and exercise examples, class suitable Informatics systems supporting the acquisition of Informatics concepts, advice for class structuring and associated concepts of use were identified as essential reasons for the still rare consideration of OOM in school practice. A similar situation is evident in other important subject areas of secondary Informatics education (e.g. principles of Informatics systems), which, on the one hand, are recommended, for which, however, on the other hand, there are still too few teaching and learning materials existent respectively accessible. With the aim of, on the one hand, covering the identified need regarding OOM lastingly, while, on the other hand, contributing to the learning and teaching processes of other areas of Informatics education as well, a compound referred to as didactic system, consisting of both traditional and new components of the learning and teaching process, was designed. In this context the deciding motive regarding the design was the need mentioned above. It was founded and proven exemplarily, how the proposed system components exercise classes, exploration modules, and knowledge structures could contribute to the enrichment of traditional learning and teaching processes through the use in, as means of creation of as well as through the support of communication concerning didactics and the discussion of learning and teaching processes. Exercise classes are abstract exercise templates, which have been derived from a choosing-, abstraction- and structuring process, especially developed for this purpose, which was applied to more than 320 exercises from scientific textbooks on OOM. In this context a methodology for creating exercises on OOM to perform a multitude of didactic functions was developed in order to facilitate this process particularly for teachers with little experience with OOM. Exercise classes give learners orientation in combining abstract exercise templates with solution strategies worked out in class. Mastering problems with similar exercises is this way simplified. Exploration modules are software-based learning offers, which are to motivate exploration of Informatics concepts in “blended learning”-scenarios. This way a new, learning-by-doing-oriented approach to Informatics concepts is opened up to learners, having them interact with representations of such concepts, while using systematic exploration strategies, instead of exclusively programming. In doing so they do not only sharpen up their professional-, method-, and social competence, but also their learning competence. As graphic representation of professional acquisition structures using and-or-graphs, knowledge networks serve as an illustration of pre-knowledge relationships between concepts of a subject for actors in learning and teaching processes, facilitate the didactic analysis respective discussion of learning and teaching processes as well as the checking of the educational level reached for teachers and students. The approach to the development of the components of the didactic system was documented and abstracted at full length. Thus, a guideline is given, according to which more didactic systems regarding other subject areas or other target groups may be designed. Furthermore, it was shown, how an exemplary trial may take place by the means of integration into secondary Informatics education as well as into Informatics teacher education and in-service teacher training. More than 100 learners in secondary Informatics education and in university promotion events, ten student teachers of Informatics as well as more than 200 teachers participating in Informatics teacher trainings were involved in this process.