On the Way to a "General Model of Contextualised Computer Science Education" – A Criteria-based Comparison of "Computer Science in Context" and the Concept of "Learning Fields"

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Extended Abstract: Vocational and general secondary computer science education in Germany pursue different aims – on the one hand, general secondary education targets to educate its students in order to attend either university or vocational education and training (with the consequence that also the learning content in computer science education should support general education of the students). On the other hand, vocational computer science education focuses on the development of skills and competencies for professional usage. For this reason, several teaching methods and approaches have been separately developed to encourage the students in gaining the competencies which are regarded as necessary with their school type. Although general secondary and vocational education often use different concepts, there is also some accordance. One such accordance can be seen in the usage of contextualised teaching methods. In general secondary computer science education the concept "Computer Science in Context" (CSiC) follows the idea of implementing contextualised teaching units by using contexts from the everyday life of the students (Koubek et al., 2009), whereas the concept of "Learning Field-orientated Computer Science Education" (LFCS) in vocational secondary education uses contexts from the professional life of the students (CMECA, 2011). These contexts should be implemented into activity-orientated lessons, called "learning situations" (Sloane, 2001).

Up to now, both approaches could be seen as promising to improve computer science education, but they have not been successfully and completely implemented into practice. To promote their implementation, it seems to be useful combining these different context-based approaches of secondary and vocational education by developing a *"General Model for Contextualised Computer Science Education"*, in order to have secondary, vocational and in prospective expansion also higher education benefit from each other.

As first step on the way to such a model, we compared in detail the concepts of CSiC and LFCS concerning their respective target groups and foundation in curriculum as well as underlying theoretical principles, competency models and superordinated aims. Therefore we established a set of criteria in an inductive way by analysing basic documents and descriptions of CSiC and LFCS. Afterwards, we selected the necessary criteria for the description of such a model.

As a result of this evaluation, we found accordances as well as differences between CSiC and LFCS. Both concepts are based on the idea of contextualisation as a way to promote the interest in and understanding of complex topics by the students. However, the target groups differ significantly – while CSiC has been developed for general secondary schools, the concept of LFCS is part of vocational computer science education and an obligatory part of the curriculum (ISB, 2007). For this reason, the basis for contextualisation is also quite different – CSiC uses contexts from everyday life and the social environment of the students, whereas LFCS uses contexts directly from their professional life. Another difference is the underlying competence model – CSiC is indirectly based on the cognition-theoretical competence model by Weinert (2001), whereas LFCS has been defined by the CMECA based on the action-theoretical, outcome-orientated model by Roth (1971).

Regarding these differences, LFCS seems to have a broader theoretical basis than CSiC. Therefore, LFCS could be the main basis for the theoretical framework of a *"General Model of Contextualised Computer Science Education"*. This prospective model can be described by different requirements: For a theoretical foundation of the model *relevant basic concepts of computer science* and *computer science education* have to be selected. Additionally, a suitable *competency model* – inclu-

ding the needs of general and vocational computer science education – has to be defined. These two parts of the model will be complemented by a *set of criteria for decision-making* based on whether a context idea is suitable to be implemented. The last – but not inherent – part consists of a *collection of guidelines* on how to implement a context idea into a teaching unit or learning situation. Since several models, standards and guidelines still exist, they have to be reviewed whether they could be suitable for the prospective model description. Our next steps will be to integrate the named requirements into a formal model description of a *"General Model of Contextualised Computer Science Education"* to promote contextualised teaching methods and facilitate the development of contextualised teaching units.

Keywords: Vocational Education, Secondary Education, Computer Science Education, Learning Fields, Contextualisation, Computer Science in Context, Activity-orientated Learning

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Biography

Simone Opel studied Information Technology at the University of Applied Sciences of Nuremberg and Vocational Education for Electrical Engineering and Computer Science at the University of Erlangen-Nuremberg. She worked as trainer for computer science and teacher at several vocational schools. Since 2010, she is working as a scientist in the "Didactics of Informatics" groups at the Universities of Erlangen-Nuremberg (until Oct. 2012) and Duisburg-Essen (since Nov. 2012).