

Let's talk about CS! – Towards a suitable Classroom Language and Terminology of CS for Teaching

Ira Diethelm, Jörn Syrbe

Computer Science Education

Carl von Ossietzky University

26111 Oldenburg, Germany

{ira.diethelm, joern.syrbe}@uni-oldenburg.de

Abstract: To communicate about a science is the most important key competence in education for any science. Without communication we cannot teach, so teachers should reflect about the language they use in class properly. But the language students and teachers use to communicate about their CS courses is very heterogeneous, inconsistent and deeply influenced by tool names. There is a big lack of research and discussion in CS education regarding the terminology and the role of concepts and tools in our science. We don't have a consistent set of terminology that we agree on to be helpful for learning our science. This makes it nearly impossible to do research on CS competencies as long as we have not agreed on the names we use to describe these. This workshop intends to provide room to fill with discussion and first ideas for future research in this field.

Keywords: Terminology, classroom language, CS concepts, competencies, tools

1 Motivation

In natural sciences there is a long tradition to think about the usage of everyday and special language in class and also there is well-developed area of research about their role in science education, e.g. (Rincke, 2010). They also have a long tradition to investigate students' and teachers' perceptions (Duit, 2007).

At conferences regarding CS education and ICT for teaching there are an uncountable number of papers focusing on the use of tools for CS or other subjects. The number of papers that discuss the relationship between these tools,

the basic concepts of CSE they are built for and the intended learning outcomes are much less. In tool-papers the authors often don't distinguish between tool and concept at all, for example it is often not clear if an "introduction to java" means to introduce into object oriented programming and algorithms or special aspects of the programming language java. Actually, the meanings of the terminology for our science Computer Science/Informatics/ICT are not yet resolved definitively.

One phenomenon that comes along with that is that the language students and teachers use to communicate about their CS courses is deeply influenced by tool names as well: e.g. "I had a Java course", "Last year we learned Greenfoot". In other disciplines this is unusual. Imagine our colleagues would hear from their students sentences like "I had a Casio Calculator Course" in math or in biology: "I learned about ph-testers and centrifuges". Sentences like these sound strange to us because calculators, ph-testers and centrifuges are clearly identified as tools and not as the learning objective. But in CS the distinction between tool and concept in learning objectives, intended competencies and related principles taught is not that easy. It depends much on the teacher's perspective on the certain course. And we are at least one century of tradition building discussion behind the natural sciences.

According to Ni and Guzdial (2012) CS teachers "have different perceptions related to CS teaching." They often feel not self-confident in teaching CS and in their choice of the topics and terminology to teach, even more if there is no teacher community to talk about CS in class available. Coming from different domains CS teachers it is coherent that they have a wide range and mixed terminology they use in class. Even in textbooks certain key terms like "algorithm" are frequently not defined clearly. Therefore, it results to be very difficult for teachers to decide upon suitable teaching material or literature for their own lifelong learning. It is even more difficult to judge on the value of certain teaching material for a given set of competencies if the terminology is floating ground. So the best teaching material provided is useless if the terminology used in the material does not fit to the teacher's one.

These fuzzy-terminologies of the CS field are an additional challenge for students, too. A reflected and unified special language during lessons and grads is indispensable for students to obtain competence and self-confidence in CS, especially for CS in general education and therefore to bridge the digital divide.

Many purposes will benefit from a unified classroom language for CS. It also would strengthen CS in class, its research and promote a better understanding of CS outside class. If we had a clear set of terminology for the use for

teaching CS and ICT in classrooms many things would get much easier, for teachers, students and researchers.

2 Outline of the Workshop

This workshop does not provide a solution for this problem. Hence, we would like to lay the land of the problem domain “classroom language for CS” and discuss with other researchers from the field of CSE and CS teachers who came across the same difficulties during their practise recurring to the lack of a clear and accepted terminology for CS in class. We’d like to reflect about questions like these: What terminology do I use to describe my intended learning outcomes/competencies for my CS courses? What terminology do I use in class to introduce the key concepts of CS? What terminology do my students use in class to talk about CS and what terminology do I want them to use (instead)?

We’d like to conduct a small survey before the workshop to become aware of the different perceptions CS professionals and teachers could have about a small set of terms, first. The analysis of these data will be an exercise during the workshop and will serve as a starting point for discussing the questions stated above. Therefore the participants will be grouped by their mother language.

To shape the problem area we will make use of several perspectives and generate some hypotheses for further research. For the first set of perspectives we like to use parts of the approach of Educational Reconstruction. There, amongst others the students’ and the teachers’ perspective are taken into account and compared with the scientific view on the subject matter (Diethelm, Hubwieser, 2012). Discussing the intended competencies and the structuring of the courses it is necessary to reflect the different roles of ICT in class: what is used as a tool or as a learning environment (media) and what is the intended subject matter knowledge addressed? Planning to teach a special subject matter these questions should be answered in order to find suitable definitions of terms we would use in class.

With these perspectives we will try to create a first set of terms and visualize their relations to make differences between them transparent and ready to handle. These differences will occur comparing the perceptions of the participants and comparing them with definitions used in scientific publications and textbooks. They might also differ regarding the use by teachers and students in class during courses about the same topic. We expect that the meanings of these terms will not match entirely but will definitely overlap, but possibly with differing interpretations of each term related to the intended teaching contexts.

References

- Diethelm, I., Hubwieser, P., Klaus, R. (2012). Students, Teachers and Phenomena: Educational Reconstruction for Computer Science Education. In McCartney, R., Laakso, M. J. (Eds), *12th Koli Calling conference on computing education research*. Tahko.
- Duit, R. (2007). Science education research internationally: conceptions, research methods, domains of research. *Eurasia Journal of Mathematics, Science & Technology Education*, 3(1), 3–15.
- Ni, L., Guzdial, M. (2012). Who AM I?: understanding high school computer science teachers' professional identity. In *Proceedings of the 43rd ACM technical symposium on Computer Science Education* (pp. 499–504). ACM.
- Rincke, K. (2010). Alltagssprache, Fachsprache und ihre besonderen Bedeutungen für das Lernen (Everyday and special language and their role in science education). *Zeitschrift für Didaktik der Naturwissenschaften*; 16, 2010.

Biographies



Ira Diethelm is full professor and leader of the research group for Computer Science Education at the Carl von Ossietzky University of Oldenburg, Germany. Most of her students are becoming CS teachers at high schools and vocational schools. She is also developing training programs for in-service teachers and teaching material.



Jörn Syrbe is research assistant and PhD student of Ira Diethelm at the University of Oldenburg, Germany. His research addresses the definition of a classroom terminology for CS Education and algorithms for automatic identification and classification of teaching material for CS at school.

Copyright

This work is licensed under a Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License. To view a copy of this licence, visit <http://creativecommons.org/licenses/by-nc-nd/3.0/>