Abstract

How students learn about network protocols is studied in a project-centred, internationally distributed, university course in computer systems taught jointly by two universities. Insights into students' understanding of basic concepts within computer networks are gained through an empirical phenomenographic research approach.

The use of phenomenography as a research approach makes it possible to learn about computer science, as it is experienced by the students. The context in which the research is carried out and issues concerning by whom the context is experienced, are investigated and form a part of the methodological basis.

Students' understanding of some protocols that are used within the project, as well as their experience of the general concept of network protocols are investigated, and different ways of experiencing the protocols are discerned. Some aspects that indicate good learning outcomes are identified, such as being capable of understanding a protocol in different ways and of making relevant choices between the ways it could be experienced according to the context in which it appears.

Based on these results a discussion on learning and teaching is developed. It is argued that a variation in the context in which the protocol is experienced promotes good learning, since different ways of experiencing a protocol are useful with different tasks to hand. A student with a good understanding of network protocols can choose in a situationally relevant way between different ways of experiencing a protocol.

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This thesis is based on two publications, written between 2001 and 2002.

Paper A: Anders Berglund. (2002). *How do students understand network protocols? A phenomenographic study*. Technical Report, 2002-006, Department of Information Technology, Uppsala University, Uppsala, Sweden.

Paper B: Tom Adawi, Anders Berglund, Shirley Booth, Åke Ingerman. (2002). *On context in phenomenographic research on understanding heat and temperature*. Revised paper presented at EARLI 2001, Fribourg, Switzerland, 2001. Submitted to Learning & Instruction.

Comments on my participation:

Paper A: I alone did the work preceding the publication as well as the writing. I discussed my work and my writing during the whole process with my supervisors.

Paper B: I have participated equally with the other authors in the work preceding the publication and in the writing. The empirical data that is referred to stems from an on-going research project by Tom Adawi. Shirley Booth brought an understanding of the theoretical foundations of phenomenography into the project.

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