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How do students understand network protocols? A phenomenographic study

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Abstract:

University students' understanding of network protocols is in focus in this report. With an overall aim to improve learning and teaching in computer systems at a university level, an empirically based study has been performed. In the study, the different ways in which students understand three specific network protocols - TCP, UDP and RMI - as well as the general concept of a network protocol have been investigated with a phenomenographic research approach. Qualitatively different ways of understanding or experiencing network protocols are discerned. The identified critical differences between the understandings are "how" or "as what" the protocols are understood, "as a part of which framework" the protocols exist, and "in what way" the protocols are described. Although experienced as different, the three protocols are understood as being parts of similarly frameworks. Recommendations for teaching of computer systems in distributed projects are made, based on the results. Universities should teach computer networks in a way that encourages students to understand network protocols in these critically different ways, and that stimulates them to shift between these ways depending on the task at hand.

Available as [PDF \(no cover\)](#) (476 Kb).

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