

Analyzing CS Competencies using The SOLO Taxonomy

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ABSTRACT

We have used the SOLO Taxonomy to analyze 5,608 competencies stemming from 734 courses from the faculties of science at Aarhus University and University of Southern Denmark. Both faculties have formulated learning outcomes using this taxonomy. This has made it possible to systematically analyze competencies and compare different science subjects. In this talk, we will explain the analysis and outline our main findings.

Categories and Subject Descriptors

K.3.2 [Computers and Education]: Computer and Information Science Education – *Computer science education, Curriculum.*

General Terms

Measurement, Theory.

Keywords

SOLO Taxonomy, Competencies, Computer Science, Curricula.

1. INTRODUCTION

In 2007, Denmark adopted a new grading scale which forced the universities to add explicit statements of learning goals to all course descriptions. The science faculties at Aarhus University and University of Southern Denmark chose to systematically formulate Intended Learning Outcomes (ILOs) using the principles of Constructive Alignment [1,3] and the SOLO Taxonomy [2]. The result of this process was a data set of 734 courses (or 5,608 competencies) which has provided a unique opportunity for getting insights into the nature of science fields (including Computer Science) and their use of competencies.

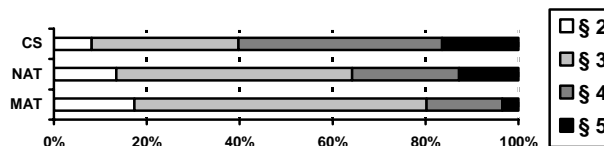
2. RESULTS

The SOLO Taxonomy provides a hierarchy of competencies, numbered from the lowest SOLO level one (§ 1) to the highest level five (§ 5). Table 1 plots the distribution of competencies of Computer Science (CS), Natural Science (NAT; here taken as Physics, Chemistry, Biology, and Molecular Biology), and Mathematics (MAT) according to their SOLO levels.

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Table 1. Distribution of SOLO competencies.



It appears that CS competencies are at a higher SOLO level than those of NAT who are in turn higher than those of MAT.

Investigating the individual competencies involved revealed that programming-related competencies such as 'implement', 'program', 'design', 'construct', and 'structure' (all of which are at SOLO level § 4) account for 15% of all CS competencies, but were only used at a 1.0% frequency in NAT and 0.3% in MAT.

The ten most used competencies in Computer Science were: 'describe' (13%), 'explain' (10%), 'apply method' (9%), 'implement' (7%), 'analyze' (6%), 'discuss' (5%), 'design' (4%), 'compare' (3%), 'evaluate' (3%), and 'identify' (3%).

There also appeared to be a progression in the SOLO level of competencies going from undergraduate to graduate level. The undergraduate SOLO average was § 3.3 at both universities, while the graduate average was § 3.8 at Aarhus University and § 3.4 at the University of Southern Denmark.

For more results and conclusions, we refer to [4,5].

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