
A Surface Approach to Learning – The Best Approach for Engineering Students?

Maria Svedin

School of Computer Science and Communication
School of Education and Communication in Engineering
KTH

Department of Numerical Analysis and Computer Science
Stockholm University and KTH

Abstract

In this short paper I will briefly describe my research so far, as well as what I hope to be my future research. It is divided into three different parts: 1) A short introduction 2) Evaluation and evolvement of online course design and 3) First-year engineering students' approaches to learning.

Author Keywords

Higher Education; Engineering Education; Course design; Approaches to learning.

1. Introduction

The approaches to learning theory derive from qualitative analysis of in-depth interviews with students describing their learning behaviour and intentions when studying a text. From students' focus on extracting meaning from this text but with different emphasis on outcome and process two distinctive approaches were identified: deep- and surface-level processing (Marton & Säljö, 2005). The difference between them could be explained by a passive and an active attitude to

learning (Dahlgren & Marton, 1978). Distinctions are made according to the respective reference students' make about intention and organization, where motivation increases deep-level processing and anxiety increases surface-level-processing (Entwistle, 1977).

The three approaches can be divided into different subscales, in order to further extend the description in aspects of studying. In this short version each approach has three subscales that express variant of motive and strategy. For deep approach the subscales/strategies are seeking meaning, relating ideas and use of evidence, all of which are driven by a meaning orientation and deep motivation. Strategic approach has time management, achieving and organised studying. Surface approach is divided into unrelated memorising, lack of purpose and fear of failure. This latter group are students who have a more extrinsic motivation with a reproducing orientation (Baeten et al., 2010).

The approaches are not contradictory; all students are believed to have streaks of all of them that emerge in different combinations based on the context, and they are therefore not placed fully in a single approach (Diseth, 2003).

2. Evaluation and evolvement of online course design

In this study we investigate two online preparatory university courses that differs in completion rate; 36.6% in a mathematics course and 69.3 % in a programming course. Since the courses target the same student group, the aim with the study is to analyze if students' approaches to learning correlate

with the difference in completion rate. The aim is further specified in two research questions:

- Do students' approaches to learning explain the difference in course completion?
- Can ASSIST be used as an instrument to evaluate an online course design effect on students' approaches to learning and studying and completion rate?

The study was first conducted in 2010 and later in 2012. In figure 1 you can see the amount of students who participated. Results showed that students demonstrating a deep approach to learning in either course were less likely to complete it. In the mathematics course a combination of deep and strategic approach correlates negatively with course completion, whereas in the programming course students who demonstrate a surface approach are more likely to complete.

These results are against the intentions of the course designers, which led to some changes. In the mathematics course a more free structure was implemented, where students won't be as strictly steered as they have been. The structure of the course material overview will also be the same in all instances of the course, so that students don't get confused when transferring between the wiki, the examination page and the head portal. We made the changes with the aim to support a more strategic approach to studying. In the programming course we took following four statements as a basis in a redesign of the course literature:

- Implementation before information
- Connection to familiar phenomenon
- Demonstrate the interdisciplinarity
- Information for both genders

These changes were in order to support a deeper interest in the subject itself. But, also in order to investigate if the literature design could explain why female dropouts are significantly higher than males.

3. First-year engineering students' approaches to learning

For this project first-year students from two five-year engineering programs participated;

- Master of Science in Engineering in Computer Science
- Master of Science in Engineering in Media Technology

The questionnaire was sent out in the beginning and the end of their first year of study. In the first instance 150 students (69.5 %) answered the questionnaire and 87 students participated on both occasions.

The results indicate that the courses in mathematics discourage a strategic approach to learning and that students demonstrating a high score in surface approach (along with not changing it during the first year of study) are likely to take more credits as well as receive higher credits.

Is this a problem, and what kind of arrangements should in that case be taken to deal with it?

This investigation will continue. In the study year 12/13 some changes have occurred in the program design, where courses have been moved or changed. The questionnaire has been sent out to the first-year engineering students in the same programs as in the study above. In future studies we will be able to evaluate if these changes had any effects in the way that the students develop their approach to learning in their first year of studying engineering, and by this come closer to defining program design effects in this discipline.

References

- Baeten, M., Kyndt, E., Struyven, K. & Dochy, F. (2010). Using student-centred learning environments to stimulate deep approaches to learning: Factors encouraging or discouraging their effectiveness, *Educational Research Review*, 5(3), 243-260.
- Dahlgren, L.O., Marton, F. (1978). Students' Conceptions of Subject Matter: an aspect of learning and teaching in higher education. *Studies in Higher Education*, 3(1), 25-35.
- Diseth, Å. (2003). Personality and approaches to learning as predictors of academic achievement. *European Journal of Personality*, 17(2), 143-155.

Entwistle, N. (1977). Strategies of Learning and Studying: Recent Research Findings. *British Journal of Educational Studies*, 25(3), 225-238.

Marton, F., & Säljö, R. (2005). Approaches to learning. In F. Marton, D. Hounsell & N. J. Entwistle (Eds.), *The Experience of Learning: Implications for teaching and studying in higher education* (pp. 39-58). Edinburgh: University of Edinburgh, Centre for Teaching, Learning and Assessment.

