

Learning how to apply complex abstract models in the biomedical domain by stepwise reflection.

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ABSTRACT

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Background

Students at higher educations can have difficulties in understanding details and applications of abstract concepts and complex models, due to knowledge gaps and misconceptions (Sotos et. Al, 2007). Within the field of biomedical engineering an example of complex material are the eHealth standards and complex abstract models that are used in the healthcare sector to reach national and international visions of interoperability. It is important that Biomedical Engineering students understand the span and application of these standards and models, in order to be able to apply them correctly when they are enrolled. Typically, the students get to a point where they are able to argue for the overall need for and high-level objectives of the models, but as a learning outcome they must also be able to apply appropriate methods in information system development and select appropriate models for a given context. In (Ertmer & Newby, 1996) it is argued that reflection during the learning process is essential in sophisticated learning. Therefore, we have developed a method, which encourage students to reflect on the applicability of these models, and at the same time allow teachers to assess the students more fine-grained knowledge on the details of the models and standards they have been teaching. Combining design, evaluation-, and collaborative learning techniques has inspired the method outlined.

Explanation of method and setup

The first setup of this method was conducted in the spring 2015 semester on biomedical engineering students in the first year of their master. In groups of 3-5, students were asked to collaborate on prioritizing a set of pre-defined visions for eHealth, and formulate roadmaps for reaching their prioritized visions. The objective was to get students to demonstrate their knowledge on the application of the standards and models they have been taught in the context of healthcare sector. The group work and discussion approach require students to use their knowledge on both theory and context to sketch and argue for an appropriate solution, as shown by (Gokhale et al., 1995). The three-step method include:

1. *A card sorting session.* Here, the pre-defined eHealth visions was prioritized to motivate the students to discuss, reflect and argue about what visions they found important and realistic to implement.
2. *A road map design session.* The students were asked to develop a road map for how to reach their top two prioritized visions. This work was supported by a set of questions to scope the content of the roadmap.
3. *A discussion session.* Each group presented their prioritization and their two roadmaps.

Results

Our early experience is that this three-fold approach engage students and force them to discuss complex material in a more detailed manner and from a more pragmatic viewpoint than what we have experienced earlier. Instead of having students explain the theoretical potential of a standard or model, students were more arguing for what it would take to actually reach the objectives formulated in the vision cards, in the context of the Danish healthcare sector. This also enabled us, as teachers, to gain insight to knowledge gaps and especially awareness about the students' actual learning outcome. Further use of this method and more structured evaluation of this will allow us to present further results on the applicability of this method.

References

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