# Report: Integrating ongoing research activities in human–computer interaction into methodological course assignments

| **Name** |
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| **Course Name** |
| *Advanced Topics in Human-Centered Computing (ATHCC)*<br>*https://kurser.ku.dk/course/ndak15012u/2019-2020* |
| **Study Board** |
| *Faculty of Science* |
| **Level and class size** |
| *MSc-level course, 26 students* |
| **Description of the experiment** |
| In the ATHCC course, the students work with pieces of research-like processes in the field of human–computer interaction, including a literature review assignment, and an assignment on statistical analysis and modelling of experimental data. We integrated real, on-going research projects to these two assignments, and evaluated both the experience of students in addressing real problems instead of "toy problems", and the impact of student's participation to the findings of these on-going research projects.<br><br>Our activities included (1) preparing instructions for the literature review assignment, mainly consisting of introduction to the topic to motivate the scope of the review (the methodological part were already included in the teaching material), (2) preparing data sets into a form that could be delivered to the students, and writing instructions and necessary descriptors of the data for the students to be able to process those in the analysis assignment, and (3) assisting in integrating the outcomes of this experiment both into the two research projects, and into next year's course planning.<br><br>The students' task in the first assignment was to select a subtopic for the literature review assignment within the area of virtual reality and human–computer interaction. We evaluated how choosing one's own area of interest as an assignment topic influenced the student's motivation for working on it by discussing it in the class and by adding questions in the course evaluation forms. The students' task in the second assignment was to model and analyse a recent motion data set of virtual reality users collected in our on-going research. We evaluated how tackling real on-going research problems influenced the students' motivation in assignment work, also by class discussions and questionnaires. Finally, we internally discussed the level of new ideas and future research topics based on the students' assignments to evaluate the outcomes for research. |
| **Outcomes for the students** |
| We included additional questions for the course evaluation for both assignments with research integration. We asked in relation to both assignments, whether tackling real on-going research problems increased motivation in assignment work. All students who evaluated the course agreed that research integration increased their motivation to some extent, and 73% thought that to a large or great extent.<br><br>The first research integration involved a free choice of the topic within a given research area (human–computer interaction with virtual reality). We asked whether choosing their own area of interest as an assignment topic was motivating for the student to work on it. 91% of the students thought so to some extent, and 82% thought so to a large or great extent. |

The second assignment involved a particular methodological scope for data analysis, restricted by the data type we collected in a recent research project. To assess the influence of this compared to the first assignment, we asked whether the students prefer learning fewer topical areas or methods deeper over smaller assignments on a variation of those. 91% agreed with a preference for deeper learning to some extent, and 73% agreed with that to a large or great extent.

**Outcomes for research**

The first assignment provided new ideas for perspectives to take on in research about human–computer interaction with virtual reality. In particular, it provided small summaries of areas our research group is less experienced with, such as medical applications and navigation in virtual worlds. These can be used as background material in ideation of research projects.

The second assignment on data analysis partly confirmed our findings in the research project, but also introduced results of using other methods in analysis, such as different models, different machine learning methods, and testing on different features of the data. These can be used for discussing alternatives in our analysis in the research project by comparing the results.

**Interaction between teaching, research and exams**

The in-class discussions facilitated interaction between teaching and research. When the students constructed ideas for their assignment topics, we gave input through examples from our own research, and vice versa, took their ideas to elevate those into research questions, which in turn again acted as feedback for them to formulate questions for their assignments. One student commented in the course feedback that the mixture of learning about different research problems and extending this to what is in their own interest worked very well.

**Strengths and weaknesses, and possible adaptation of the experiment**

The first assignment was widened more in scope from the original plan to allow more freedom for the students in choosing the topic. Some found it hard as this assignment was early in the course. One student commented that they enjoyed the current structure of the course, especially the discussion about the on-going research topics. However, they experienced that although they did get a chance to explore a topic in depth with literature review assignment, it could have been put in a later stage where they would've been exposed to a larger variety of topics. Another commented that they were more interested in the real research problems and found it a harder to choose their own interest area. Therefore, the timing of the first assignment could be re-considered. Also, while the real data was valued in the second assignment, it required use of particular methods. It can be considered whether to use a new, timely data set next year, or this same one in addition to a different data type to allow more freedom of choice.

**The most important experience**

The most valuable experience was to see how well the combination of giving a real research problem supported with motivation and data merged with the level of freedom the students had in choosing their own assignment topic. In the first assignment we gained plenty of new ideas for research problems, and in the second one new perspectives for a rather constrained research problem. The lower and higher levels of freedom for the students to follow their own interests were mostly appreciated but divided opinions. Yet, both merged very well with integrating real, ongoing research. This is important, because it suggests there are alternative ways of integrating research in teaching of this course, and perhaps the choice can be made based on the desired outcomes for research as discuss above.