Students change in attitudes towards group work: A case study of the ISLE-based reform

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Abstract. We examine students' attitudes to group work in physics courses with the Investigative Science Learning Environment (ISLE) approach. ISLE highlights the importance of group work. Students collaborate in lectures, recitations, and laboratories. We aim to answer the following questions: How have students' attitudes towards group work changed during the course? How is this change influenced by their previous experiences? What role did ISLE play in the development of students' attitudes?
We examine students' attitudes using semi-structured interviews. For triangulation we use responses to CLASS and E-CLASS questionnaires, attendance records, their submission and resubmission of lab reports, and success on exams.

Introduction

At the University of Ljubljana, Faculty of Mathematics and Physics, we are currently reforming the Applied Physics engineering study programme. The reform is based on the Investigative Science Learning Environment (ISLE) approach [1]. ISLE is a student-centred learning approach which engages students in learning physics by following processes that are similar to those that researchers use when they construct and apply new knowledge.

ISLE students work in groups on carefully selected activities to learn physics through observing simple experiments, discussing patterns, constructing, testing and applying explanations of those patterns. In the classroom, the students are encouraged to share their ideas freely, while also being encouraged to pay attention to the ideas of other students within their groups and among different groups. Ultimately, the quality of collaboration in groups depends on how group members respond to each other’s ideas, how they present their ideas, and on their social awareness – on the social positioning of group members [2]. One of the goals of the reformed course is to help students develop the skills needed for productive group work.

While engaging students in group work, we need to be aware of different experiences and personalities of students and how those affect students' perception of working in groups. The aim of the study is to use the case studies to answer the following questions: How did students' attitudes towards working in a group change during the course? How was this change affected by their prior experiences? What role did the ISLE approach play in the development of students' attitudes?

Methodology

To answer the research questions, we take a case-study methodology [3]. By documenting experiences of carefully selected 5 students, we will gain insight into the commonalities and differences in experiences with group work of students with different backgrounds. Students included in our case study are all first-year students of the reformed Applied Physics programme.

To create case studies of those 5 students we will use the following sources of data: face-to-face semi-structured interviews, responses to CLASS and E-CLASS questionnaires, records of students' attendance at class meetings (exposure to the ISLE-based-activities), submission and resubmission scores of their lab reports, and written exams grades.

We conducted the first round of face-to-face semi-structured interviews approximately 10 weeks into the Applied Physics programme. One part of the interview focused on students' experiences before they had come to the university and the other one on their experiences within the

course. The interviews lasted between 40 minutes and 1 hour 18 minutes. To study the longitudinal perspective of the students' attitudes towards group work, we will conduct the second round of interviews at the end of the second semester. All the interviews are being taped and transcribed. We developed a coding scheme for the interview data to analyze the changes between the initial attitudes, attitudes after 10 weeks and final attitudes. The codes focus on but not limited to – how the students feel during group work, how they participate, how they distribute the roles, whether they also work in groups when the work is not organized by their instructors.

We will use other sources of data to triangulate findings from the interview data to create case studies of those students. Those include pre- post course CLASS [4] and E-CLASS [5] questionnaires; collaboratively written lab reports with the feedback of the TA [6] and students' revisions; exam scores and results of the revisions of the exams. During weekly laboratory work students collaborate in groups in experimental work and in writing lab reports. We will search for any patterns that may emerge from the data, such as a link between their attitudes, information about improving their scores, attendance at various group activities (exposure to the ISLE-based-activities), and their perceived comfort with other students.

Preliminary results

The students' responses indicate that they had almost no experience with group work prior to taking the ISLE course. However, they brought different experiences with cooperation from their personal lives. While some of them never participated in any group activity, others participated in a theatre group, as a volunteer firefighter, etc.

The interviews show that their attitudes towards group work were very different at the beginning of the semester. Some felt uncomfortable: *"I felt uncomfortable. I am not used to work in groups"*, some liked it immediately: *"It is interesting, I like it!"*, some had barriers that had to be overcome over time: "*There was no problem,...we did not know each other, but we started to communicate fast, first by making jokes...".* After 10 weeks some of the students began feeling differently about their collaboration in groups: *"Yes, now I say what I think sooner...",* while the others do not feel different about working in groups: *"Actually no, I know the people now, therefore it is more comfortable, but in my opinion, my work inside the group did not change."* Some of them are aware that they affect how much and how other group members will participate. The interviewed students after 10 weeks think that different students collaborate in a different way, that the participation of the students is not equal between different students and different groups.

References

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