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How to utilise interdisciplinary backgrounds

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Introduction

Some university courses are aimed at students with differing academic backgrounds. I teach in such a course named Science Communication targeted for students at the Faculty of Science at the University of Copenhagen. The purpose of the course is to provide the students with tools to communicate their particular field of science to layman. The variation in student background constitutes a factor necessary to take into consideration because the nature of the different scientific fields hold by the students such as biology, computer science, nano science, physics, geology, math, and so forth is very diverse. The course has been run twice but the issue of varied scientific backgrounds has not yet been addressed. The purpose of this project is to shed light on the implications of the issue of interdisciplinary backgrounds in order to improve the course.

The focus of the project is based on a previous project I was part of concerned with the implications of interdisciplinary backgrounds in relation to the course Environmental Impact Assessment run by the Faculty of Life Sciences. In this project we investigated the hypotheses that 1) there is a correlation between students' academic background and their perception and impact of the course and 2) student discussions will benefit from interdisciplinary backgrounds in terms of higher impact of the course. We concluded that students' interdisciplinary backgrounds seemed to be an advantage in group discussions. The students thought it was beneficial to the discussions that the different participants were able to contribute with each their perspective based on their specific background. Further, it appeared

that students would like the teachers to address the interdisciplinary backgrounds by reminding and encouraging everyone to bring in their specific perspectives to the discussions. Regarding the correlation between academic background and perception/impact, the results were a little vague. But there was a tendency toward a positive correlation; the course appeared to be easier to understand and follow to certain types of students as opposed to others.

The conclusions of the project raised the questions of how to better take into account and utilise the different backgrounds of the students. *How can we as teachers design the course and teach so that the different academic backgrounds of the students can be put into play and utilised? Which tools are at hand?*

Thus, these questions form the basis of the current project concerning the Science Communication Course. The main focus is to further investigate the conclusion regarding the advantage of interdisciplinary backgrounds and, if this conclusion proves plausible, to take a closer look at how I and my co-teachers can address the interdisciplinary backgrounds better and utilise the students' specific backgrounds in group discussions and group work. The outcome would be to conclude on which tools could scaffold the students in how to use their backgrounds.

The approach was to investigate two groups of students who have previously participated in the Science Communication Course. The two times the course has been run the approach to the composition of groups differed. Much of the work carried out by the students is group work such as solving tasks together, making projects, and discussing problems. In the first run the compulsory groups were composed in such a way that the academic backgrounds of the students were as uniform as possible; resulting in biologists in one group, nano scientist in another, computer scientists in a third, and so forth. In the second run, this approach was changed and all groups were composed to represent a mix of the participating students.

Methodology

Focus group interviews were selected as an appropriate interview method to assess the intended purpose. Six students from each of the two rounds of the course were recruited via email-invitations. I had to encourage the students several time to participate in the interview. Finally six students from each round volunteered. This approach meant that the span in the partici-

pants' academic backgrounds were not as varied as I could have hoped for though it was varied enough to generate meaningful data. Four different backgrounds were represented in each group which I considered sufficient.

The development of an interview guide for the two focus group interviews was inspired by McCracken's (1988) *grand-tour* questions. These are initiating questions aimed to trigger or prompt the informants in order to promote discussion. The idea is to allow the informants to tell their own story and for the researcher to keep a low profile. Questions should be asked in general and open terms. Grand-tour questions can be supplemented by *floating prompts*, which are used to make the informants specify or elaborate, e.g.: "what do you mean by that?". It is important not to put words into the mouth of the informants for instance by saying: "do you mean that xxx?". Floating prompts arise in the situation and so these are not prepared questions that must be posed. On the contrary, *planned prompts* are questions that are essential to the interview purpose and accordingly must be posed at some point or another. Thus, planned prompts are prepared questions but they should not be posed until the end of a grand-tour sequence if the informants have not touched upon the topics in question already. A possible strategy for the planned prompts is to encourage the informants to recall certain episodes or elements and if needed to show objects, pictures etc. to stimulate the recollection.

Further, I studied the official evaluation of the course consisting of questionnaires in order to identify possible target subjects or problems relevant to the project purpose. Based on this analysis and the overall focus of the project eight grand-tour questions emerged. The first and second respectively regard the students' perception of academic level of the course and their expectations to the course. The third concerns the students' perception of the different elements of the course, such as plenum teaching, discussion sessions, group work, presentations, and feedback sessions. The forth grand-tour question concerns the students' perception/impact of teaching material. The course literature consists of a compendium compiled of text book material and research papers plus a practical oriented booklet. The fifth question regards the relationship between personal effort and impact/understanding of the course. The last three questions aim directly at addressing whether academic background correlates with perception/impact of the course and of the different elements such as group work and discussions. The reason for keeping this direct addressing for the finale part of the interviews was to ensure that the informants would not realize my agenda, which could cause a bias.

The focus group interviews were conducted as one-hour interviews based on the developed interview guide containing the grand-tour questions. The full interview has been recorded for analysis and the recordings have been transcribed. The analysis approach is hermeneutic and *ad hoc* based on (Kvale; 1997). This means that no standard methods are used for analysis but rather a free use of different techniques. The first listening has given a first impression of the interview as a whole. The next step was to go back to specific passages crucial to the purpose. Then I have counted utterances pointing in the same direction thereby looking for patterns and related those to the interview as a whole to verify if they seemed meaningful. Further, I have looked for contrasting and comparable utterances and again related those to the whole. Finally I have built a coherent understanding of the interview data and based the conclusions on that.

Findings

As mentioned, the six participating informants in each interview represent different academic backgrounds. Below follows a list of each of the informants' backgrounds. The names are made up for anonymity.

The students from Round One, interview 1:

- Susi, biology
- Ruth, nano science
- Ole, nano science
- Niels, nano science
- Lars, computer science
- Henrik, molecular biomedicine

The students from Round Two, interview 2:

- Dorthe, geology
- Sofie, biology
- Hans, computer science
- Jesper, computer science

Further two students from nano science and biology respectively had been recruited for interview 2 but one cancelled in the last minute and the other one never showed up.

Correlation between academic background and perception/impact

The tentative conclusion from the previous project mentioned earlier regarding the tendency towards a positive correlation between academic background and perception/impact of the course is not confirmed in this project. The students from Round One predominately agreed in most of there statements. Two particular statements were heavily agreed upon from this interview. One regarded the teaching form during plenum sessions. Three students unambiguously thought the plenum sessions were too full of interruptions such as buzz meetings and questions and that such exercises should be kept for non-plenum sessions (like exercise classes). Two of these students were from nano science (Niels and Ruth) and the third from molecular biomedicine (Henrik). The biology student (Susi) and the third nano science student (Ole) agreed on this and elaborated that if the teacher should ask questions like: "what do *you* think about this?", the students would need to have much more input from the teacher to base there answers on. Otherwise the students' responses would be (and was in their opinion) unqualified talk. The same nano science student who agreed to this (Ole) further uttered though, that the idea of having these buzz meetings was a good because it permitted the students to discuss with the students next to them. In his opinion this worked quite well some of the times so he wasn't all reluctant toward buzz meetings. But this was clearly in opposition to his fellow nano students (Niels and Ruth) and thereby clear conclusions of a correlation between academic background and perception/impact can not be made. The other heavily-agreed-upon statement from Round One regarded the course literature. The majority of the Round-One students' thought the literature was un-concise, too humanistic, and not consistent with the teaching. There were deviations from this viewpoint (that the literature wasn't all bad) but a consistency in which types of students says what can not be traced.

The students from Round Two differ from the students from Round One by being more negative towards the course as a whole. Three of the students (Hans, Jesper, and Dorthe) felt that the course was either difficult, disappointing or that something was missing. It was not only the compendium and the teaching form that were disappointing (as for the students of Round One), but also the topics and whole focus of the course. On the contrary the fourth student (Sofie) was very positive. She thought the course had been very rewarding. Two of the negative students, Hans and Jesper, are both

in computer science and this could express a trend but the third negative student (Dorthe) and the positive student (Sofie) are more closely related background-wise than either of them are with Hans and Jesper. This points to other factors for variation than academic background, which is supported by an utterance from Hans saying that he believes perception and outcome relates to expectation of the course. It appears that he, Jesper, and Dorthe expected something else than what the course was, whereas Sofie expected exactly what it was.

The value of interdisciplinary backgrounds

Regarding the second hypothesis from the previous project mentioned earlier that student discussions will benefit from interdisciplinary backgrounds the current project confirms the conclusions made previously; indeed students express to feel that varied academic background are an advantage to the discussions, to group work, and to the overall outcome of the course.

The students from Round One; the ones that were deliberately grouped in mono-background working groups, univocally express that during plenum and exercise class where a span of backgrounds were represented the different viewpoints that were uttered by the different students were very meaningful and rewarding to them. Though most of their group work took place in mono-background groups some of them had participated shortly in group work with students from other subjects than their own and these group works were considered more interesting and fruitful than mono-background group work. A typical perception was that the fellow students with differing backgrounds brought in angles they had not considered themselves and that this was very educational. E.g. Henrik said:

> "Angles came in that I hadn't even considered. For instance, some of the things the computer scientist guys talked about, I hadn't even seen - thought about – that maybe there were other aspects within science – and a whole different way of thinking."

One student specifically said that in the mono-background groups the lack of "other" angles and viewpoints was a shortcoming. Further perceptions were that is was funny and educational to have to craft one's language to be understandable to the others and that it was insightful to learn which words of one's own professional vocabulary were not common words by others, e.g.:

"And you also become aware about which words you use yourself and that you think everybody understands. Suddenly it occurs to you that it is totally within you own circles [professional wise] that people understand. So in that way it was good to become aware of things you think everybody knows" (Ruth)

The students from Round Two are very much in line with the students from Round One. They were at all times grouped heterogeneously and they all thought that the varied span of backgrounds were beneficial. E.g. they uttered that it was refreshing to meet students from other subjects and that it was funny and educational to observe and experience the different viewpoints of the others. E.g.:

"I thought it was refreshing for once to meet students from the other subjects around here. It has been very one-sided in the other classes we've had" (Hans)

"You end up becoming very subject-chauvinistic. It was fun to become inspired by the other's ideas and examples" (Sofie)

"It was fun just to observe and hear the different approaches people have – and real eye-opener" (Dorthe)

The only exception to this view of appreciating interdisciplinary backgrounds was uttered by Dorthe stating that she thought this one particular group work activity possibly would be more fruitful if the groups were of mono-backgrounds: "*maybe the part on museum communication would have been better off with mono-background groups*". A response to this was made by Hans who disagreed: "*then I would say that in a group of computer scientist guys having to make a museum exhibit it would not have worked*".

In conclusion this project shows that (1) there is no clear correlation between academic background and perception/impact of the course in Science Communication and (2) discussions and group work clearly benefits from interdisciplinary backgrounds and this regards all of the different activities of the course. There was no clear consensus that particularly activities of the course would be better off with mono-background groups. In the following section I will investigate how the teaching of the course can be crafted so that the different academic backgrounds of the students can be better put into play and utilised. I will base the investigation on the students own ideas (apparent from the interviews) and discuss those.

How to utilise interdisciplinary backgrounds

Three main ideas emerged from the interviews. The first is to specifically address the different backgrounds in plenum or during exercise class. This could be done in various ways, when discussing a particularly topic, e.g. a biology-related topic. For instance, the teacher could encourage all of the expert students (in this case the biology students) to comment on the work presented by the different groups excluding their own. Also, the teacher could encourage a sort of battle between the different groups of students when discussing e.g. a biology-related communication product or issue by specifically asking the computer science students, the biology students, the nano science students etc. what they think of this product or issue and why.

I believe this idea could successfully utilise the various backgrounds represented and further facilitate an intrinsic motivation among the students, since this approach encourage each of them to bring in their existing competencies and talk about something they already have an interest in and know something about (Biggs and Tang; 2007, p. 31). Possibly such experiences could have a positive feedback and stimulate even further intrinsic motivation towards the unfamiliar field of communication.

The second main idea that emerged from the interviews is to develop tasks for group work that holds interdisciplinary possibilities. Thus, each task should contain some biology, some computer science, some nano science, some geography etc. thereby enabling the group to approach the task from different angles. This should allow the students to contribute with their particular expertise and also to force them to involve with other fields than their own. Like the previous idea this idea could possibly facilitate or increase an intrinsic motivation by encouraging the students to bring in their specific expertise.

The third main idea that emerged from the interviews is to form groups of two students with different backgrounds and give them the task to each make an article based on an interview with the other about his or hers particularly field. This idea could enable the interviewing student to practice the interview-method and the interviewee to practice how the phrase and angle ones own topic when communicating with layman. Both of these activities are part of the ILOs of the course and at the same time utilises the varied academic backgrounds.

Also evident from the interviews is the statement that the buzz meetings is a bad idea in plenum as described above. These statements are not in agreement with current views of teaching, where plenum lessons are not

seen as one-way communication but should incorporate interactivity such as buzz meetings (Herskin; 2001). This discordance could reflect that students don't always know what is best for them, but may very well be worth taking a closer look at. Based on these findings I will investigate the student's statement further to see if this count for the majority and if so look into alternative approaches. One option is to provide the students with more information before demanding of them to discuss and have their own opinion. This is in line with what some of the students in this project expressed.

Closing comments

In conclusion I believe that all of these ideas are realistic and will contribute to improve the course in Science Communication. Further, this project has shown how much valuable information can be gained from focus group interviews. I have learned that especially when developing a new course focus group interviews can contribute in the adjusting of the course during the first two-four times the course is run.