

Who needs Popper in public health?

The challenges of teaching 'theory of science' to public health students

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Background

In the fall of 2015, I became course responsible for the course *Ethics and Theory of Science* ('Etik og videnskabsteori') within the Bachelor program in Public Health. I had previously been affiliated with the course by being one of the teachers for the ethics section of the course. The course is mandatory for obtaining a BA in Public Health and counts for 5 ECTS points. The course runs every fall semester in the first year of the Bachelor degree. The course is divided into two sections (ethics and theory of science). Students have six lectures in each of the disciplines. Duration of each lecture is 45 minutes. After the lecture, students meet for a two hour SAUs which are group sessions where they work more practically with the theoretical lessons from the lecture, for example by analyzing cases and developing their conceptual understanding. I teach the classes in ethics. I do not teach any SAU classes or the lectures in theory of science. The exam form changed in 2016. It used to be an oral exam with an external assessor. It is now a written exam (2 questions, 48 hour, 4 pages paper, pass/fail). As course responsible, I assess all papers. There is no internal or external assessor.

When I took over the course, I redesigned the entire ethics part. Previously the course was leaning towards medical ethics. Considering the fact that this is a course for Public Health students and not medical students, I felt compelled to change the literature and the content of the lectures in ethics so to align the teaching with the field of the students (Biggs, 2002).

The ethics part became specifically about public ethics. As indicated in the course goal description ('Fagets målbeskrivelse'; see appendix A) students need to be familiar with theories and principles/concepts within ethics and theory of science. I decided, at least in the ethics section, that they should not read primary literature (for example, Kant) as these texts are too complex and difficult for their level. I found a book on public health ethics (Holland, 2015) that they read relevant chapters from. This book serves as a textbook and is thus the primary source of information in relation to ethical issues within public health.

Since the beginning of my tenure as course responsible, I have been occupied with the aim, content and structure of the theory of science section, in particular, and how to best tie it to the ethics part. My background is not in the field of theory of science and thus I have struggled to find the red thread in the six lectures and appropriate literature where each lecture leads to the next and tire naturally to issues in public health. This sentiment is echoed by students in previous evaluations of the course. They are often bewildered when going through the classes and have a hard time finding the relevance to public health: Who needs Popper when you study Public Health? Though they may see the relevance later on in their studies (or so older students report), it is important that they sense the relevance even if they cannot verbalize yet while taking the course. It is important for their engagement in the class and for their learning process. Nobody benefits from students mentally tuning out in lectures and who are passive in group work.

As a teacher, it is frustrating situation to find oneself in and it has led me in this paper to examine the didactic and educational challenges of teaching theory of science to undergraduate public health students. In light of these challenges, the paper wishes to suggest how to design an effective learning environment that will augment the learning experience for the students. I am interested in becoming informed about what theory of science means to public health students/teachers within the context of public health, why theory of science seems difficult and often perceived irrelevant to public health students and, finally, what the didactic and educational challenges are in terms of teaching/form and in terms of curriculum/content.

Method

In order to support my own interpretation of the frustrating situation of designing a course that has numerous educational challenges in terms of form and content, I decided to conduct a interviews with a couple of teachers who have longstanding experience teaching the course in various departments at the Faculty of Medicine. Since the student perspective is important to understand in order to accommodate their needs, I posted a notice on Absalon where I described the purpose of my paper and asked the students to answer some questions. In the hope that the participants could cast further light on the issue from different angles (teacher and student), I posed four questions to all participants:

1. What do you find difficult/problematic/challenging about 'theory of science' as it now looks in Public Health?
2. How would you like to have the material presented to you in class (for students)/how would like to present the material in class (for teachers)?
3. Do the two sections, 'ethics' and 'theory of science', complement each other? If yes, how?
4. What do you think of the teaching style (lectures and SAU)?

This paper will first convey the lessons from the teacher and student interviews and, subsequently, introduce a series of suggestions as to effectively create a better learning environment. The suggestions are born out of my own reflections over the years about the didactic and educational challenges of the course, particularly with 'theory of science' and the outcome of the interviews.

The Interviews

My micro-empirical study started with the two teachers. After interviewing them, a broad pattern emerged that was somewhat surprising. The two teachers have both taught this course or similar courses for many years and thus draw on immense experience. Both teachers are convinced that theory of science has an important place in Public Health primarily as a critical thinking tool for the students. However, they express that the biggest challenge is to get the students "to lean back, give time and believe that they will eventually get some overview and understanding of the subject matter"

in the words of one of the teachers (question 1). In answering the second question, one teacher could not see how abstract material could be presented differently from now without running the risk of making it too superficial. He also pointed to the need for a double lecture instead of the single lecture at the moment. This is a sentiment that resonates with the students as they have aired the same wish in the past. As a consequence of the abstract character of theory of science, the other teacher has played with different ways of presenting the material, mentioning his use of illustrations and short YouTube clips to exemplify the content matter, for example sensory perception and interpretation. The two teachers diverge somewhat in question number 3 as one teacher believed that the two subjects (ethics and theory of science) do complement each other though it is difficult to show how they converge, whereas the other didn't, stating that "they touch on different areas of reality: the theory of science is a scientific-technological descriptive, causal-related thinking; but ethics is about normative theories where the subject field is interpersonal relationships, or relationships between human beings". Both teachers find the combination of lectures and SAU excellent as the latter "offers the students the possibility of getting the concepts and theories explained further and processed through discussions and assignments, i.e. a better practicalization of the lecture content". This teaching format opens up students to the material through their own questions and, thus, makes it more possible for them to explicitly understand it.

I had anticipated more responses from the notice I posted on Absalon encouraging students to answer my questions. I only received 2 written responses. I am therefore glad that I incorporated some of the questions into the obligatory dialogue-based evaluation that I carried out at the end of the semester. At least 80% of students attended this final class that also prepared them for the exam. The students were by and large active in verbalizing their opinions of the course. Combined with my two written responses, I could draw a general picture of their perception of 'theory of science'.

The biggest surprise in the data material was to see how aligned the students' responses were with that of the teachers'. Using other words, the students mimicked the board picture portrayed by the teachers. In pointing to the highly abstract subject of theory of science, they called for the need for double lectures and more examples to illustrate the content and relevance of theory of science to public health. They drew attention to the beneficial combination of lectures and SAU where they were given a chance to work more actively with the material. They pointed to the educational use of case

studies and encouraged teachers to incorporate more examples in the lectures so to get a clearer understanding of how theory of science applies to the field of public health. In the dialogue based course evaluation many students expressed that they found the two subjects very different explaining how they could easily relate ethics to public health but not theory of science. They underlined how valuable the group work was both as a test to their understanding and because of the discussions it generated. They mentioned how helpful it had been, during my introduction to the course at the very beginning of the semester, to hear that they did not need to bridge the two subjects, 'ethics' and 'theory of science', but could regard them separately since they were cut into two sections with six lectures in each. One student pointed out in the written response that though she had a vague notion of how the two subjects are tied together, "it was good to have them divided up with theory of science first, followed by ethics – otherwise it would create confusion".

Though the responses confirm the remarks and evaluations over the years in regards to the difficulty of theory of science, they clearly indicate much less of a problem than I had anticipated. This insight is valuable to me when designing an effective learning environment because it helps me calibrate the measures I need to take to address the challenge of the course more realistically. In other words, I may not need to resort to drastic measures (major changes) but small, creative ones. Some of these changes or additions are not directly linked to the content matter of theory of science but the way it is being presented to the students. These changes, however, can carry significant didactic and educational weight that will make theory of science more accessible to students.

Designing an effective learning environment

"Effective university teaching is a holistic endeavour that embraces not only the practice of teaching but an understanding of how students learn" (Hunt, Chalmers, & Macdonald, 2012). How can I use didactic and educational tools to improve my students' learning? First, let me introduce who my students are. My students are undergraduate students who predominantly are straight out of high school, i.e. between 18-21 years of age. The vast majority of them are young women with a very high average DPA (average grade) who are copiously determinate, motivated, driven and ambitious. They are used to setting goals and working hard. Encountering 'theory of

science' is a shock to most of them. The thinking involved and the language are different from what they are used to. The subjects seem abstract and far removed from what they think they need for their public health studies. As the students view this course as a very abstract (and demanding) course according to evaluations, I have thought of ways to guide them through the literature they read. In their evaluations, students have requested hand-outs that indicate what to pay special attention to in their readings. I may make a list with key concepts to focus on for each class. It seems to be in line with what they have been used to in high school. Since this course is their first at the university, handing out this conceptual guide may ease the difficult transition from high school to university. Last year I handed out a list of concepts for the ethics part and for the theory of science part. They seemed to be grateful for having this as a guiding tool as they got a better grasp of what were the most important concepts to understand. The students from this year mentioned the value of having these concepts in preparing for the classes. However, I was also afraid that they would simply skip to where these concepts appear in the text and miss the context and how these concepts connect to other less important points in the literature. It will be difficult for me to find out in the lectures as discussions are limited but I have informed my SAU-teachers to watch out for this particular problem.

Though I am not sure if I can enforce the students to keep a learning log, I find several advances in keeping one. This log could be an integral part of SAU work. A learning log is where I/we set aside some time (usually a few minutes) at the end of a class for students to write about what they have learnt today. In that way they have a log book at the end of the semester that can help them with preparing for the exam. I would, of course, have to also note down what I find is the most important 'take home' lessons of the particular classes, so for the students to compare their one with mine. This seems important as I would not see their learning log and therefore not be able to correct mistakes. On a trial basis, my SAU-teachers and I came up with the idea of a 5 minute writing exercise at the beginning of the SAU to practice writing since their exam is now a written exam. Eventually, we could develop the log book idea into SAU.

I have not previously considered the use of electronic devices to advance the learning process of students. Being new to the possibilities awarded by technology, I think I should explore some of the online platforms to be used in the classroom. I could experiment with, for example, word clouds in my classes. Seeing the word cloud on the screen would visualize learning points for the students and give me a chance to specify key concepts that they need

to know. Web-clickers could also be used as means to 'peer instruction'. I found out that there are several web-clickers on the market. The student response system that professor Jan Halborg Jensen has used on his blog with great success is called 'Socrative' but there is also 'menti.com' (word cloud based on the responses from students) and 'Shake-speak' which can be added on to a power point presentation which would be useful and practical. The advantages of web-clickers is that it can improve the attention span by inserting these reflective 'pauses' where the students have to take a stand, add a dose of fun to the lecture format and make the subject more accessible and visible. On the other hand, the down side could be that it serves as a distraction, reduces the complexity of the subject to one-liners and prevents stimulating the student to work harder with challenging topics.

Another way that Halborg Jensen inspired me was in his decision to video tape his lectures for the students to view at home in advance of them coming to class to discuss the lecture and before going to attend their 'SAU'. Though setting this up would be time-consuming and essentially not a decision for me to make as I would need the Department's and the Study Board's approval, it is worth looking at. The advantage is that this format would encourage the students to work actively with the material and give them a greater chance of exchanging thoughts and posing questions in the classroom. A learning by doing approach. The downside is that if students do not watch the video, the idea falls flat on the ground in the classroom because they have nothing much to contribute with in the classroom.

The splitting up of the course into two sections helps the students in one way, but it may also benefit them to consider mixing the two. This suggestion would require, however, a completely new structure of the course. A new structure where the two subjects are interwoven would underline the interconnectedness of them within the framework of public health and adopt a more pragmatic approach to the course instead of a theoretical approach as it is at the moment. One pragmatic approach could be to take a concrete problem and analyze it through theory of science and ethics. An example of this approach could be 'personal medicine' where the ethical issue could be 'informed consent' and the issue within theory of science could be the question of how much we know and how we scientifically determine what we know.

Finally, I think that improving note taking is important and can be done by, for example: Framing questions (what are the major questions in the topic for today), handouts (of major points and things to focus on) and summaries (recaps through out the lecture).

Conclusion

The course has suffered from problems of relevance and level of abstract thinking over the years, some of which have been resolved by changing the ethics curriculum (change of literature), focus (public health ethics) and teaching style (incorporation of examples and case analysis in teaching). However, students still wonder why and how Popper and co. is relevant for their future work in public health.

By incorporating some or all of my suggestions for effective learning, I hope to make students reflect more on their own learning and more clearly acknowledge the relevance of theory of science to their field of study while taking the course and not, as now, realizing it a couple of years later. Small changes that foster a creative attitude to learning will make an abstract subject less impenetrable and more enjoyable to engage in.

References

- Biggs, J. (2002). Aligning the curriculum to promote good learning. In *Constructive alignment in action: imaginative curriculum symposium, ltsn generic centre* (Vol. 4).
- Holland, S. (2015). *Public health ethics*. John Wiley & Sons.
- Hunt, L., Chalmers, D., & Macdonald, R. (2012). Effective classroom teaching. In L. Hunt & D. Chalmers (Eds.), *University teaching in focus: a learning-centred approach*. Routledge.

A

Fagets målbeskrivelse

Efter endt kursus forventes den studerende at kunne:

Viden

- Beskrive overordnede teoretiske retninger indenfor videnskabsteori og etik
- Refleksiv forståelse af centrale principper og begreber inden for videnskabsteori og etik
- Beherske videnskabsteoretiske metoder, der indgår i pensum, herunder årsag og virkning, hermeneutisk fortolkning, og hvordan man kan teste hypoteser.
- Reflektere over etiske aspekter i folkesundhedsvidenskabeligt arbejde

Færdigheder

- Anvende videnskabsteoretisk tænkning og etisk ræsonnering i relation til en konkret problemstilling i folkesundhedsvidenskab
- Vurdere kritisk etiske og videnskabsteoretiske problemstillinger inden for folkesundhedsvidenskab
- Læse og bedømme etiske og videnskabsteoretiske oplysninger i rapporter, videnskabelige artikler og medier
- Gennemføre etisk analyse af folkesundhedspraksisser og udforme klar videnskabsteoretisk kausalitetsvurdering og metodeanalyse

Kompetencer

- Overføre kendskab til forskellige videnskabsteoretiske og etiske positioner og dertil hørende teorier til anvendelse inden for folkesundhedsvidenskab
- Præsentere selvstændige indsigter i videnskabsteoretiske og etiske positioner i relation til folkesundhedsvidenskab
- Indgå i sundhedsfagligt projektarbejde hvor videnskabsteoretiske og/eller etiske oplysninger og metodik har betydning enten som produkt af eller som beslutningsgrundlag for det overordnede projekt