27

Getting students to read

Mads Eggert Nielsen

Department of Plant and Environmental Sciences, University of Copenhagen

Introduction

My project is based on the course "Genome and Cell Biology" in which I teach together with three others (http://kurser.ku.dk/course/lbik10135u/). It is offered in the MSc Programme in Animal Science and MSc Programme in Biology-Biotechnology, however the course is open to everyone who would like to raise their understanding of cell biology to an advanced level. The course is offered in Block 1 and I would like to dedicate my UP project to this course in trying to improve how the attending students prepare for the discussions of a selection of scientifically related articles. The teaching is based on textbook, lectures, poster presentation (group work) and presentation of scientific articles (group work). In the course description, the students are given a content list of areas that this course will cover. These include a wide variety of themes on molecular cell biology such as: Gene regulation, structure of genomes and their content of information, membrane structure and transport, cell cycle control, programmed cell death and autophagy.

This course is mainly aimed at students who are about to start their masters project. The course is organized in such a way that it is highly recommended that the students have previously attended a 7.5 ECTS Bachelor Level Cell Biology course. Students with little previous knowledge are informed that they must be prepared to work hard.

The purpose of this course is to bring students to an advanced level in cell biology. This level allows an easy start on a master's project or PhD project with cell biology content. Therefore the focus is on understanding

principles and not on memorizing details since cell biology is an area of biology that evolves rapidly. The textbook, Molecular Biology of the Cell by Alberts et al., forms the basis for lectures and poster work.

Teaching

Besides using the textbook, this course is based three main types of teaching and/or group work:

Lectures:
The course is based on a series of lectures, each devoted to cover a particular area within genome and cell biology. The lectures will involve a great deal of in class problem solving. It is therefore expected that the students are well prepared for the lectures.

Poster work:
Groups of students prepare posters based on original articles in areas selected by the teachers. The posters are printed and presented at the end of the course.

Article work:
Groups of students prepare a presentations on a larger articles recently published in a high impact scientific journal. The articles have been selected by the teachers.

From the course homepage, the students are informed of the intended learning objectives (ILOs) which are the following:

Knowledge:
Describe the genetic and structural elements, genetic mechanisms and cellular communication of living cells.
Describe mechanisms involved in gene regulation in cells.
Display an overview of membrane structures, cellular compartments and transport of molecules between compartments.
Describe cell division, cell cycle control, autophagy and programmed cell death.

Skills:
Analyse and evaluate scientific papers which describe cellular processes of

any kind.
Apply knowledge on the molecular biology of cells in the planning of own experiments.
Communicate know how in English on the structure and molecular mechanisms of living cells.

Competences:
Apply knowledge on the structure of molecular mechanisms of cells to further analyse problems within genome and cell biology. This level allows for an easy start on a masters project or a PhD project with the cell biology content.

Exam: The exam is based on an oral presentation of one of several exam topics. Exam topics are given in good time before the exam so that students have time to prepare presentations of each topic. The topic to present at the exam is determined by lottery at the start of the examination. Following the topic presentation, the examiners will ask questions for the remaining time of the exam. All aids are allowed. Each student will be assessed according to their performance during the exam and given a mark using the 7-point grading scale.

Problems

From my experience teaching the course last year (2014), it came to my attention that most students did not prepare well for the discussions of the scientific articles. As reading scientific articles is an important part of actually doing science, this course is intended to give an introduction to how you read and understand these. The discussions were arranged so that one group would present an article, 12 in all, after which an opposing group would ask questions. Lastly the discussion was to be set free including all students and teachers. However, it was clear that only the groups who were selected to present and oppose the article had actually done the reading which lead to a rather short lived discussion and only few students who actually grasped the concepts of the article. Since one of the ILOs of this course is to give the students some experience in reading scientific articles, I find that we need to establish more interest among the students in order to achieve that.

Aim

In this UP project, I would like to come up with ideas of to how change the current teaching format during the course so that more students end up reading and understanding the selected scientific articles. My current thoughts are that lectures could be aligned with the selected articles. This could be used to create Case Based Teaching and underline how the textbook does not cover all aspects of cell biology. In addition, to ensure that more students prepare for the article discussions I would like to explore the possible use of class preparation assignments. To get a feel for why the scientific articles seem so low prioritized, I would like to interview students from last year's course. This would give me a better understanding of how well the student's actually did prepare for the article discussions, but also their own views on how to improve this. As this course only runs in block 1 and this project is due before that, it will not be possible for me to carry out and evaluate on these ideas. Yet, I will discuss my ideas with my colleagues, utilizing their vast experience in teaching this course and others, and together design some uniform improvements for next year's course.

Preparation for student interview

To get some feedback and ideas to possible improvements to the course, with a main emphasis on the presentation/discussion of the articles, I invited 3 students who all attended the course last year (i.e. 2014). The aim of this interview was:

1. To establish how well the student's prepare for the discussions of the scientific articles: Am I right when I presume that most students do not read all the articles?
2. To understand, from a student's perspective, why preparing for the articles seems to be so low prioritized.
3. What could be done in order to raise the level of engagement in the article discussions?

Since I relied on cooperation from the students, I was aware that starting the interview by accusing the students of not having done the reading would probably only result in an unfriendly atmosphere. Instead I would start off by offering coffee and a cake, and by thoroughly explaining the background for the interview i.e. that the only intention was to come up with suggestions for next year's course.

Interview with students

As expected, all three concurred that reading all the articles was not something that was highly prioritized. Instead, most articles were either completely skipped or only briefly looked upon before attending class. Moreover, it was their feeling that this practice was common among the rest of the students. It should be noted that one student had not understood that it was considered mandatory to have read all articles, which would suggest that a minor part of the students simply do not read because they think that they do not have to. Nonetheless there was a consensus among the students, that there was no risk in not reading the articles and thus no pressure to actually do so. The students also remarked that the scientific level of the articles was very high and demanded a large effort in order to fully understand them. It was suggested that perhaps a more randomized way of selecting who would present the given article would result in more students reading. However, it was quickly agreed upon that none of the three interviewees would have liked to be in a situation where they would have to explain an article for which they had not prepared or did not understand. Instead it was suggested to divide the class into two or more groups, where each group was appointed an article. One or more students from each group would then at random be selected to present the article for the rest of the class. To this idea I pointed out that the intention was for all students to read all articles. From here the discussion went back and forth on how to establish a more positive attitude towards reading the articles so that the reading is done on a basis of "wanting to" instead of "having to". I explained that for me, the ultimate scenario would be that all students read the articles out of interest rather than being forced to do so. In addition I revealed my thoughts of including the articles, when appropriate, into the lectures, thereby making it clearer as to how they complement the textbook. To this the interviewees responded positively, saying that a brief introduction of the article and how it relates and complements the textbook would almost certainly incite more students to read the articles. Nonetheless, all three students concurred in finding it very unlikely that this alone would result in all students reading all articles.

Personal reflections upon student interview

To summarize, the interview was conducted in a friendly atmosphere and the students were very eager to help out. As described above, the inter-

view revealed that I was right in my presumptions that most of the students did not read all the articles. Since a small fraction of the students could be excused due to not knowing that reading all articles was considered mandatory, we should be more explicit in addressing this at the introduction to the course (this was also pointed out by some of the students in the course feedback; Appendix A). Yet, it was clear that most students prioritized their preparation time on matters that would have the biggest effect on the final outcome at the exam, such as reading the book chapters and preparing their presentations. Clearly the interviewees thought that it would have a positive effect if some kind of pressure was put on the students in order to get them to read all the articles. Although I respect their self-awareness on what works in terms of how they prioritize their preparation for the course, I am reluctant in setting up a system that makes the students read by brute force alone. Instead I was delighted to hear the positive feedback on the idea of introducing the articles in the lectures, which inspired me to rethink how I teach.

For some time, teaching based solely on traditional lecturing has been considered "a thing of the past" and several studies have suggested teachers to reconsider the teaching format in order to improve the way content is learned at a university level (Duffrin 2003). In fact, some studies suggest that lecturing is not a particularly effective way of promoting deep student learning (Bates & Galloway 2012, Chew 2014). Nonetheless, lecturing is still very much the predominant way of teaching at many universities and it certainly also dominated my own way of teaching at the course last year. Based on the input from the student interview, I would like to include the relevant articles into my lectures. Ideally this could be done by introducing a form of Case-based teaching (CBT) which is an active learning strategy where students apply their knowledge and their analytical skills to complex, real-life scenarios relevant to the subject matter. As CBT is considered a useful way to combine traditional lectures with problem-based learning (Van der Veken et al. 2008, Coorey & Firth 2013), I find that it could be helpful for engaging and creating relevance for students to the articles.

Although I am confident that introducing the articles by CBT will inspire more students to prepare better for the discussions, I am aware that this alone is unlikely to get all student's to read all articles. Having to teach students that are not well prepared for class seems to be one of the most fundamental problems encountered when teaching. One approach to increase student involvement, and thereby engage the students in the learning process, is to introduce class preparation assignments (CPAs; (Yamane 2006)).

CPAs are described as regular, low-stakes writing assignments that lead students to critically engage with the primary or secondary sources that constitute the assigned readings. Quite recently this approach was tested revealing that CPAs provide a strong preparatory base for active learning and are effective means of boosting student involvement and comprehension of course material (Davis & Minifie 2013). It therefore seems that combining CBT with CPAs could be an effective way of getting more students to read more articles. This would, however, require a combined effort from me and my colleagues in redesigning the approach to the article discussions.

Preparation meeting for Genome and Cell biology course 2015

To evaluate on last year's course and prepare for the next, I met with my colleagues in the end of June. During the meeting we discussed several matters that lie outside the scope of this project and will therefore not be described in detail here.

On the evaluation of the article discussions I was not surprised to hear that my colleagues shared my concerns that the students in most cases were ill prepared. Based on my informal interview with the students and the official course feedback, we quickly agreed that we need to be more clear in explaining the article discussions format and how well-prepared we as teachers expect the students to be. In addition to this, we will provide the students with a short written guideline which should help them focus on what is important when presenting an article for others and serve as a written explanation on the article discussions format.

While the written guideline would help to ensure that all students are informed on "the what's, the when's and the how's" related to the article discussions, this would not ensure that the students actually sit down and read the articles. I therefore proposed my ideas on CBT and CPA as explained above. These ideas were well received among the other teachers. This lead to the discussion whether we the previous year had been too focused on finding recently published, high impact articles instead of finding articles that would fit better into our lecturing format, complementing or underlining the textbook. It was decided that more focus should be on selecting articles that aligns with the lectures although we still find it important that the articles represent the latest research within their respective fields. In addition to this, we discussed a CPA format where each group

would be asked to hand in one question to each article prior to the discussions. All questions should be readily available to all students prior to the discussions, clearly stating who formulated the question and to which article it is related. After the presentation of each article, the groups will be asked to put forward their questions and engage in the discussion. The idea is that no single group or student would like to be associated with tedious or even banal questions. Note that the intention is not to ridicule anyone. Instead, our hope is that this format would create a form of self-discipline among the students, inciting each group to formulate interesting questions that will stimulate the article discussions.

Conclusions

It is clear that when trying to improve any course, it helps when there is commitment to do so from both sides of the teacher's desk. I was therefore very pleased to find that both students as well as my colleagues were so positive in their support of this project. Obviously it remains to be seen whether the implementations of e.g. CBT and CPA will have the desired effects. It is therefore difficult for me to conclude anything on the changes of format that we have decided upon for next year's course. Nonetheless, I have found it very inspiring to interact with the students and my colleagues trying to improve the way I/we teach. One thing I did noticed during this project is that, for me, it is much more interesting to prepare and rethink a teaching format instead of just following "the same procedure as last year" brushing of the presentations/notes/questions from last year and do the teaching from there.

All contributions to this volume can be found at:

http://www.ind.ku.dk/publikationer/up_projekter/2015-8/

The bibliography can be found at:

http://www.ind.ku.dk/publikationer/up_projekter/

kapitler/2015_vol8_nr1-2_bibliography.pdf/