Using teacher training courses as levers for faculty educational development -an example from the University of Copenhagen

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Abstract

This article describes the use of action research elements in a teacher training programme to support faculty educational development. Empirically the article is based on examples from the teacher training programme (TTP) for assistant professors and post-docs at the Faculties of Science, Life Sciences, and Pharmaceutical Sciences (University of Copenhagen). Three examples are described, displaying various levels of generality and impact – from the very specific outcome for a relatively limited group of teachers, to general faculty development initiatives. The first example concerns the development of a set of specific suggestions for developing a course at the Pharmaceutical Faculty. The second example concerns the projects made by assistant professors in relation to the teacher training programme. The third concerns the recent change of grading scale in Denmark, and the faculties' need to educate staff in relation to this. The article describes the utility and motivational aspects of using such embedded activity research elements and concludes that they can be important elements of faculty educational development.

Introduction

In spite of the fact that most tenured teachers at the university spend at least half their time teaching, it can still be a challenge to motivate scientific staff to engage in teacher training courses and development of teaching in research intensive environments like the University of Copenhagen. This is not because the scientific staff does not find teaching important. Most staff members seem to agree that the teaching obligations of the universities are at least as important as the research obligations from a third-person perspective. However, from the first-person perspective, the case is different. The general stress level and workload of tenured staff often make them stay away from, at least voluntary, teacher training courses. The teaching obligations of many newly employed staff members (particularly post-docs) are relatively limited, and the feeling is that what counts in order to achieve tenure (associate professorships) is the length of the publication list. One participant in our teacher training programme (TTP) has expressed it like this: "The research demands that the [newly appointed assistant] professor must meet are very clear. For example, the [assistant] professor must

publish 1.7 articles in journals with peer review every year. Considering the fact that most articles have two or more authors, this number is *de facto* closer to 3 articles in journals with peer review every year. If these criteria are not met, financial penalties may be enforced, either on group level, institute level or even department level. [..] This is in contrast to teaching performance where the criteria that must be met are less well defined, and where no financial penalties are enforced in the case of poor teaching. From this, I can personally only reach one conclusion. No matter what they say: research comes first!!! [..] A newly appointed [assistant] professor can only obtain adequate research funding by applying for external funding and the only way to document academic competence within the research area in question is a publication list that clearly demonstrate scientific competences. For such applications, teaching competences are utterly irrelevant. The way I see it, the university reinforces the statement 'research comes first' because society demands it. What is a boy to do?"

We find that this statement provide an accurate description of the mixed feelings towards teaching that many participants in our compulsory TTP have, and such understandably strategic feelings towards the time spent on teaching are quite widespread. Thus, the challenge for developers is two-fold: (1) To motivate our participants in our quite extensive compulsory course to engage in personal development, and (2) to disseminate new ideas and methods in teaching to tenured staff.

In this article we will provide some examples of what we are doing to ensure that participants in our TTP feel that the time spent is worth the effort. Specifically, it is our ambition that the teacher training programme at Copenhagen University should not just be "a course to follow", and unrelated to their own teaching practices, but of relevance to these practices and constitute an integral part of the faculty educational development efforts.

We will start by outlining the development of higher education teacher traning programmes in Denmark, and describe briefly the structure and content of the teacher training course in the sciences at the University of Copenhagen. Then we will provide three examples of how the teacher training course is used as a lever for faculty educational development at the three faculties involved in the TTP.

A brief history of the development of higher education teacher training programmes in Denmark

In the Danish Job Structure, in the description for assistant professors, it is stated that "Supervision is provided, as well as the opportunity to enhance pedagogical competencies with a view to [i.e. leading to] a written assessment of the assistant professor's teaching qualifications." (Universitets og bygningsstyrelsen, 2006). Thus, from the legal perspective, universities are obliged to provide assistant professors with supervision on their teaching, opportunities to enhance their pedagogical competencies, and make a statement about their teaching qualifications. This statement on teaching qualifications should be taken into consideration when employing associate professors (e.g. tenure). The above rather vague description about supervision in the Job Structure has, in slightly modified form, existed since 1993. In the period from 1993 to 1997 there was little consensus among the universities on how this should be

interpreted. However, in 1997 The Danish Rectors' Conference decided upon a set of general recommendations for the organization of teacher training courses for assistant professors in higher education in Denmark (Rektorkollegiet, 1997). In these recommendations, it was suggested that the TTPs for assistant professors should include supervision as well as pedagogical courses, workshops etc., and have an estimated workload of 250 hours for participants. Thus, a basic distinction was made between a practical part (supervision) and a more theoretical part (courses etc.) was established. Beyond that, the Rectors' conference provided no specific recommendations for content or structure, but left it specifically to the institutions: "The content and pedagogical structure and the practical planning of the programme should take into consideration the special nature of the institutions and the disciplines." (Rektorkollegiet, 1997). Thus, in the period from 1997 the different universities have developed a number of quite different TTPs – some organised on a faculty basis, others on central university basis. Typically, the courses have developed gradually over the period in a political process varying from university to university, and with only a few TTPs reaching a volume as recommended by the Rectors' Conference (250 hours); the typical volume is around 180 hours. Trowler and Bamber's (2005) description of the cumbersome development of compulsory higher education teacher training programmes in Norway bears many similarities to the Danish development, except perhaps that the Danish programmes have taken even longer to develop. There are several reasons for this, but one important reason is probably, that whereas the Norwegian model only requires a 100 hour workload of participants, the Danish aim has been for 250 hours.

The teacher training programme in the sciences at the University of Copenhagen

The faculties of science and pharmaceutical sciences at the University of Copenhagen have had a formal cooperation about a joint teacher training programme since 2003. As of 2008 the faculty of Life Sciences has joined the programme, so that now the TTP addresses three science oriented faculties at the University of Copenhagen. The TTP is currently the most extensive programme at the University of Copenhagen both in terms of enrolled participants and in workload for the participants, and is comparable in scope to the most extensive programmes at other Danish Universities.

Figure 1 outlines the different elements in the teacher training programme at the three faculties. The *theoretical part* of the programme consists of a Course in University Pedagogy in Science (CUPS), containing a pre-project on student learning and a final project where participants investigate a problem related to their own teaching. In addition the participants organize peer supervision of each others' teaching. Furthermore, a separate 4-day 65 hour course in practical pedagogy (Introduction to University Pedagogy) focussed on lesson planning and teaching has to be passed. Some participants have followed this course while doing their Ph.d study. The workload in relation to the theoretical part is around 185 hours.

In the *practical part* of the course, two senior staff members with appropriate pedagogical background supervise the teaching of the assistant professor. On the

basis of the supervision and the participant's developed teaching portfolio, a statement about the teacher's teaching qualifications is made (in accordance with the legal obligation). The workload in relation to the practical part is estimated to around 65 hours.
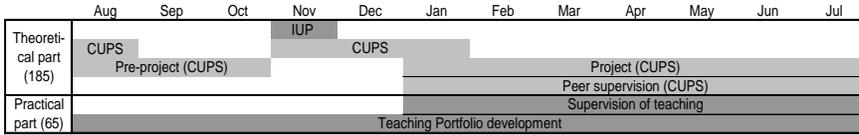
	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
Theoretical part (185)				IUP								
	CUPS				CUPS							
	Pre-project (CUPS)						Project (CUPS)					
							Peer supervision (CUPS)					
Practical part (65)							Supervision of teaching					
				Teaching Portfolio development								

Figure 1. Outline of the TTP for assistant professors in the sciences at the University of Copenhagen

Table 1 shows the intended learning objectives for the TTP as a whole. The different elements of the TTP contribute variously to the teaching and learning activities in the different bullets of the intended learning outcomes. For instance, the last two bullets are addressed in the CUPS course, but may also be addressed in the supervision, and in the participants' projects. These two bullets are very closely related to general faculty development efforts, and constructive alignment implies that if participants should learn how to engage in such developmental work, they should also be engaged in teaching and learning activities that support this in the course.

Table 1. Intended learning outcomes for the teacher training programme (TTP)

At the end of the course participants should be able to:
- Plan, carry out and evaluate teaching at tertiary level within the participant's subject area
- Employ a repertoire of planning, teaching, assessment and evaluation methods, and demonstrate understanding of the possibilities, limitations, strengths and weaknesses of the various methods in relation to curriculum, learning objectives, participants' previous knowledge and the institutional limitations.
- Justify choice of content, sequencing, teaching methods and modes of assessment on the basis of a pedagogical knowledge base and understanding of the students' previous knowledge.
- Reflect upon students' learning in relation to the teaching activities, and assess the students' learning outcomes in relation to the learning objectives. Can plan suitably challenging learning activities for the students.
- Adjust the teaching in real-time, in order to improve student learning.
- Reflect upon own teaching and the teaching of others, drawing upon relevant pedagogical literature.
- Can take part in the development of courses, modules or entire study programmes, and relate to the interplay between the objectives and assessment methods of the study programme as whole and its constituent parts.
- Can take part in discussions of the development of the faculties' study programmes, quality assurance and the external factors and conditions influencing the development of the study programmes.

Course in University Pedagogy in Science (CUPS)

The Course in University Pedagogy in Science is organized around 5 authentic case based themes, as illustrated in figure 2. The participants' work with the different themes is typically based on a PBL session in groups of 3-6. For each theme, several different cases are available for the students to choose from.

Thus, for instance, in relation to theme 1 on teaching methods, there are cases related to problems with lectures, tutorials, laboratory work, use of ICT, and clinical teaching. In this way the participants may choose to work with the case that is most relevant in relation to their own actual teaching.

Introduction (1 day)	Ordinary course days (4 days)				Final retreat (2 days)
Poster-session	Pre-project presentations	Theme 1: Teaching methods	Theme 2: Assessment	Theme 3: Constructive alignment	Theme 4: Supervision
Introduction to pre-project	Exercise in peer supervision				Theme 5: Optional
Group formation	Theme 1: Teaching methods	Theme 2: Assessment (sum. and form.)	Theme 3: Constructive alignment	Theme 4: Supervision	Introduction to projects
Introduction to ICT					Exercise in peer supervision

Figure 2. Outline of the Course in University Pedagogy in Science (CUPS).

The basic textbook used in the course is Biggs and Tang (2007), but a wide range of supplementary literature is provided as suggested reading for the treatment of the cases, and participant find relevant literature on their own – depending on the learning objectives they decide upon.

The use of the TTP for more general faculty educational development has its roots in the CUPS course from which we shall present three examples of such faculty development efforts.

Example 1: Helping improve a specific course in one of the faculties

In the PBL session on theme 1 (teaching methods) in 2008 (see figure 2), the participants were presented with an (actual but slightly modified) e-mail sent to one of the authors. The e-mail was from a group of teachers who requested help on developing their course at the pharmaceutical faculty. The course had many lectures, and somewhat fewer tutorials, and was attended by around 150 students. Many students fail the course, and the teachers wrote as part of their request "We wish to change the teaching, particularly the tutorials, so that the students take responsibility for their own learning." At the CUPS course, three PBL groups were formed around this case, one focusing on improving the tutorials, and two groups on improving the lectures. In their presentations, the first group considered how students could be motivated to work independently, and had several suggestions for how the teaching could be organized in new ways, allowing for increased student activity. The groups on lectures focused on getting the students to work during lectures, for instance by solving problems in smaller groups, and peer-instruction like approaches. One group had also found the slides from the lectures on the web, and had suggestions on to how one could focus more on the core mechanisms and concepts, leaving the rest to the students' work out of class. The other group considered the use of ICT in class and out of class. The three presentations have been sent to the teachers of the involved course. It is a motivation to the participants in the course to work on an authentic case, where

they could actually help their colleagues develop their teaching, instead of an "artificial" case just for their own learning. Furthermore, because the problems in the case are relatively typical, the case had a generality that made it relevant to the participants' own teaching. While the case in this way helped colleagues outside the course develop their teaching, it is obvious that this is not the way to bring about faculty educational development on a grander scale. But for the involved participants and for the teachers who had the problem it is useful, and because of the generality of the problem the methods and the results may be used many other similar situations encountered by the participants in the future. In this way such cases do have a faculty educational development potential, and are definitely worthwhile in the CUPS course.

Example 2: Providing in-depth development of a number of courses at the Faculties

The projects in the CUPS course (see figure 1) constitute an important part of the teaching and learning activity in the TTP. As stated in the last two bullets of the intended learning outcomes, the participants should be able to *take part in the development of courses, modules or entire study programmes*, and to *take part in discussions of the development of the faculties' study programmes and quality assurance*. The project is an important opportunity to practice these skills. They are typically made individually, but some are group-based.

The project is based on the participants' development of and reflections on his or her own teaching. It is a specific requirement for attending the TTP that the participant must be allowed to plan and design his or her own teaching – of course in relation to given frames and programme requirements. Sometimes the framing of the teaching does not allow for all the changes which the participant consider relevant. For instance, if the participant teaches only a fraction of a larger course, assessment method and content may have been decided by other (and more senior) colleagues. Then the participant may argue his or her suggestions for change as recommendations for future development in the project. It is quite often the case that participants in this case manage to influence and change important elements in subsequent implementations of the course.

It is possible to write a project which addresses issues beyond concrete changes to a specific course. In a few cases, participants have chosen to write on e.g. a curriculum analysis on the programme level. For instance, one participant analysed the progression in the curriculum in human physiology in the study programme in sports and exercises, and concluded that there was ample room for improvement in terms of alignment by increasing integration of the theoretical courses with the practical exercise courses. On another occasion, a group conducted an empirical survey of the students' ability to solve the same mathematics problems when written in English and Danish respectively. Results showed that students in general overestimated their own language skills and that the institutions' general assumption that the teaching language in teaching does not play a major role in learning could be questioned.

The 88 projects made in the period from 2003 all involve revisions which result in more student centred teaching and/or increased constructive alignment. The project brings appropriate literature to bear, often on deep and surface

learning and constructive alignment, but also more content oriented theories such as the Theory of Didactical Situations (Brousseau, 1978). A typical project results in revisions within the given frames of the traditional teaching, for instance introduction of peer instruction or other types of interactive lectures, but also changes to the tutorial recitation format is quite typical. The more outstanding projects are shared with subsequent participants in the course literature, and thus gain impact beyond the specific course. We present a number of such examples below.

Example A: Traditional tutorial or problem solving classes represent huge challenge to the participants. In the "ideal format", students bring their individual solutions to a number of typical end-of-chapter text book problems and volunteer to take turns in presenting their solution to the class which takes proper notes. The teacher supervise the process and help students when they get stuck. Most often, however, students are poorly prepared, refuse to present at the blackboard and quickly force the instructor to present the correct solutions to the class which thereby get the solution – with notes. Most instructors are unhappy with this situation, but feel powerless and quickly resign. However, the participants in CUPS quickly realise that even the ideal format is not very student centred.

In one project a participant designed the following format: Students come to class more or less prepared, but are told that they should at least try to solve all problems beforehand, and if they get stuck on a problem, note why. In class the students are first divided into groups based on the type of their difficulties: Students, who only experienced difficulties in the most advanced problem are grouped together, likewise are students who experienced problems in the more basic problems. The groups then work on the problems for one hour (of two), facilitated by the instructor. Difficult parts of the problems are then presented by the different groups in the second hour, supervised by the instructor. The participants' class was one of three parallel sections, and students were assigned randomly to a section, but were free to change. Initially the students were thus evenly distributed in thirds, but the CUPS participant ended up teaching more than half the entire group of students enrolled.

Example B: Revisions of cook-book labs have been the theme of several projects. In one project an entire course for 50 students was revised and the former cook-book labs were replaced by more open-ended exercises, where studens had to design their own experimental setup. The number of exercises was lowered, but the study showed a much better and more useful learning outcome, which was better aligned to the study programmes overall learning objectives.

Example C: Course alignment was the theme of a project where assessment procedures in the participants' course were evaluated and revised to become in accordance with the new national rules for assessment which ruled out the hitherto used assessment method. The previous assessment was a pass/non-pass assessment of a group report, but the new rules stressed a requirement for individual assessment. The project took results from the participants' pre-project into account where it was found that the group project played an important part in the students learning process. Therefore, the new assessment is an individual oral exam based on a group based report. Furthermore, a new course element with individual presentations of smaller case studies allowing for formative assessment of the students' oral presentation skills was added.

Example D: Other significant projects implied introducing case- or PBL-based learning, for instance in a crucially important course on drug formulation at the pharmaceutical faculty; these activities now play an important role in the structure of the whole course, and has also spread to other courses in the department.

Faculty development on a course by course basis may seem almost futile given the enormous number of courses in the three faculties. The number of courses at the three faculties exceeds 1000. However, it is our experience that the ideas for new student centred approaches developed in relation to the participants' projects, actually have a tendency to spread to other courses – an effect that may otherwise be difficult to establish. An important reason for this is of course, that the teachers have developed these new initiatives themselves, and bring the ideas with them to their colleagues and to the new teaching responsibilities the meet. In this way, the former participants in the course become "ambassadors" of student learning at the departments. In addition, over the past year the enrolment to the TTP has increased dramatically, mainly because of the increased recognition of the importance of the TTP by the faculties. Thus, this year (2008/2009) the number of participants in the course is around 80, and the age profiles at the faculties suggest that this number may even increase in coming years. In a not so far future, the number of courses which has been through the critical eye of a student focused teacher in each programme will have reached a critical number, were "traditional teaching" is not really the tradition any more, and where the former participants in the course will be the citizens rather than ambassadors. In this perspective the future seems quite promising, even for the most confirmed pessimists (i.e. the authors).

Example 3: Helping initiate a large scale educational development projects at the faculties: Implementation of a new grade system

In 2007 a new grade system was implemented in the Danish educational system (The Ministry of Science, Technology and Innovation, 2007). The introduction of a new grade system was mainly lead by a wish to coordinate the Danish grade system with European standards (ECTS) and was a result of several years' ministerial work, hearings phases and debate (Undervisningsministeriet, 2006).

At the university level the implementation was to be finished and in use to the exams in fall 2007, however the implementation process in itself was up to the individual universities to decide. At the University of Copenhagen it was laid out to the different faculties and the Department of Science Education was appointed the task of initiating an implementation process at the departments at the Faculty of Science. The Didactical Unit at the pharmaceutical faculty played a similar role, in cooperation with the head of studies. The authors played key roles in these development projects.

The main new aspect of the new grading system is that it is based on an absolute scale and that this scale must be related to learning objectives described for the course involved. Learning goals had at the time been described for all courses at the faculties but were of a varied quality seen from an educational development perspective. Many teachers experienced the task of making learning

objectives as a purely administrative task that had nothing to do with their teaching practice.

Based on these experiences we decided to use the task of leading the implementation process of the new grade system at the Faculty of Science to stimulate the use of constructive alignment, where learning objectives, teaching and learning activities and assessment reflected and reinforced each other. Thus, the relatively mundane challenge of implementing a new grading scale was taken as an opportunity to create educational development at the faculties.

Accordingly, the implementation of the new grade system at Faculty of Science was established in three steeps: Development of prototypes at the CUPS course, by using resource persons at the departments, and providing workshops for all members of scientific staff at the faculties. A similar, if slightly less ambitious, process took place at the Pharmaceutical Faculty.

The process of initiating the work with constructive alignment linked to the new grade system was started at the CUPS course (theme 3, figure 2). Each of the participants was given the task of looking at one of the courses at his/her department - preferably a course that he/she was directly involved in or related to in one way or the other. The task was to assess the existing learning goals if such goals existed, and to formulate more appropriate ones and then relate them to the exam measurements. The assignment involved individual work, group feed-back and plenary discussions where participants received feed-back from the facilitators and other participants. This exercise dealt with around 25 different courses at the Faculties of Science and pharmaceutical sciences and actually meant that all departments within the faculties had a staff member who had considered the question of defining learning objectives and accompanying operational grading criteria in detail. This process was finished at the beginning of 2007.

At the Faculty of Science, the next step in the process was to appoint resource persons at each of the Departments. Some of these resource persons were assistant professors from the TTP (or former TTPs), others were teachers involved in the administrative parts of the teaching organisations or pedagogically trained departmental supervisors from the TTP (see figure 1). In this process two persons from each of the involved 8 departments were involved. Individual meetings and feed-back sessions were held with the resource persons and they were guided to formulate learning goals and reflect on the process involved in order to be able to present it to their colleagues at department workshops.

During the spring 2007 the Department of Science Education conducted workshops at the faculty's Departments. Each workshop was focused on letting the teachers work with formulating the learning goals for their courses in groups that teach on the same course, and letting them discuss the relation between learning goals and assessment criteria. The point of departure was taken in presenting the learning goals and the reflections of the process from the resource persons from that particular department. So after a short introduction to the prototype case developed by the resource person, most of the day was spent actually working on the learning goals and discussing. The process went very differently at the different Departments – from very productive and centred on constructive and valuable discussions to reluctance and even resistance to working with the learning goals. In this process, the insights from the assistant

professors' CUPS cases were invaluable in trying to feed into and facilitate the process. At a number of the departments it was mandatory for the teachers to turn up to the workshop, and in that respect this process meant that a large number of courses that were reconsidered and reworked. At the most sceptical departments, the effect of re-formulating learning goals and trying to get the teachers to link them to the assessment criteria was not great, but in each department we observed great differences between different groups of teachers.

At the pharmaceutical faculty, two theme-days were held for scientific staff where participants from the TTP presented their work, and teachers were informed and discussed the new system and the process of change.

The TTP thus played a crucial role in the development program at the two faculties, in helping staff make sense of the new grading system. The task of formulating learning goals and relate these to the teaching and learning activities and the assessment in ones own course is still a part of CUPS. In this way all new members of the departments' teachers gets training and experience with this increasingly important part of educational practice. Both for the benefit of specific courses, but also in order for the assistant professors to be able to participate in department discussions of future educational practices.

Conclusion

In this article we have given an account of how the teacher training programme at the faculties of science, life sciences and pharmaceutical sciences at the University of Copenhagen is used as a lever for general faculty educational development efforts at the faculties. The three examples provided range from the relatively limited impact of developing a specific course, to larger scale individual developments in the participants' projects with substantial and growing impact. Finally, an example is given of how a specific faculty educational development project at the faculties was coupled with activities in the TTP. The coupling of the TTP and the general faculty development efforts will be developed further in the years to come.

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