

Training of Academic Staff for Engineering Education: A Programme for Developing Teaching and Learning at University

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INTRODUCTION

Technische Universität Berlin (TUB), one of the biggest technical universities in Germany, is qualifying about 30 000 students. In engineering education, promoting young teaching scientists is necessary to improve the attractiveness of STEM-studies and the success of students. The challenges are hundreds of students in lectures and courses that make teaching and learning often ineffective and unsatisfying – also with regard to high drop out rates. This situation is very demanding for the teaching staff, the more that most of them have neither had previous didactic nor pedagogic training for their teaching tasks.

Therefore, we train teaching staff at TUB to develop their teaching competences. In addition to about 300 full-time professors, it comprises nearly 2500 research and teaching assistants, normally contracted for 5 years. Besides working on their doctoral thesis, they are obliged to teach at least 4 hours per week.

The crucial question is: How can teaching staff be trained effectively and be motivated to use innovative teaching formats and to foster interactive learning in this environment? How can a new teaching and learning culture be implemented successfully?

Our solution is to develop teaching competences theoretically and practically. We focus on improving the quality of teaching and learning as well as on the satisfaction of teachers and learners. Our accredited advanced training programme for teaching and learning in higher education is complemented by tailor-made offers according to the academic teachers' individual needs. The long-term goal is to qualify and accompany all teaching staff of TUB during all phases of their teaching career, corresponding with the impact of lifelong learning and to build up professional, supportive structures at the university and in the faculties. Our didactic solutions for the structuring of study courses are activating lectures for large groups of learners and project studies for technical subjects [1].

This paper will describe and analyze the continuing education curriculum for the qualification destined to improve the teaching competences. A desirable composition of competences in the teaching-profile will be outlined. The recent project "*tu wimi plus*", to train change agents for engineering education [2], is a job specialisation of this underlying and more general training for all teaching staff in academic engineering education at TU Berlin.

1 GENERAL

In this section, the framework for our continuing education programme for teaching in higher education is outlined.

1.1 The organisation

Our university is technically oriented and thus, our offers for continuing education and additional pedagogical qualification are to a large extent focused on teaching and learning in technical or engineering studies. TU Berlin keeps a central unit in charge of all scientific continuing education measures at all stages of an academic career. This continuing education programme is offered by the Centre for Scientific Continuing Education and Cooperation (ZEWK) in collaboration with the Doctoral and Postdoctoral Services (TU DOC) and the Departments for Study and Teaching at TU Berlin.

Since 1996 the ZEWK performs continuing education courses for the scientific staff of TU Berlin. We have many years of experience with the conception and performance of scientifically founded, innovative and proven continuing education concepts.

Our continuing education programme includes the focal subjects:

- Promotion of quality in teaching and learning
- Research management
- Science communication
- Working and management techniques

This programme also covers blended learning courses for online-learning and global project management.

1.2 Our conception

Basic questions are: What is “good” teaching and/or research? How can we support the development of good teachers and/or researchers with respect to the demands of a competence profile for university professors?

Our teaching concept

- is oriented towards activation and motivation,
- fosters exemplary learning and reduction of learning materials,
- is oriented towards problems and holistic concepts,
- includes special teaching methods for engineering subjects,
- is interdisciplinary and intercultural,
- supports the change of perspectives and follows the sandwich principle,
- includes video-supported feedback.

For our continuing education programme, we regularly evaluate all course offers in order to have data for the examination and, where necessary, for the modification of the whole curriculum. This evaluation is also covered by a course documentation.

Quality measures

- include all phases: before, during and after the training,
- view both perspectives: of participants and trainers,
- focus on topics: satisfaction and assessment of learning goals,
- choose trainers: by recommendations, assessment, teaching portfolios, drafts, detailed programmes,
- include thorough documentation: teaching portfolios, learning materials for participants, results of evaluation in reports.

1.3 Competence of training staff

To improve the teaching competence of TU Berlin’s teaching staff, our courses are performed in principle by two experienced trainers, respectively lecturers, in a tandem teaching team. The advantage of this team teaching is that the complexity of training courses for teaching methodology in higher education can be handled in the best possible way. This complexity is generated by the programme offer for participants with different specialist backgrounds (interdisciplinary) and previous knowledge and experience (heterogeneous). This advantage refers to the specialist and professional aspects as well as to the feedback for participants. Additionally, we are skilled in practical intercultural experience and in theoretical knowledge by “internationalization at home” and international projects.

Our teaching methods follow an approach that is orientated towards modern principles of teaching methodology in higher education and adult education (andragogy): besides stimulating talks and presentations of the lecturers, we train our participants with individual and partner work, video-supported presentations of the participants, working/learning in small groups, role games, discussions in plenum sessions.

Our quality assurance comprises an evaluation of all courses in three phases: before the course for preparation, directly at the end of the course and a year after the course for transfer management. Mutual feedback conversations and peer consultations as well as permanent continuing education are standard for our trainers.

1.4 Competences of teaching staff

A desirable composition of competences associated with our teaching-profile is outlined in this chapter. The development of the curriculum and therewith the learning outcomes for teaching competences are based to a large extent on the analysis and the frame given by the German Association for Teaching in Higher Education (dghd) within the accreditation procedure. Accordingly, elements of a curriculum include competences for

- the analysis of learning situations and learning processes,
- the planning for studies, study sequences and study modules,
- planning and "staging" of learning situations,
- teaching and facilitation of learning,
- consultation on study goals, study strategies, study planning,
- consultation on learning strategies, learning tasks, learning problems, working,
- examinations,
- evaluation.

Desirable attributes of continuing education offers for teaching in higher education are described with the following headwords and subjects of recent discussion: reflexivity, reform orientation, participant orientation, problem and activity orientation, focus on learning, variety of methods, internationalisation, scholarship of teaching, consistency, sustainability and transfer.

We understand that our teaching staff start their academic career with learning how to teach, also in an international academic context. Besides their factual teaching task, they have to fulfill additional roles in the context of studies, e.g. lecturer, scientific advisor for students and exam candidates, supervising tutor for student tutors (please compare 2.1), assistance in the (study) organization of the chair, the institute and the faculty. Further roles lie in research and research management and administration, as far as relevant for the teaching [3, p. 16].

Our continuing education modules cover the following areas of teaching competences:

- planning and performing,
- learning,
- use of classical and new media,
- quality,
- communication,
- learning culture,
- methods.

Central intentions for a profile of teaching staff besides technical or engineering expertise are conceptual and planning activities, interdisciplinary activity, intercultural competence and a didactic attitude as role model, mentor, trainer respectively lecturer or teacher.

Resulting competences and derived consequences for the training of our teaching staff are realized in the described curriculum. We work and train along the guideline "all teaching methods and media we introduce theoretically, we test und simulate practically in the course and reflect them intending the best possible transfer to the daily teaching routine of our participants".

It is agreed upon that professional teaching competences cannot be gained once-only, but have to be further developed continuously ("life-long learning").

Requirements our teaching staff has to cover during participation in our continuing education courses in order to be rewarded with the professional certificate are [4, p. 16],

- teaching practice and experience,
- willingness to actively participate, including deepening self study,

- active collaboration in a minimum volume of 210 full hours (including self-study),
- performance of single and group presentations, moderation of learning groups,
- to give and to receive feedback for presentations during presence days,
- disposition to change behaviour in and attitude towards teaching,
- disposition to organize, receive and handle written and oral feedback of students in their lectures.

To support our continuing education measures and to strengthen models for good teaching as well as to support the further developing of a new teaching and learning culture at TU Berlin, we have launched a poster campaign "What is good teaching?" in October 2013. The accessory postcards to be filled in with their opinions by students and teaching staff on this question lead to collect qualitative data on the image and their wishes concerning good teaching practice. The results, following a text analysis of this student-centered activity, will be published to TU Berlin members at an innovative "Day of Teaching" in November 2014. First results can be part of the presentation in Birmingham in September 2014: yet a non-representative impression of the answers shows already that motivation and enthusiasm both of students' learning activities and of teaching staffs' continuous learning-how-to-teach-process are crucial questions.



Fig. 1. What is good teaching? Love, Future, Success, Happiness, Fun, Humour, Desire

2 TEACHING AND LEARNING: COURSES FOR THE ACADEMIC STAFF

In this section the curriculum for the qualification how to teach in higher education is described and analyzed. It covers course offers for all phases in the career of teaching academics. The continuing education programme is completed by parallel course offerings.

2.1 Train the Tutor

The target group are student tutors who are new in the teaching business. Student tutors are students in higher semesters who support the lectures by teaching in additional tutorials where they practice exercises of the respective subject with their younger fellow students. This is an accompanying principle especially in STEM-studies. We have performed 66 courses of this introduction for new student teaching assistants since 2004. The course duration is three consecutive days, preceding the semester start, plus two times half a day during the middle and at the very end of the semester, respectively. Spread over a period of one semester, the workload is 32 contact hours. The contents

and organization follow closely the introductory course “Teaching for University’s Best” for scientific staff.

2.2 Teaching for University’s Best

The target group are newly appointed scientific staff and any other newcomer in teaching at TUB. This introduction for academic teaching assistants has been performed in 35 courses since 2002. It is covering the basic elements of “good teaching”; i.e. design, teaching in a social context, activating teaching and learning methods, use of media (traditional and electronic), evaluation and assessment. The course duration is three consecutive days, preceding the semester start, plus two times half a day during the middle and at the very end of the semester, respectively. Spread over a period of one semester, the workload is 32 contact hours plus 18 hours of prepared, independent learning.

Teaching for University’s Best

Introductory



Fig. 2. Outline

Topics of the introductory course cover basic methods and contents to improve the quality of teaching in higher education as described in the survey above. The participants are motivated to visit lectures of colleagues for exchange or experiences, reflection of and consequences to own teaching.

This is a face-to-face course with theoretical topics and talks as well as comprising many single tasks and working or learning in small groups. It provides written material for course learning and for individual studies later. We offer the possibility for the group of meeting virtually in an online forum, to exchange experiences and continue with subjects according to participants needs.

2.3 Training Programme “Quality enhancement for teaching at university”

The target group of the training programme are all members of scientific staff. The fully modularized package for advanced continuing education consists of 18 teaching modules (eight basic modules and ten advanced modules), each of which lasts from one to three days duration. Spread over a period of five years, the workload is 256 contact hours plus an average of 20% of this time spent on independent learning.

2.4 Parallel Course Offerings

Since winter term 2008/09, a lecture series on academic teaching methods offers regular open access to information on latest developments in the discussion about teaching in higher education. National and European experts are invited to speak of their perspective and share experiences of their professional background on teaching matters.

This is completed by informal monthly meetings for counselling and consultation on teaching questions since winter term 2001/02.

Especially for teaching professors, we have established individual coaching packages and expert observation of lectures with personal feedback as new measures since 2011.

Subsidiary, the supportive offers include [4, p. 7]

- a wide range of written material for deepening self-studies,
- a book series on good teaching practice,
- peer consulting, expert and peer teaching observations, peer learning tandems,
- an online forum for experience exchange,
- a workshop on the concept and philosophy in teaching portfolios for self-reflection.

The programme for the “Promotion of Quality in Teaching and Learning” includes continuing education measures for student tutors, Ph.D. students and other scientific staff as well as for lecturers/professors. The introductory course “Teaching for University’s Best” and the continuing education programme focus for “quality enhancement for teaching at university” with 8 introductory modules and 10 advanced modules have been successfully accredited by the German Association for Teaching in Higher Education (Deutsche Gesellschaft für Hochschuldidaktik dghd) in 2006 and 2011.

3 THE CERTIFICATE

In this section, the certificate of our qualification for teaching in higher education is described.

3.1 Survey

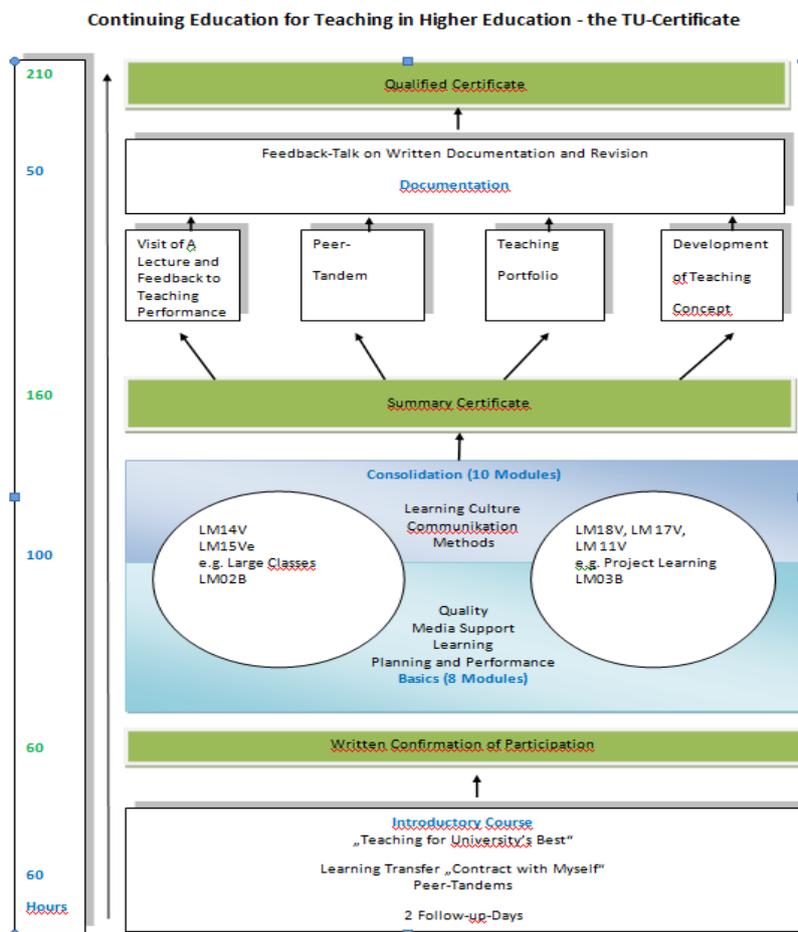


Fig. 3. Levels of Certificate

We offer two certificates of qualification in higher education teaching:

- A. Summary certificate
Required performance record:
active participation in at least 5 teaching modules or 10 days completed.
- B. Professional certificate
Required performance record on three levels:

- 1: introductory course, including peer observation and written reflection of own teaching,
- 2: active participation in at least 5 modules or 10 days completed plus
- 3: critically written documentation of past and current teaching experience, e.g. teaching portfolio, teaching project, expert observation.

3.2 Three Levels of Qualification

To gain the professional certificate including all possible three levels, the participant has to complete the following courses of our continuing education programme for the promotion of quality in teaching and learning to extend his didactic repertoire and to improve his teaching competence:

First Level:

Active participation in the introductory course “Teaching for University’s Best” (total: 60 hours)

Second Level:

Active participation in an individual selection of at least five out of the following 18 teaching modules (total minimum: 100 hours):

- LM 01B: Planning and designing teaching and learning
- LM 02B: Promotion of learning in lectures and large groups
- LM 03B: Project work and project organized learning in higher education
- LM 04B: Basics of how students learn
- LM 05B: Traditional media in teaching and learning
- LM 06B: New media in teaching for beginners
- LM 07B: Evaluation of teaching in higher education
- LM 08B: Competence-oriented assessment, grading and examination
- LM 09V: Communication and group dynamics for teaching staff
- LM 10V: Resolving difficulties to ensure successful teaching
- LM 11V: Workshop: Enhancing key competences by games
- LM 12V: Gender in teaching and learning
- LM 13V: Intercultural communication in teaching and learning
- LM 14V: Planning a presentation or lecture for an English speaking audience
- LM 15V: Presentation techniques
- LM 16V: Learning techniques and organization of scientific work
- LM 17V: Moderation in teaching and learning
- LM 18V: Working with problem based-learning – management of the learning process

Third Level:

Active participation in the workshop “Teaching Portfolio – Concept and Teaching Philosophy” and written development of own teaching portfolio in German or English on teaching activities including two coaching sessions (total: 50 hours).

We certify that the participant has successfully fulfilled the following requirements during the participant-focussed programme:

- at least 80% attendance,
- video-supported didactically prepared individual presentations,
- moderation of group discussions and presentations of findings from group work,
- self-determined learning with individual preparation and post-processing and specialisation.

“Successfully completed” means that the requirements listed above have been fulfilled satisfactory.

3.3 Fields of Application

The knowledge and skills attained during the continuing education programme can be applied in the following fields, depending on the participant’s chosen areas of specialisation:

- teaching at university-level institutions,
- training courses in higher education institutions,
- staff training in companies,
- moderation of conferences and meetings,
- presentations and lectures for working groups and large groups,
- gender-specific and intercultural communication in work and project teams,
- new media in teaching and learning.

3.4 Value of the Certificate

The value of a good teaching performance and satisfying teaching competences is increasing and accordingly, the offers and request for continuing education for teaching in higher education.

Certificates on successfully completed continuing education and teaching portfolios become slowly but surely valuable parts in application procedures for professors and assistant professors at TUB and at other universities in Germany. In general, more attention is paid on the estimation of teaching competence.

4 SUMMARY AND OUTLOOK

At TU Berlin, the participation in our continuing education programme to enhance the quality of teaching and learning is strongly recommended by our president, but still a voluntary task for the scientific staff. We demand a minimum of participation and self-study of 210 hours to gain the professional certificate [5]. This is comparable to an average seize of about 200 hours that is standard in Germany.

Unique within Germany is our (also video-taped and online available) lecture series with teaching experts as lecturers from Germany and Europe [6].

The above described curriculum was developed with reference made to the criteria and elements of a curriculum for academic staff development of the German Society for Teaching in Higher Education.

Within the TU 9 (nine leading German Institutes of Technology), the units responsible for scientific continuing education meet regularly and have agreed on common standards and mutual acknowledgements of their offers to train teaching competences for engineering sciences.

Within Germany, the universities for applied sciences especially in Bavaria, Baden-Wuerttemberg and North Rhine-Westphalia demand an obligatory participation for newly employed professors in their certificate programmes.

We also observe what is done in this field in other European and North American countries. In Scandinavian countries the dimensions are similar. Anglosaxon countries have higher demands.

This topic is one that certainly needs discussion.

REFERENCES

- [1] Rummler, M. (ed) (2014), *Vorlesungen innovativ gestalten. Neue Lernformen für große Lerngruppen*, Beltz Verlag, Weinheim und Basel.
Rummler, M. (ed) (2012), *Innovative Lehrformen: Projektarbeit in der Hochschule. Projektbasiertes und problemorientiertes Lehren und Lernen*, Beltz Verlag, Weinheim und Basel.
- [2] cf. conference submission Rummler, M., Nikol, P., *Training of Change Agents for Engineering Education: A Concept for Improving Teaching and Learning of Students*, 41th SEFI Conference, 16-20 September 2013, Leuven, Belgium.
- [3] Senger, U. (2008), *Personal-, Organisations- und Hochschulentwicklung im Zeichen der Hochschuldidaktik. Vorschlag zur einer Programmatik zur Weiterentwicklung der professionellen Identität und Gestaltungskompetenz der Hochschuldidaktik am Beispiel der Doktorandenausbildung (L 2.4)*, in Berendt, B., Fleischmann, A., Schaper, N., Szczyrba, B., Wildt, J. (eds), *Neues Handbuch Hochschullehre. Lehren und lernen effizient gestalten*, Josef Raabe, Berlin.
- [4] Rummler, M. (2007), "Was wir theoretisch vorschlagen, führen wir vor und wenden es im Kurs praktisch an!" *Akkreditierte „Förderung der Qualität der Lehre“ an der TU Berlin (L 1.10)*, in Berendt, B., Fleischmann, A., Schaper, N., Szczyrba, B., Wildt, J. (eds), *Neues Handbuch Hochschullehre. Lehren und lernen effizient gestalten*, Josef Raabe, Berlin.
- [5] More detailed material on our continuing education offers for the teaching staff of TU Berlin at <http://www.tu-berlin.de/?id=49431> (12-05-2014).
- [6] Find the video-taped lectures (in German) at <http://www.tu-berlin.de/?id=58122> (12-05-2014)