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Evaluation Process and Quality Management in a Blended-Learning Bachelor's Programme

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Abstract

In this contribution an evaluation process for a blended-learning Bachelor's programme in electrical engineering and information technology is reported. The rather diverse group of students with limited contact time, due to the fact that they work alongside studying, made us design a dedicated and effective quality circle for continuous improvement. Various layers are used to open channels for information exchange: Self assessment is element of a bridging course in mathematics. Biographical data are retrieved in the beginning of the course programme for a better understanding of the cohort. For each module, summative evaluation by means of an electronic questionnaire is used in addition to a quick feedback channel during the semester. In order to enable improvement, the loop is closed. Additionally, the whole study programme undergoes external evaluation by an accreditation agency on a regular basis. The described quality management process has been developed and tested over the last three years. We suggest that this process can be easily used as a versatile blueprint for blended and distance-learning programmes.

Keywords: Evaluation process; blended-learning; Bachelor's programme; quality management.

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1. Introduction

A blended-learning study programme in electrical engineering and information technology has been developed in a joint effort of two German Universities of Applied Sciences (Petendra, Kälberer, Kurz & Hoppe, 2014; Roznawski & Kurz, 2013). The part-time programme aims at non-traditional students as a target group, and was realized in the context of a research project supported by the German Federal Ministry of Education and Research within the initiative "Upward Mobility through Academic Training: Open Universities" (Wissenschaftliche Begleitung, 2015). This funding made it possible to study various aspects of programme development in more detail. Although care was taken to design an attractive programme for the target group on the basis of surveys (Böhmer, Roznawski, Meuth & Beck-Meuth, 2013) and according to the state of the art, e.g. regarding e-learning material, continuous improvement is necessary to match current students' expectations and needs with the existing programme. Evaluation is an established core element of quality management (HRK, 2007; European Commission, 2014). Smythe (2012) discusses the difficulties of evaluating blended-learning courses. In the considered programme, the challenge arises from several aspects: there is a lot less contact time between students and lecturers, so that informal communication is hindered. It is more difficult for students to express maybe "delicate" comments via forum, e-mail or chat in an appropriate way. The target group is rather diverse, and changes over time: For example, we have observed a significant shift towards younger people without family obligations within the last two years. The concept of a module including syllabus, study material, learning support, lectures, and exam should be evaluated in the sense of constructive alignment (Biggs, 1996), not just one element out of these. However, this is only possible after completion of the module. Moreover, contact time is very precious; thus it should not be used to fill out questionnaires which can be done at home. In section 2. we propose an evaluation process that takes these aspects into account. In section 3. we discuss our results with respect to quality management. Section 4 addresses open questions and limitations.

2. Evaluation Process

The evaluation process serves the purpose of improving the learning situation for the students and the study programme as a whole. People involved in the programme should be triggered to reflect on good teaching and appropriate learning material. In this programme, lecturers' awareness should be raised for the situation and special needs of employed and often non-traditional students. The elements to achieve these goals are shown in the left-hand part of Figure 1. Students begin with self-assessment at the end of a bridging course in mathematics, which helps them to analyze their readiness for further studies. Biographical data of the students is gathered in the beginning of the first semester, which helps staff to understand their students' situation. Module evaluation provides lecturers and programme responsibles with direct feedback, and makes students reflect on their learning habits and learning outcomes. Polling graduates will give additional information on the relevance of the syllabus at the working place. On the right-hand side of Figure 1, a cycle in the spirit of Deming's PDCA "plan – do – check – act" (Deming, 1986) is used for quality assurance.

In the following subsections, the elements of evaluation are explained in more detail.

2.1. Bridging Course in Mathematics

The bridging course is intended to give students a chance to catch up with basic mathematics before they begin their engineering studies. At the same time it allows them to try out the concept of blended learning (Kälberer, Tschirpke, Böhmer & Beck-Meuth, 2014). Evaluation yields information regarding the subjects chosen for the course and makes it possible to adjust the course continuously. From students' point of view, self-assessment fosters reflection on their learning.
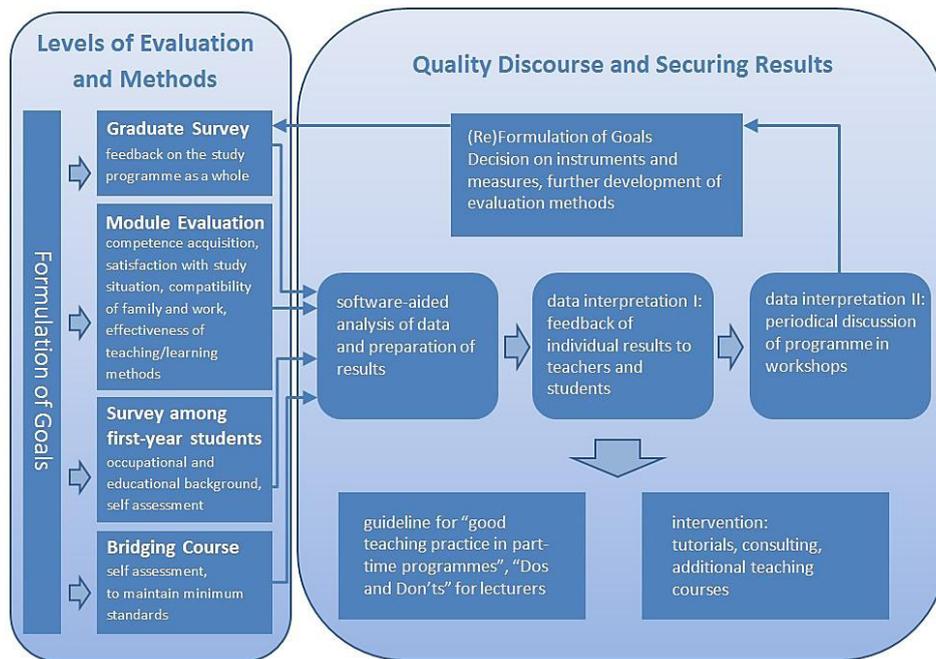
Fig. 1: Evaluation process for quality assurance

2.2. Biographical Data

In the beginning of the first semester, a block seminar of four days is meant to give the students a lightning start drawing on their high initial motivation. Anonymously, they fill in a questionnaire on the following aspects: Age, family status, sex, previous studies and professional training, branch and size of employing firm, support granted, motivation for studying. These biographical data give an overview over the cohort. Lecturers and programme responsibles receive aggregated data in order to recognize trends, and adapt early.

2.3. Module Evaluation

Module evaluation is crucial to learn more about the entities of the programme and their individual contribution towards the objectives. The roles depicted in Figure 2 are involved in the evaluation process with an online questionnaire tool, in this case Questor Pro (Blubbsoft, 2015).

A link is sent to the students that allows them to fill in an electronic form, see section 2.4. Thus, they are able to reflect on their learning process at home, after having completed the entire module. About two weeks later a reminder is sent to the students who did not answer. Typically, the final respondance rate lies between 50 % and 65 %. By law, the evaluation process needs to be put down in writing and approved by the university board and the university privacy officer. The system makes sure that it is not possible to reconstruct a connection between the identity of a student and a certain answer.
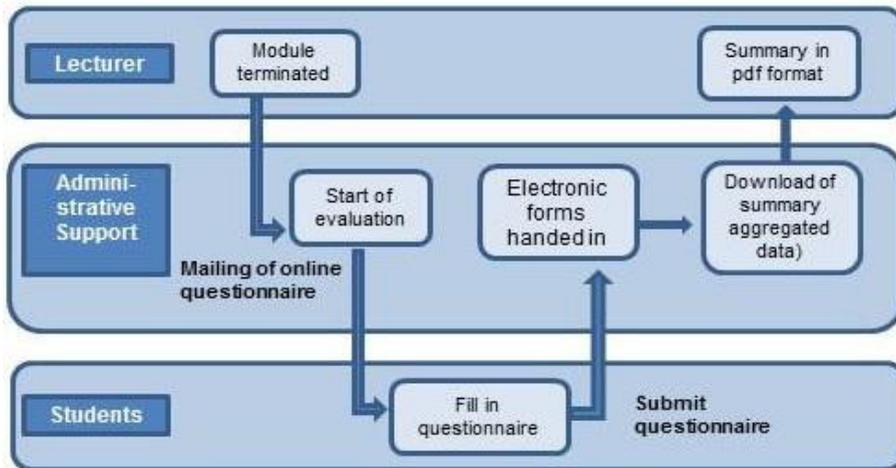
Fig. 2: Roles in the module evaluation process

2.4. Questionnaire for Module Evaluation

The questionnaire for module evaluation used by students at the end of the module addresses the lecture, self-study phases, the exam, overall impression, and self-assessment. Answers are given on a five-point Likert scale between the poles "fully agree" and "totally disagree". Additionally, a text box is offered for free-text comments at the end of the questionnaire.

2.4.1. Lecture

- Lecture supports comprehension of subject matter.
- Difficult facts are explained by lecturer, e.g. illustrated through examples.
- Lecturer responds to questions.
- Lecture is clearly structured.
- Lecture and study material go together well.
- Lecture helped me to understand material in self-study.
- Attending lecture paid off.

2.4.2 Self-study phases

- Learning material (e.g. book, videos, problems) is structured well.
- Learning material (e.g. book, videos, problems) is comprehensible.
- On the basis of the learning material (e.g. book, videos, problems) subject matter is workable in self-study.
- The learning material is a good basis for understanding current issues in this field.
- If applicable: Problems can be solved with the given material.
- If applicable: Given procedures of solutions can be followed.
- I used the e-learning material of this module.
- The e-learning material supported me in coping with the matter.

2.4.3 Exam

- The level of the exam was communicated well in advance.
- The learning material was adequate to be prepared for the exam.
- The exam was on the subject matter of the lecture and learning material.
- The level of the exam corresponded to the previous problems and tests.
- The exam was fair.

2.4.4 Overall impression and self-assessment

- The subject matter of this module is relevant in industry.
- The connection with other modules is made clear.
- The requirements for passing the exam were communicated in time.
- I had enough previous knowledge to grasp the subject matter of this module.
- The level of this module was too low.
- I learnt something new in this module.
- I was able to satisfy the requirements of this module.
- I am happy with my own effort in this module.
- Overall I put in that many hours for this module: (Intervals) up to 74, 75 to 99, 100 to 125, 126 to 150
- Compared with other modules, the work load in this module is: Scale ranges from very high to very low
- Overall I rate this module: Scale ranges from 1 (best) to 5 (worst)

2.5. Feedback Channel

In addition to the summative evaluation of a module (reported in 2.4.), a fast feedback channel will be provided for each module to allow for anonymous comments during the semester. The feedback tool in *Moodle* shall be used for this purpose. Only the lecturer is able to read comments, but not the class mates. This function of the system needs to be approved locally with respect to information privacy prior to use.

2.6. Graduate Survey

Graduate surveys are an established tool to receive feedback on the study programme as a whole. Questions focus on the big picture of the programme, competencies, employability, and the general framework. Open questions are widely used to leave space for suggestions. These surveys play an important role in the review process by accreditation agencies. The first graduates are expected for 2017 in the Bachelor's programme discussed here.

3. Evaluation Process and Quality Management

The evaluation process is an essential part of the quality management for the study programme. It lead to modifications in the past: Due to comments on the feasibility of handling four modules at a time, a semester was "virtually" partitioned so that students manage only two modules instead of four in parallel. This way, they can concentrate better on the subject matter of each module, and lose less time to context switch. It needs to be taken into account that all students have a job, and quite many do have a family. This measure was evaluated to be very helpful by students. Actually, an empirical study by Schulmeister & Metzger (2011) shows that this arrangement results in a higher engagement per module, which is beneficial to learning. Another change was triggered through evaluation: Somewhat unusual for a Bachelor's in that field, the electronics module was shifted to the first semester,

and interchanged with fundamentals of electrical engineering which was moved to the second semester. The reason was that the target group with lots of industrial experience relates more easily to electronics than to the mathematically founded fundamentals.

Currently, the quality management system for the programme is documented, with organizational processes being described in a process wiki accessible to staff. This will be useful for the management of the programme, which has many interfaces to university administration. Furthermore, it is planned to make a survey among lecturers regarding their experiences with their e-learning material. The results shall be used for further programme development.

Evaluation and quality management are pivotal for external accreditation by agencies, mandatory for study programmes. Following the above-suggested evaluation process, the data gathered will be valuable for self reporting, and allow substantiated reasoning. Overall acceptance of students and lecturers should be augmented in the long run.

4. Evaluation – a critical appraisal

Although enforced by law because of its undoubted benefits for continuous improvement, evaluation seems to be associated with a certain unease on both sides in the blended-learning setting. Students and lecturers do not have much time to tune in to each other's communication style or build a solid foundation of trust. There is no possibility to talk over the results and clarify ambiguities. Engineering students are not necessarily masters of overtones. German communication being rather direct evokes a situation that may make it difficult for the teacher to accept feedback easily. In contrast, the style of conveying criticism in English seems mellowed, and more suitable for writing. In the Bologna territory, cultural aspects in communication might play a more important role in basic procedures like evaluation than has been discussed so far. Another cultural gap plays a role since the students are employees in industry: Firms widely use (360-degree) feedback in hierarchical structures, whereas academia thrives on autonomy, at least at public universities. Time and again it is necessary to point out the advantage of evaluation for quality, and teachers' individual gratification by widening their understanding for their students' difficulties.

Acknowledgments

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