Multimedia teaching aids for the practice and development of the pedagogical skills of undergraduates

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Abstract: In the Czech Republic, teachers at secondary schools are obliged to expand their educational knowledge and skills because engineering education completed at technical university is not sufficient to practice the profession of the teacher of technical subjects. The Dept. of Engineering Pedagogy, Masaryk Institute of Advanced Studies (MIAS), CTU in Prague prepares students for the profession of technical teacher in a Bachelors’ study program entitled, “Technical Teacher Education”. We offer both in-class and distance study. Graduates are encouraged to integrate their knowledge of humanities with practical abilities and skills.

The program aims to support teaching practice through a focus on case studies within the core subject “teaching methodology”. The case studies are presented through videos of what we call “representative classes” and are designed to engage students with both pedagogical theory and practice, predominantly through facilitated discussion. Students assess the performance of teachers in these videos across a range of pedagogical aspects including verbal and non-verbal communication, motivation of students, involvement and co-operation, feedback, - evaluation and marking and so on. These aspects are discussed and analysed by students as well as by the teacher who also plays the role of facilitator and moderator in order to convey new knowledge and skills. Thus a model teaching presentation, that is, a short presentation by the student as a teacher, is an important didactic tool applied in technical teacher training.

Keywords: teaching aid, representative classes, model teaching presentation, teaching methodology

Introduction

“Teaching methodology” is the core subject of the program “Technical Teacher Education” at the department of Engineering Pedagogy, MIAS. Classes aim to develop theoretical knowledge, as well as basic didactic skills. Knowledge integration and interdisciplinary relations play an important role in forming such competences. To be able to specify the quality of the graduands we should be able to allocate output abilities and skills, i.e. general, technical, pedagogical and other specific skills. Students of the program “Technical Teacher Education” are equipped with knowledge and practical skills in
pedagogy, psychology, and teaching methodology. These are the profile subjects among others. The stated objective we have to achieve is a well prepared graduate able to apply knowledge, skills and attitudes used in common pedagogical practice. To become a successful teacher, graduates have to be able to use acquired knowledge and developed capabilities in a creative way in order to effectively control the educational process. During their studies, the students are acquainted with different learning styles and they build basic competences in pedagogical diagnostics and other pedagogical and psychological abilities and skills. The pedagogical qualification can be seen as the whole of a teacher’s preparation for effective pedagogical work or as a complex ability; a competence of teacher professional performance that involves knowledge, skills, attitudes, values, and last but not least, personal characteristics.

Theory of Teaching aids

In this part of the paper, it is necessary to answer the question: what kind of pedagogical skills are formed and developed. There are some requirements for advancing pedagogical skills. They are represented by internal and external conditions of the acquisition process. Internal conditions are determined by individual characteristics of the student which include motivation to study, abilities, mastered skills, previous experience, flexibility, empathy, and others.

Teaching pedagogical skills is situated in the external environment. Principally, this means content, structure, didactic conception of technical teacher education, skill development of the professional competences of university teachers, etc. (Švec, 2002).

Pedagogical competences can be classified. One such classification is the so called “competency structure” (Helus, 1995) within which the author classifies and characterizes seven of its parts. They are:

- Technical subjects
- Psychological
- Pedagogical – didactics – psychological
- Communication
- Managerial
- Counselling
- Planning (project)

The issue of teachers’ competences is closely related to the general trends in technical teacher education. In a simplified view, we can consider three basic trends of technical teacher education. Each trend has a different focus and a different emphasis (Svatoš, Holý, 2002).

- Scientific (theory) trend - Objective technical teacher education
- Activity (practice) trend - Professional training, focused on skills preparation for the education process
- Personality (axiological) trend - Forming and adopting socio-personality and communication qualities of the teacher

At the department of Engineering Education, MIAS, we strive for a systematic synthesis of all these approaches to educate well prepared graduates for pedagogical practice by analysing the results of research, the goal of which was to identify the key knowledge and skills of pedagogy that are counted as decisive by experienced teachers. Views of the experts have been analysed by means of the so called Q-methodology. The evaluated objects became particular pedagogical knowledge and skills. The assessment criterion was important for the teaching profession. Consequently, the order has been listed according to this criterion (Chráska, 1996).
This next section gives basic information on the application of teaching aids and their function in developing these key competencies.

Teaching aid construction for the subject “Teaching methodology”

One of the main objectives is increasing the didactic skills of our students, and practice in teaching is one of the most common strategies to accomplish this goal effectively. It is a part of the study program, of course, and it is an extension of the subject teaching methodology. However, it is not possible to provide extended student teaching for everyone. Observation can partly be used, the idea of which is to diagnose the pedagogical situation. The core of the observation is a class in which a sizeable range of pedagogical activities is represented. The form of the observation, of course plays an important role in the assessment of particular educational activities of the teacher, students’ activity, their mutual cooperation, and communication between teacher and pupils.

In framing of the program design, student teaching is an add-on. The idea is to find out whether the particular student is able to stand up in the role of teacher. It means the trainee should apply adopted knowledge and skills in real conditions at the particular kind of school. In most cases, this is secondary technical school because of the student’s area of specialization.

The Department of Engineering Pedagogy has begun with representative classes at selected secondary technical schools. At the first stage, we have contacted some technical vocational and engineering (industrial) schools with specializations in machinery, civil engineering, and electrical engineering. The aim was to choose suitable themes, and teachers, as well, for this purpose, i.e. making a taped record of the particular technical subject. The Audiovisual and Technical Centre has been authorized to carry this out.

The Audiovisual and Technical Centre produces educational video programs and interactive programs for multimedia systems according to the needs of individual Czech Technical University faculties, and is involved in receiving, recording and distributing satellite-transmitted education programs. The Centre also provides design and consultancy services related to the introduction of audiovisual technology in
Czech Technical University faculties, sells education programs to schools and other education facilities, cooperates with other institutions to carry out research in the field of modern education technologies, co-operates with foreign higher educational facilities, and helps Czech Technical University with its publicity work.

We believe, however, that just video records are not sufficient without a context. Rather, they should be integrated into the social frame and school climate necessary to demonstrate the educational context. To this end, pictures of the schools’ background and video sequences have been taken and an opening commentary added which introduces the school and study program.

Firstly, a teaching methodology analysis for the video has been done. Time slots have been chosen for subsequent technical processing, i.e. editing of appropriate sequences mixed from fixed and mobile cameras.

Videos are used during the seminars for the subject “Teaching Methodology”. Students thus can confront theory and the real conditions of pedagogical practice, in the form of representative classes. An integral part of the seminars is an analysis of these recordings and their evaluation followed by discussion.

**Example for one of the recorded classes**
Subject: Computer Technology  
Theme: Multiple Correspondence (MS Word)

1. **Situation base**
   Students acquired essential skills of text formatting, are able to adjust properties of the paragraph and font, are able to apply tabulator, they know how to make an envelope

2. **Theme content analysis**
   - stages of multiple correspondence
   - main file creation
   - data definition
   - data integration
   - types of documents created by multiple correspondence
   - panel of tools for multiple correspondence
   - query definition
   - support guide for multiple correspondence

3. **Specification of objectives**
   - to remember how many steps multiple correspondence consist of
   - to name three main stages of creation of multiple correspondence
   - to name what kind of documents is it possible to create by means of multiple correspondence
   - to state own examples of utilization of multiple correspondence in practice
   - to explain query definition making
   - to indicate what possibilities are available for font edit
   - to make a list of products (bikes) according these criteria: price from the the lowest to the highest kind (road, cross, track, mountain)
   - weight from the lowest to the highest
This is an example (output) of the didactic analysis. Students should improve their skills in this didactic category, i.e. how to structure the theme, making relations, specification of particular objectives for the teaching defined as a student behaviour that can be observed, evaluated and marking as well.

The teacher’s preparation should be supported by time for particular parts of the theme as well. Moreover, these parts have to be in mutual relations, logically structured into the fluent interpretation. This part of video will be presented to the conference audience as a demonstration.

One issue with being recorded while teaching is that it produces substantial mental stress. Not everyone is prepared to undergo this load. In-depth analysis has to precede the recording so that the objectives can be fulfilled. It means that a plan for the lesson has to be written, i.e. structure of the teaching, chosen methods, forms and means for facilitation of subject matter. This preparation is important so that it can be used as an effective aid in the classes.

Additionally, a seminar is a suitable supplement to the practical training of pedagogical and didactics skills. To be accepted for the exam, students are obliged to show at least one model teaching presentation. Thus students experience training in practical skills of keeping control of the educational process. After the teaching presentation, a student has to evaluate himself or herself, assess his or her performance and describe personal feelings. Evaluation from the other listeners, i.e. students, is a part of the training. They can express their opinions, objections, notes, etc. Finally, university teachers evaluate this particular presentation and summarize all the views.

The benefits of the model teaching presentation can be seen at several levels. Mainly, it is in the active participation of students in forming their pedagogical skills. Students are given the opportunity to analyse their presentation, i.e. verbal, non-verbal communication, speaking, behaviour, etc. They can assess the quality of their preparation and overall performance. Thus, students are given the opportunity to gain valuable experience, develop their self view, and, most importantly, they can test the level of development of their personal competence (Horká, 2002).

The position of in-class and distance learning students is quite different to their previous experience as a teacher. Classroom students frequently lack pedagogical experience. Of course, some, especially students of post-graduate study, are obliged to conduct seminars, for instance, it is a requirement to conduct a technical subject as a part of their PhD preparation in the form of a half-time teaching load. Conversely, distance learners are in most cases employed at secondary technical schools, each with a different length of work experience. These applicants are motivated to study mainly because of the requirement to complete their pedagogical qualification. Personal interest and expanding their qualifications are less frequent (Dobrovská & Andres, 2002).

 Conclusion

The idea of teaching aids development leads towards a higher degree of interactivity with a stress on activating, motivating and encouraging students for a creative processing of materials. It means students are required to be prepared for the seminars, and sometimes to work out a seminar work or project. We plan to enlarge the recordings by assignments that should focus on individual students’ work. These tasks will relate to particular parts of the syllabus. Some sequences of the video program recorded at secondary technical schools can be used to demonstrate forms of teaching, methods, pedagogical principles and so on. For this purpose taped recordings are not appropriate. We decided to use the DVD medium that makes it possible to divide the recording into particular sections that logically follow the structure of the lesson.
References

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