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Undergraduate Educational System of Technical Teacher Education in the Czech Republic

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Abstract

The paper deals with the analysis of the external environment according to the currently valid legislative regulations concerning the regulated profession of pedagogic workers according to the Act No. 563/2004 Coll. on pedagogic workers and about amendments to certain laws, as amended, with the adoption of the Act No. 111/1998 Coll., on universities and amending and supplementing other acts (law on higher education), as amended.
In addition to legislation, paper deals with current trends in education, conceptual issues and engineering pedagogy curriculum development. The curriculum, on the one hand, is influenced by accreditation standards, educational areas based on the standard of the teacher preparation, on the other hand, it can be shaped on the basis of the university plan of the strategic intention implementation, as well as technological innovation (Education 4.0).

Keywords:
Technical Teacher Education
Curriculum Development
National Accreditation Bureau for Higher Education
Accreditation Standards
IGIP, International Society for Engineering Pedagogy

1 Introduction

What do you mean by modern education? The content of education, methods and forms of education, or the means that help us achieve the required learning outcomes or professional competencies in general? All these variables are set in motion by the pedagogue with his or her own creative way, using didactic principles, a well-founded expert in the field of education on the one hand and in the field of pedagogy, psychology and teaching methodology on the other.
Modern trends in education are characterized by an overall shift to the use of digital technologies. In higher education, technological innovation expands learning opportunities depending on the effective use of digital education strategies with emphasis on e-learning, m-learning, e-twinning, MOOC, social networks, educasting, shared e-learning support through cloud computing services (e.g. Office 365), etc. It is worth mentioning the fact that within the project ESF OPVVV KA02 at CTU in Prague, these activities are developed within the Support of new teaching methods, where the implementation of LMS (Learning Management System) Moodle within the university (https://moodle.cvut.cz) and its further integration with the study information system KOS (Study Component, https://www.kos.cvut.cz/). These innovations accelerate the development of distance education and combined forms of higher education, or further education of pedagogical staff (DVPP) and, in general, the expansion of their qualifications.

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2 Methodological aspects of ICT in education

We ask ourselves fundamental questions that are related to the emphasis on improving the quality of study, updating content, or modernizing it in a broader sense. What do we teach? How do we teach? How do we educate and develop our future teachers? How do our students learn? When and how intensely should we learn? How do we cooperate with students? How do we manage the educational process? How do we increase the efficiency of this process? Where do we teach? Who we teach? There are many relations between these sub-didactic categories, as illustrated by the didactic octagon.

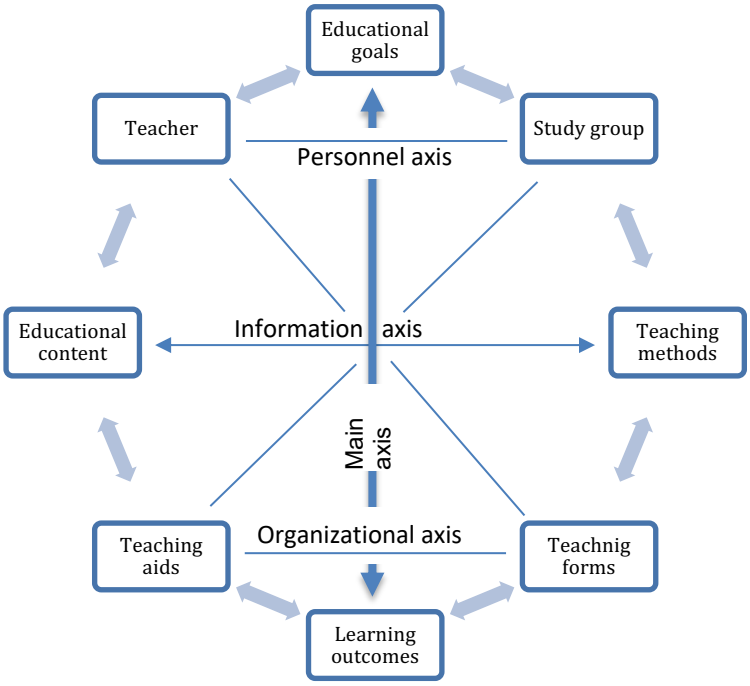

Fig. 1: Didactic octagon

The purpose of the digital education strategy is to open education to new methods and ways of learning through digital technologies, to improve pupils 'competences in working with information and digital technologies, to develop pupils' computer thinking. By the competency model of a teacher working with ICT we understand the following sub-areas:

- Strategy (Knowledge of goals, classroom practice)
- Content of education and learning environment (Teaching planning, learning environment, student role, assessment, communication and cooperation, special educational needs)
- Pedagogy (Planning, problem-based teaching, pupil experience, ethics and risks of virtual space, cooperation, projects, creativity)
- Digital technologies (software tools, authoring tools, internet, communication and collaboration, administration, student learning)
- Organization and administration (Integration of digital technologies, classroom management, reasonable and legal use)
- Further education (Planning, teacher cooperation, non-formal learning)

The topic of the role of ICT in education, specifically for the vocational training of technically educated teachers, is closely linked to the sociological and psychological aspects of the learning society, currently referred to as Education 4.0. School change, its climate, value orientations, emphasis on tolerance, pluralism, multicultural dialogue and many other societal demands and realities place new demands on theoretical insight, understanding and interpretation of current trends, as well as on practical teacher training and the acquisition of new competencies. Technologies are becoming a natural means not only of everyday communication, they are also significantly involved in the process of (self) cognition, so they have a huge potential even within the didactic transformation of the content of education. The didactic interpretation of the content of education itself

is then in the hands of the teacher. An important feature is the fact that digital educational resources are available anytime and anywhere, we learn at every step, not only within the school, i.e. at the level of institutional education.
In the context of a globalized knowledge society, modern education is moving towards online courses, where teaching takes place in a virtual classroom, which we access via our computer, tablet or mobile phone. With the development of mobile devices, 3D models, animations, or combined with virtual and augmented reality. These tools make it possible to clarify the basic concepts and principles, structure, composition, in the context of a given subject.

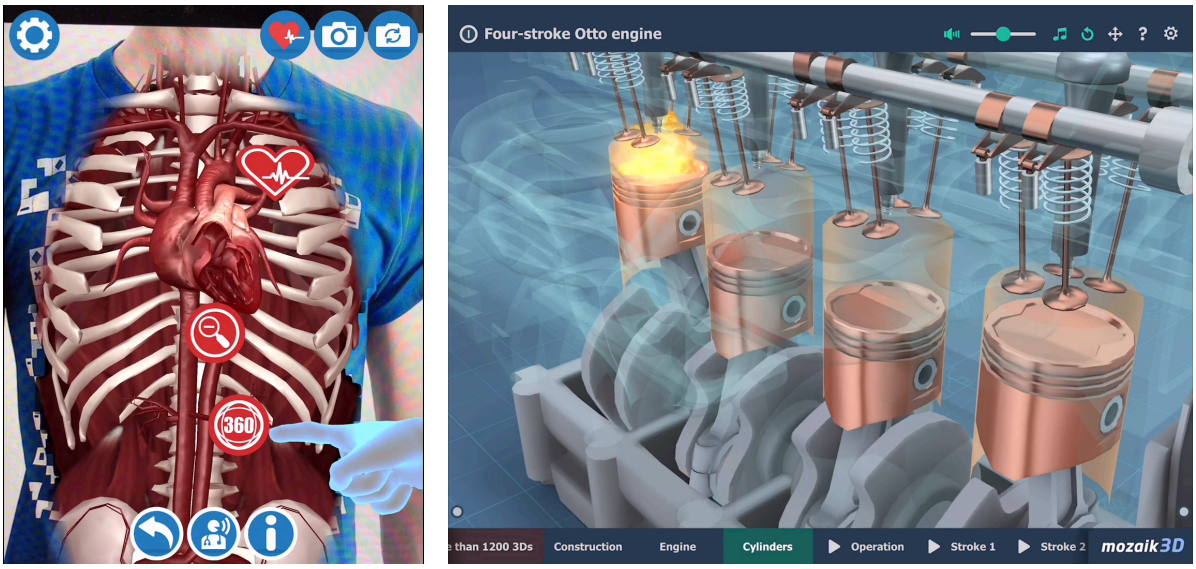

Fig. 2: ICT in education examples, demonstration – Virtuali-tee (left), Mozaik education 3D animation (right)

In addition to virtual and augmented reality, from the point of view of trends in education, gamification, which has been transferred to the field of education from marketing, is still growing in popularity. This area is gaining in popularity precisely with the approach of modern digital technologies, which allow to transform "conventional" teaching into a game, it increases motivation, in addition to professional competencies can be just as well developed soft-skills, ie mutual cooperation and communication that can be implemented even outside the school itself.
The Covid-19 coronavirus epidemic now illustratively shows how important it is to offer education in a globalized society through online courses in a virtual classroom. In such situation, the classroom that we access through a computer, tablet, or smart phone is the only one we can use without being forced to lose valuable weeks of the academic year. Learning Management Systems, Office 365, 3D models and simple and sophisticated animations combined with virtual reality allow teachers to explain to students the basic concepts and principles of the subject. Among other things, thanks to the Masaryk Institute of Advanced Studies (MIAS), graduates of CTU programs Specialization in pedagogy are equipped with a wide range of competencies (not only technical ones) and are ready to respond to similar challenges as the global epidemic may bring.

3 Accreditation standards

The Ministry of Education, Youth and Sports as the recognition authority for regulated professions of pedagogical staff pursuant to Act No. 111/1998 Coll., on Higher Education Institutions and on Amendments other laws (the Higher Education Act), as amended, comment on higher education study programs, the graduates of which will acquire the professional qualification of a pedagogical worker. Fulfillment of the Framework Requirements for study programs, the completion of which acquires a professional qualification for the performance of regulated professions, is a prerequisite for the graduates of a given study program to be adequately prepared for the performance of a regulated profession. The framework requirements aim to determine a balanced relationship between the basic components of teacher training.

In the case of accreditation of the study program, the consent of the Ministry of Education, Youth and Sports is a necessary part of the university's application for accreditation [§ 78 para. 6 and § 79 para. f) of Act No. 111/1998 Coll.] submitted to the National Accreditation Bureau for Higher Education (NAÚ).

A graduate of the Masaryk Institute of Advanced Studies (IGIP Training Centre), the study program Specialization in Pedagogy, is prepared for the profession of teacher of technical subjects or teacher of practical teaching. He or she is able to orientate in modern educational concepts and use them in planning, monitoring, managing and evaluating the teaching process; it is also ready to use selected management competencies for the organization of processes in education and for the management of lifelong learning.

According to accreditation file, a successful graduate should be is able to:

- Orientate in development trends and technical fields and technical innovations;
- Manage and organize processes in education and lifelong learning;
- Plan, monitor, manage and evaluate the teaching process with regard to the individual needs of students
- Work with the curriculum, with the FEP and create the SEP;
- Design specific preparation for teaching;
- Use adequate organizational forms of teaching and teaching methods with regard to the individuality of students;
- Solve problematic educational, upbringing and social situations in education;
- Create educational and preventive projects;
- Work independently and coordinate team activities;
- Reflect, analyse and evaluate one's own educational activities;
- Use in teaching modern information technology;
- Apply knowledge of biological sciences, psych hygiene and the creation of school and classroom climate to the educational process;
- Orientate in educational policy, economic management and school administration.

The study program respects the requirements of school policy for the preparation of teachers for regulated professions. Therefore, the subjects are divided in accordance with Accreditation Standards – Framework Requirements for study programs, the completion of which provides a professional qualification to perform regulated professions of pedagogical staff (Ref. MŠMT-21271 / 2017-5) into individual components, such as Teaching propaedeutics, Diploma thesis preparation and Foreign language etc. Technical profiling of graduates is also enhanced by the incorporation of a new group of ICT subjects. The following table shows the share of individual components of teaching.

Component	%	Credits
Teaching propaedeutics	**40**	**72**
Field and subject didactics	**30**	**54**
Practice	**13**	**24**
Diploma thesis preparation	**6**	**10**
Fundamentals	**6**	**11**
Foreign language	**3**	**5**
Optional subjects	**2**	**4**
Total	**100**	**180**

Table 1: Percentage of particular components of teacher preparation.

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