

# The Role of Information and Communication Technologies (ICT) in Undergraduate Education of Technically Educated Teachers

*Education Policy Fund of the Ministry of Education, Youth and Sports 2019*

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## Abstract

The aim of the support of the Education Policy Fund of the Ministry of Education, Youth and Sports (MEYS, MŠMT in Czech) is to create more favorable financial conditions for study programs aimed at educating future teachers, preparing teachers for transition to teaching practice and their subsequent stabilization in the school sector. The support follows similarly designed measures implemented by the Ministry between 2014 and 2018.

## 1 Introduction

Support for study programs aimed at educating future teachers is one of the Ministry of Education, Youth and Sport's measures responding to the persistent lack of quality teachers within the education system of the Czech Republic. The Education Policy Fund is implemented in accordance with the intention of the Czech Government.

The activities carried out under this support are generally aimed primarily at motivating students and future graduates to successfully complete their studies and to enter the teaching profession.

The Plan of Implementation of the Strategic Plan of CTU for 2019 is based on the Strategic Plan of Educational and Creative Activities of CTU in Prague 2016-2020, respecting the main starting points and priorities of the Long-term Plan of Educational, Scientific, Research, Development and Innovation. This is a key strategic document of the MEYS, MŠMT (in Czech) which defines the priorities and main planned measures in the field of higher education policy in the period from 2016 to 2020, especially its update for 2019.

In accordance with the Plan of Implementation of the Strategic Plan of CTU for 2019, the project plan is based on the following areas:

### Quality Assurance

We will continue to strengthen students' practical skills, increase their readiness for practice, lead them to autonomy and decision-making ability, support their personal development and general knowledge across the field.

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### Relevance

In educational, creative and other activities, we will respond to local, regional, national and international conditions and problems:

- a) we will create and maintain bachelor's and master's degree programs in such a way as to provide the basis for the lifelong pursuit of the profession and to reflect not only current but also future challenges,
- b) linking the curriculum content to develop an interdisciplinary approach: for example, developing IT competencies in social and humanities study programs or developing transferable competencies in technical study programs.

We will strengthen the third role of the University:

- a) deepening cooperation with partners from the application sphere with the aim of exploiting mutual synergy in education and transferring the results of university activities into practice.

## 2 Project characteristics

Modern trends in education are characterized by an overall shift towards the use of digital technologies. In higher education, technological innovation extends learning opportunities depending on the efficient use of the learning environment with an emphasis on e-learning, m-learning, e-twinning, MOOC, social networking, educasting, shared e-learning support through cloud computing services, etc. These innovations accelerate the development of distance education and combined forms of higher education, further education and lifelong learning and broadening the qualification of staff teaching in general.

The main aim of the research plan is to find an answer to the question of the possibilities offered by technological innovations and trends in the field of information and communication technologies in the preparation of technical subject teachers and teachers of practical education and vocational training for the function of pedagogical staff.

The project is oriented on the theoretical level to the possibility of increasing the motivation of students of teaching to study teaching at a technical university. The research probe will specifically focus on the attitudes of teaching students to ICT in the context of other didactic categories. Innovative methods and forms of teaching are an important means of emphasizing the use of ICT and elements of activity learning. The project is based on a combination of extensive and intensive forms of research.

Our aspiration is to identify the role and didactic function of ICT tools for the successful development of information thinking in the context of the prepared Framework Educational Programs (FEP) changes, as well as with regard to the trends of integration of pupils with some disabilities, which emphasizes the role of inclusive education, which has become a compulsory component of undergraduate teacher training according to the standards of the MEYS, MŠMT (in Czech) and methodological materials of the National Accreditation Bureau for Higher Education of the Czech Republic.

The topic of the role of ICT resources in education, specifically for the training of teachers of technically educated teachers, is closely linked to the sociological and psychological aspects of the learning society, currently referred to as Education 4.0. Changing what can be referred to as "school culture", i.e., its climate and value orientations in addition to a newfound 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 the practical training of teachers and the acquisition of new competences.

The presented project extends current knowledge in the sense of seeking basic answers to the influence of motivational factors to study technical education in the context of accelerating the penetration of ICT resources into education. We are looking for the basic connections between the cause (technological innovations, trends in information and communication technologies) and the effects of changing requirements for the education of technical subject teachers. Based on a combination of extensive and intensive forms of research and other theoretical-empirical approaches, we are seeking an answer to the conceptual approach of the role of ICT in increasing motivation to study technical education.

## 2.1 Objectives and project schedule

In 2019, activities increasing both theoretical and practical competences as well as educational activities aimed at intensive connection of the academic environment with the practice of technical schools as well as with special institutions preparing pupils with certain disabilities are included in the indicators as listed below.

### Indicators

- two seminars with international participation,
- one workshop on the use of digital technologies in teaching technical subjects
- two presentations of results in professional periodicals, eventually professional publications (seminars, conferences, professional journals),
- one newly created subject for students of teaching (focused on e-technology for special education)

### Objectives

The main aim of this project is to support the development of digital literacy and the digital competences of teachers of technical subjects and practical training in undergraduate education. In addition to research, within the framework of the Education Policy Fund 2019, current topics of Czech education with this specific area of interest are planned in the form of seminars.

The project focuses on managing students' motivational readiness to gain a deeper interest in the teaching profession in order to facilitate the transition to school practice. In order to meet this objective, current topics reflecting the current situation of our education and educational activities in close cooperation with contractual and international partners are incorporated.

The partial objectives of the project are:

1. to realize an initial focus group with teaching students (intensive research) in order to identify their experiences, attitudes and ideas regarding the use of e-technology in education,
2. to carry out an extensive form of research by means of a questionnaire survey for students of the teaching study programs
  - a. to describe students' attitudes towards the issue of the function and goals of ICT in education
  - b. to interpret experiences of e-technology use in the training of technical subject teachers,
3. to organize a workshop for students presenting the possibilities of using digital technologies in teaching practice, including their possibilities when working with students with special educational needs,
4. to publish the results of theoretical analyses in professional journals.

### Project schedule

#### Phase 1 - preparatory phase of the project

1<sup>st</sup> July 2019 to 31<sup>st</sup> August 2019

- Study of information sources, i.e. literature, magazines, previous research studies, consultations with experts, evaluation of existing knowledge of the researched problem,
- specification of the thematic focus of two professional seminars for students of teaching,
- methodological preparation of research design for an extensive form (questionnaire survey - ICT in education, its role in teacher education, problems of application of ICT to specific educational needs)

#### Phase 2 - implementation phase of the project

1<sup>st</sup> September 2019 to 30<sup>th</sup> November 2019

- Collection of information (extensive and intensive forms of research),
- organization of seminars and workshops (organization, promotion).

1<sup>st</sup> December 2019 to 31<sup>st</sup> December 2019

- Interpretation of acquired data and practical theory (evaluation),
- design of innovations and their practical implementation (new subject),
- presentation of project results.

Two seminars were organized within the project.

### **Technology on the background of project-oriented teaching - case study**

The introduction of modern information and communication technologies into education is important and desirable. But whether we want it or not, it is a fundamental change in the concept of teaching, teaching management and communication channels. How do pupils and teachers perceive this change? In the case study "Microsoft Teams: Introduction of communication tools with social network elements for teaching management", key factors from the perspective of pupils and teachers that influence such a change were presented. What makes it difficult for pupils and teachers, what they perceive positively, and what new possibilities technology brings, as well as what problems these changes can cause were also discussed. Issues dealing with motivation, adaptation to change, emotions, social relationships, and feeling of success or shame were also analyzed along with discussions pertaining to the possibilities of transferability of MS Teams environment to different levels of educational institutions, i.e. elementary schools, high schools, universities.

#### **Micro: bit – A case study of the introduction to technical subjects**

The programming of microcomputers with sensors has been very popular in recent years, even with the arrival of the IoT (Internet of Things). However, many programmable devices are not fully usable in computer science lessons, mainly because of the need for complicated hardware elements. Micro: bit comes as standard with a number of technologies that make it a powerful tool in the field of physical computing and STEM (Science, Technology, Engineering, Mathematics). Hardware programming allows students to develop specific products. The great advantage of "physical engagement" is the view of computer science that promotes creativity and encourages learning by engaging the whole mind and body. The seminar covered the basics of integrating physical computing into education using the BBC micro: bit microcontroller. The main aim of the seminar was to show a set of activities that are designed so that pupils can first analyze the task, discuss it outside the computer, then program the micro: bit behavior on the computer and verify the functionality of the program again in an entertaining form. We used only basic programming language commands while discussing the suitability of implementing a microcontroller in education for pupils of different ages.

## **2.2 Research on the role of information and communication technologies in education**

Research is being carried out between students of CTU in Prague and DTI University in Dubnica nad Váhom. It is divided into the following sections:

- Opportunities and threats of ICT in education,
- the use of ICT resources in various phases of educational activities,
- the use of ICT resources according to the methods and forms of education used,
- the usability of ICT in teacher and school activities,
- priorities of ICT resources in education,
- further education of teachers in the field of ICT.

As mentioned above, the goal was to carry out an extensive form of research by means of a questionnaire survey for students of the teaching study program

- a. to describe students' attitudes towards the issue of the function and goals of ICT in education
- b. to interpret experiences of e-technology use in the training of technical subject teachers

Data collection is currently being completed. As part of the Schola 2019 conference, a workshop on digital technologies in the teaching of technical subjects will be organized, where partial results of the project will be presented.

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