
INFORMATION AND COMMUNICATION TECHNOLOGY IN EDUCATION – PH.D. STUDY

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The doctoral degree program Specialisation in Pedagogy, in the field of study Information and Communication Technologies in Education (ICTE), is provided jointly by four pedagogical faculties in the Czech Republic: The Faculty of Education of the University of West Bohemia, Faculty of Education of the University of South Bohemia in České Budějovice, Pedagogical Faculty of the University of Ostrava and Faculty of Education of the University of Hradec Králové. We were inspired by the doctoral degree programme Theory of Education in Physics, taught by three of the aforementioned universities, and we also originally considered offering the doctoral degree programme Theory of Education in Informatics.

Preparations for the request for accreditation are accompanied by searching, ideas, refining views, numerous revisions and refining to precision once more. Searching for partners in resolving this issue was perhaps the easiest part. We know each other through European projects. Educators of departments providing training in informatics or at least information and computer literacy at pedagogical faculties in the Czech Republic have been meeting since 1992. Meetings have taken place at expert workshops, seminars and conferences. For example, in the European project dealing with information and communications technology in education, we first stayed four weeks in Glasgow, and spent the same amount of time in Barcelona. And over such a long stay there was enough time for us to discuss our approaches to ICTE. Therefore, since the beginning of discussions on the doctoral degree programme we know what we can expect from our team counterparts, that we can trust them and that they believe in attempting accreditation of such a degree programme.

Doctoral degree programme

After preparing accreditation, there exist certain rules that are formally given by regulations, documents, terms and processes. It is necessary to define the objective of study, the graduate profile, conditions for admissions, the academic programme – thus to define not only subjects and other obligations of the doctoral student, the topics for dissertations and ultimately to select a team of experts who can guarantee the third level of university education. It is also essential to comply with the Universities Act, as well as guidelines and regulations of participating universities or their pedagogical faculties. We will now discuss certain points.

Objective of the academic programme

The aim of the doctoral degree programme Information and Communications Technology in Education is systemic preparation of experts on independent creative work in science, research and development in the field with good expectations of further developing the field. We want to achieve the sophistication level of selected qualitative doctoral studies abroad.

In the Czech Republic there exists no doctoral degree programme with a similar focus or even in the framework of the degree programme Primary School Education or Secondary School Education, or in the Informatics programme.

Graduate profile

Graduates of this study augment their undergraduate studies with detailed knowledge of the content and methods of discipline from informatics and new directions in the area of pedagogy and psychology. They orient themselves in current opinions on education and information technologies here and abroad. They gain new knowledge and skills in designing modern information systems, in theoretical bases of informatics, and upon creation of educational materials for eLearning. They broaden their knowledge and skills in multimedia, visual and objectively oriented programming, and in the area of theory and practice of computers. They familiarize themselves with selected methods for resolving problems using the computer.

Doctoral studies graduates will work mainly as

- scientific workers dealing with information technologies in the context of teaching;
- teachers, didactics of informatics at faculties preparing informatics teachers;
- teachers, didactics of informatics at primary and secondary schools;
- authors of instruction supported by Information and Communication Technologies (ICT) for various forms of study, including eLearning;
- workers in state educational administration.

Characteristics of professions,

for whose performance the graduate will be prepared, other possibilities of his/her application and the characteristics of employers where the graduate will be able to apply his/her acquired education:

- scientific workers dealing with discovery of new forms of use of information technologies in education;
- employees applying themselves on the theoretical and application level during scientific research in institutions involved in education;
- employees taking part in preparation and gradual implementation of reform of education in informatics, which is realized at schools of all levels, including preparation of teachers at universities;
- employees capable of initiating and supporting introduction of ICT into education, to be responsible for their rational use, to propose a structure of a scholastic information system;
- employees capable of mapping the needs of ICT in education, of overseeing development of ICT in school in terms of methodology and education, of engaging in methodical management and preparing ICT coordinators;
- educators providing education in informatics at all types of primary and secondary schools and university faculties preparing informatics teacher and teachers of the 1st level of primary school;
- professional trainers handling complex applications in the field of informatics, including training for educators;
- creators of eLearning courses and other educational programmes and training materials;
- employees capable of cooperating in designing, implementing and evaluating on applications, including the capacity to communicate with resolvers and lecturers;
- employees capable of creating an evaluation of educational systems and judge the quality of degree programs from the field aspect.

The doctoral degree programme gives an opportunity to students who are currently completing their master's degree study, and previous graduates who are trying to work

scientifically in this field and develop it further. A condition for admission is due completion of a master's degree programme. During the admissions interview, the doctoral studies applicant presents his/her impression on content of a dissertation. The individual study plan then guarantees augmentation of knowledge in those areas in which the applicant does not have sufficient previous preparation – this concerns course of knowledge in informatics and pedagogical and psychological disciplines.

Conditions

which the student must fulfil during the course of study upon its completion are given:

- by an individual study plan;
- by content and scope of a state doctoral studies examination and requirements for proving the prescribed knowledge.

The basic differentiation of the study curriculum is comprised of the aim of the applicant's dissertation.

The degree programme includes

1. Subjects for a theoretical base (philosophical, pedagogical and psychological part, informatics and its theoretical bases).
2. Field subjects.
3. Other subjects – foreign languages.

During studies, the doctoral student must

- successfully complete at least three subjects for a theoretical basis, whereas in his/her individual study plan, both parts will be represented;
- successfully complete at least three subjects in the field;
- successfully complete a test in a foreign language;
- successfully complete at least one subject of his/her study plan at a different partner faculty;
- take part in three joint workshops of doctoral students, where the doctoral student will present results of his/her dissertation so far; these are published in an electronic proceedings;
- give a presentation in at least one domestic conference and one abroad;
- publish at least one paper in a certain professional journal, and in an international scientific journal or in the proceedings of an international scientific conference or its equivalent, e.g. a chapter of a reviewed book designed for an international public.

Further obligations

- participation in activities at a scientific research of faculty;
- activities relating to the actual creative activity of the doctoral student such as active participation in conferences, seminars, special courses, student's mobility at other centres, scholarship or research fellowship abroad;
- pedagogical activity for doctoral students in full-time form;
- research fellowship at a foreign university of the relevant type (as possibilities allow);
- participation in research projects and grants solved at the faculty with regard to professional dissertation focus.

State doctoral examination

The state doctoral examination tests

- the competence of the doctoral student to assess widely varying problems of the chosen field in the wider, both field-specific and interdisciplinary correlations;
- the capability of the doctoral student to judge whether the field of doctoral study can react adequately to the given problem in terms of practical consequences.

For the given topic, the doctoral student will answer questions

- of methodology and research correlations of the topic, i.e. he/she will critically analyze how the given problems are examined and will compare the developing approaches to understanding the topic;
- he/she states the newest theories relating to the given topic and compares it to previous concepts;
- critically assess conflicting aspects in the concept of the given topic;
- expounds in general terms upon the pedagogical aspects of the given topic, and discusses possible problems upon its implementation in educational practice.

The dissertation

must introduce an original solution to the given problem. At least part must be published in the reviewed scientific magazine or presented as a separate paper at a scientific conference.

Dissertation topics are in line of the specialization of the trainer workplaces that are gradually profiling themselves:

Faculty of Education of the University of West Bohemia – web technologies in education and new methods of teaching programming.

Faculty of Education of the University of South Bohemia in České Budějovice – researching changes caused by implementing ICT into education in relation to reformulation of education objectives, the impact of use of technology on a change of the educator's teaching style, the need for curricular changes of the given topic or subject being taught.

The Pedagogical Faculty of the University of Ostrava is focusing on certain areas of eLearning such as adaptive individualized teaching and personalization of teaching by means of eLearning or an evaluation of eLearning.

Faculty of Education of the University of Hradec Králové – management and control of technological processes, assessment and statistical elaboration of results of measuring, simulation of experiments and support of natural science fields by information technologies.

Topics already defended by dissertations

- Adaptive LMS systems.
- Analysis and design of learning graph theory optimization and combinatorial algorithms.
- Implementation of interactive animations in eLearning courses.
- Information and communication technologies in the pedagogical evaluation process.
- Projects in science education.
- Teaching of basic numerical methods in Matlab and its evaluation.
- Teaching of computer graphics at secondary vocational schools.

Departmental board of doctoral study

A common (national) departmental board provides the professional guarantee over the course and quality of doctoral study and a faculty departmental board does so at each contractual workplace. An *Agreement on the common form of a doctoral study program* has been concluded between the four workplaces.

Information and Communication Technologies in Education at the University of Ostrava

The Department of Information and Communications Technologies was established in 2000. It separated from the Department of Technical and Vocational Education which, *inter alias*, taught future educators how to use didactic aids such as overhead projectors and other projection devices, cassette players, and also taught them computer basics. Modern information technologies required modern computer classrooms furnished with multimedia equipment, slide projectors and interactive boards. The newly formed department searched for its own academic focus. Two areas crystallized:

- information technologies for all students of the University of Ostrava, especially the Pedagogical Faculty;
- ICTE as a separate field of study.

Study field ICTE

The department guarantees the study field ICTE within the framework of the programme specializing in bachelor's, master's and doctoral level in full-time and combined form. Graduates of master's degree programmes can perform the rigorous state examination, a part of which is defence of a rigorous dissertation. After successful performance of the rigorous state examination, the academic title of doctor of philosophy is awarded abbreviated as PhDr. listed before the name.

Scientific research trends of the department

The scientific research focus of the department cannot help but follow the direction of taught fields – integration of ICT in education. We also participate in one of the main directions of research activities of the University of Ostrava *Research of education with support of information and communications technologies*. All of this is too wide of a scope, and is regularly being specified and refined. In the long-term horizon, this concerns development of methods of modelling and optimization of educational processes. Research focuses on creating a laboratory of intelligent educational processes and their system integration into education.

Currently we focus on

- personalization of the learning process;
- evaluation of eLearning.

Conclusion

Everything – from the name through the enumeration of pedagogical and scientific research activities of the department – revolves around the ICTE concept. Without deviating from this topic in conclusion, we must mention the international conference entitled ICTE which has

taken place in Rožnov pod Radhoštěm for the past thirteen years under the patronage of the Rector of the University of Ostrava. An integral part of this conference is the doctoral section, which has undoubtedly enriched the conference programme. The Department of Information and Communications Technologies has become the main organizer and guarantor of the conference.

As of 2012, the department began publishing an electronic magazine entitled ICTE Journal. The papers in this journal correspond thematically to the topics of the ICTE conference. The aim is to conceive and edit the journal in order to apply to become a domestic, peer-reviewed magazine, and in the future, to have it included in the Thomson Reuters citation database.

Some publications of department members

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