

EDUCATION ON DOCTORAL STUDIES IN TECHNICAL SPECIALIZATIONS IN RELATION TO THE EXISTING LEGAL REGULATIONS

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Abstract: Doctoral studies become more popular among university graduates both in technical and humanistic specialties. They give a possibility of further scientific development and give a possibility to gain a scientific title which could open a new career paths. PhD studies are one of the possible ways to the scientific community. They can also be important stage of development for persons who wish to continue their professional career as scientist. In Poland the duration of doctoral studies is planned for four years, after which should be defense of the PhD thesis. The paper shows reasons why usually doctoral thesis are finished in the period exceeding four years that were originally planned for PhD thesis defense. This paper describes system of doctoral studies implemented in selected Polish universities. SWOT analysis is presented in order to show advantages and disadvantages of PhD studies from student's point of view.

Keywords: doctoral studies, PhD, doctoral students education

Introduction

PhD studies in Poland are governed by regulatory acts [1]. These acts determine way of education, scholarships [2, 3, 4] granting and conditions that must be fulfilled by universities and research units leading doctoral studies. These acts are only basic for establishing doctoral studies and they do not contain detailed guidelines about PhD studies construction. Academic units have high flexibility in teaching program adjustment to their needs and possibilities. This fact can be an

asset for academic units, which have a lot of autonomy and can compete with each other. On the other hand significant differences in teaching program can lead to major differences in graduate PhD student skills and education level. The paper presents some aspects of doctoral studies on technical universities which have different teaching systems and different approach to PhD student education.

After master studies graduation, graduate person can choose between two main career paths: professional work or scientific career. By choosing professional career former student

starts to acquire professional experience and skills needed at work. Second possibility that can be chosen by graduate are doctoral studies which gives possibility to start scientific career, but also could help to return into the labor market with higher qualifications. Doctoral studies can be conducted in both stationary and non-stationary modes. Non-stationary studies gives PhD student possibility of gaining professional experience and PhD degree. In today's world a doctorate is also part of professional life in other areas and gives an opportunity to highlight your skills compared to other people without academic title.

PhD studies program and its usefulness in PhD thesis

The act about academic degrees [5] strictly specifies scope of competences, knowledge and requirements to be met by a candidate for a PhD degree. On the basis of a set of guidelines described in the regulations by the Ministry of Science and Higher Education universities

create their individual program of doctoral studies, so they fulfill the requirements imposed by the legislator. Additional factor that could have influence on doctoral studies structure are National Qualifications Framework which now describes results of education that doctoral student should have after PhD studies graduation.

Doctoral studies program depending on the university, emphasis on education in various fields of science. The cause of this is lack of strict guidelines for educational program on doctoral studies. Polish Ministry of Science and Higher Education imposes only an obligation to fulfill results of education included in National Qualifications Framework which are described in act [2]. Most important fields of education in doctoral studies are shown on fig. 1. Most important for PhD thesis completion are activities connected with scientific research therefore most of doctoral students are neglecting other learning activities on PhD studies, especially when they are not connected with they scientific field of interest.

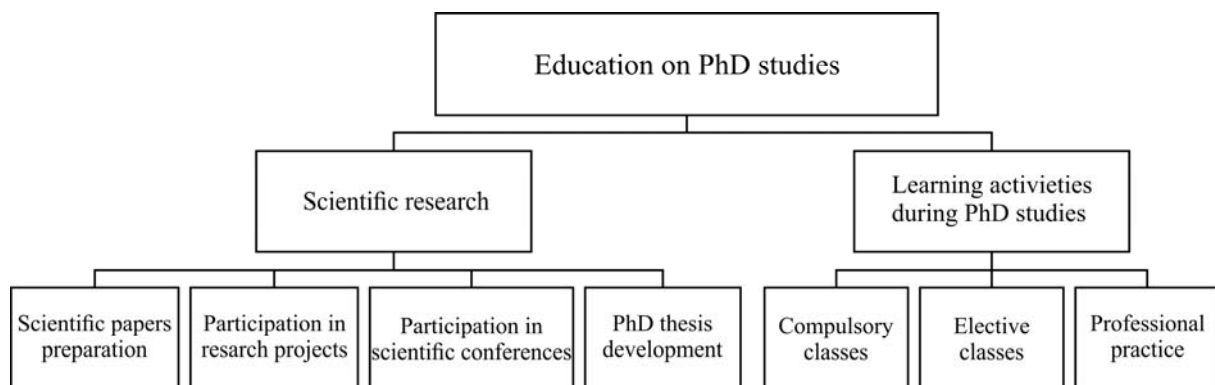


Fig. 1. Education on doctoral studies

As it was mentioned before there are no strict guidelines about doctoral studies program. This gives a research unit large flexibility in students education. Supervision under doctoral studies is held by council of research unit that is leading the studies. This means that the evaluation of the progress of work under doctoral dissertation depends only on the academic staff of the university. The scientific work of doctoral students in one discipline can vary significantly, but PhD programs in spite of these differences, in most cases are the same and they are often

misaligned with the doctoral dissertation subject.

Full-time doctoral studies are usually constructed in such a way that at least half of the training program in a particular direction requires the presence of the participants and it is implemented in the form of teaching and scientific work requiring the direct participation of academics and PhD students. This implies the need to participate in everyday university life which provides an opportunity to acquaint with the functioning of the scientific unit and it helps to strength the relationships with other

employees. In addition, classes in which a doctoral student participates are designed to expand his skills so that he could deal with advanced problems and provide a methods of solving them in a consistent and logical manner.

Subjects taught at doctoral studies vary depending on the scientific institution and field of study, however they are designed to enrich the knowledge of the future doctors and distinguish them from the graduates of the second degree studies. Way of examining of doctoral students usually do not differ from those carried out at master studies. Common practice is to organize reporting seminars on which PhD students present the results of their work in front of a committee consisting of members of the research unit.

Schedule of doctoral studies at technical universities aims to facilitate the implementation of the main objectives of the teaching program, however, it is not always suited to the individual needs of the student.

Autonomy in constructing grid of classes on the one hand gives the freedom to choose the courses that doctoral students must take on the other hand it can lead to significant differences between the universities. Participants of the doctoral studies must take this into account when they are selecting an institution in which they will attend in doctoral studies. The main goal of PhD students is the development of the doctoral dissertation, and this should be the main objective of their activities.

The availability of funds for doctoral thesis accomplishment

Current legislation and internal policies prevailing in the public universities give many opportunities for financing work of doctoral student, both in scientific and non-scientific ways. Graph showing funds for doctoral thesis development is shown on fig. 2.

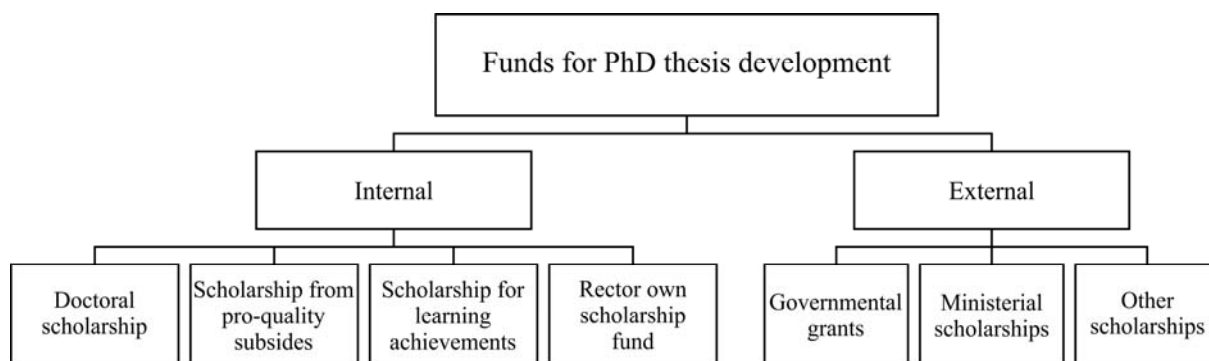


Fig. 2. Funds for PhD thesis development

The document defining rules of determining and granting internal doctoral scholarships in scientific institutions is regulation issued by Polish Ministry of Science and Higher Education [6]. It contains guidelines for student eligibility criteria for financial aid. University can grant: doctoral scholarship, scholarship from pro-quality subsidies, learning achievements scholarship and scholarship from rector own fund. Receiving one of the scholarships does not exclude the possibility of obtaining other ones. This could be motivation for doctoral student for harder work. Funds designated for PhD students are a significant financial burden in the budgets of the

universities departments, but they are meant to guarantee the minimum needed to the completion of the PhD dissertation. Another feature that is important in scholarship system is to ensure the conditions for scientific work so that the student does not have to look for additional sources of income involving his time and energy.

Another possible source of financing of doctoral work are external funds granted for specific scientific task invented by doctoral student. These funds are granted by the National Science Centre or the National Centre for Research and Development. Money from these sources are designed to allow PhD student

to solve a scientific problem, which usually is the essence of a doctoral thesis. Grants are awarded for a specific amount of time which results in the need to reliably fulfill the planned work and present its results.

To external sources which can be used for research work financing can be included any other scholarships offered by private and public institutions. These are usually the money granted in the form of temporary non-repayable financial aid provided to ensure dissertation defense. Depending on the type of scholarship funds may be used for the purchase of materials necessary for the execution of scientific work or can provide additional income for doctoral student. The most popular activities of this type include the scholarships offered by the Ministry of Science and Higher Education, the Presidents of the cities, Provincial Labor Offices or private companies that would like to support the development in the areas in which they operate. An additional indirect support for doctoral students is the fact that most of the scholarships are not subject to income tax. PhD student has also a privilege to have at the age of 35 a student card, which entitles him benefit from the same discounts as other students. That means cheaper traveling by train, public transport or usage of some cultural facilities.

The current reality of granting the funds for the doctoral scientific works allow doctoral students to retain freedom of action, and ensure conditions for a peaceful performing of their duties. It should be noted that such aid is granted for tangible results of students work and, depending on their activity it could vary significantly. To obtain an acceptable rate of funding it is necessary to permanently be involved in academic life of university in order to demonstrate the achievements necessary to receive the scholarships. Scholarships are granted mostly on a pre-determined period of time (usually a year) so it forces doctoral students to systematic work to apply for further funding.

The realities of scientific work, organizational work and teaching of doctoral student

Doctoral students during studies are obliged not only to acquire theoretical knowledge, but also organizational and teaching skills. Their main scientific tasks include acquiring the skills

necessary to perform the doctoral thesis by reading professional literature and participate in the necessary training, scientific research necessary to complete a doctoral dissertation, expanding their scientific achievements through participation in conferences and writing articles. These points should be organized and planned in such a way that eventually lead to the completion of a doctoral dissertation at the scheduled time.

The specificity of Polish universities means that a doctoral student is often not only focuses on the realization of his doctoral thesis, but also participates in other works, not directly related with doctoral dissertation. These activities frequently consist of participation in research projects, performing work related to the cooperation with external companies and doing organizational activities at the university. Participation in mentioned activities allows to gain valuable skills and professional practice. Scientific projects offer the possibility of extending the scope of professional knowledge and engineering skills, they also give a PhD student benefits from additional financial inflows. Contacts with companies allow you to acquire useful connections and interactions with the world of industry, which is particularly important for universities with technical profile due to the need for constant tracking of trends in the rapidly changing market. Participation in various committees of faculty and student's organizations, gives doctoral students an opportunity to familiarize them with the specifics of the work of research units and the people responsible for their operation. This makes easier to understand the university structures and can be especially useful if a doctoral student wants to continue their career at university, but most often it involves a tedious administrative work, which can use a lot of student's energy.

Doctoral studies in Poland should last for four years, but experience from different universities shows that only few doctoral students manages to defend their thesis at that time, or earlier. This is due to participate in a variety of projects often associated with the personal and scientific development, but at the expense of time spent on completing a doctorate. This is due to participate in a variety of projects often associated with the development of personal and scientific, but at the expense of time spent on completing a PhD thesis. It is essential that doctoral student could manage their time and

have the ability to self-discipline and assertiveness in order to complete their studies and defend the PhD thesis on time.

The data collected in the last eight years from dean's offices of Faculty of Electrical Engineering and Faculty of Mechanical Engineering and Mechatronics of West Pomeranian University of Technology in Szczecin says that more than 80% of doctoral thesis are defended in the time longer than four years. It is a common phenomenon in Polish universities and is associated with a shortage of educated personnel, which would be able to cope with all the tasks that appear at the university. Teaching and organizational activity of university staff also enforces indirectly doctoral participation in these activities.

An important role in controlling the progress of the doctoral dissertation and doctoral students' work has their supervisor. The supervisor is the person who introduces PhD student into world of science and it largely depends on him on which area doctoral student work would be focused. Supervisor activities can significantly

accelerate or delay work under the doctoral dissertation. A very important issue is to carefully balance the additional activities of the student in such a way that they are only background for the doctoral thesis.

SWOT analysis of doctoral studies on technical university

SWOT analysis of doctoral studies at technical university from PhD student's point of view is show in table 1. The analysis is designed to show the kind of work performed by the student and indicate the main needs but also the benefits from creating a doctoral dissertation. Presented data are based on opinions of doctoral students of Faculty of Electrical Engineering and Faculty of Mechanical Engineering and Mechatronics of West Pomeranian University of Technology in Szczecin. The analysis only emphasizes most important aspects of being a PhD student.

Table 1

SWOT analysis of PhD studies

<p>Strengths</p> <ul style="list-style-type: none"> - self-realization - obtaining academic title - obtaining unique skills and knowledge - development of interpersonal skills - access to advanced research equipment 	<p>Weaknesses</p> <ul style="list-style-type: none"> - PhD studies system - level of Polish science lower than leading countries - work overload - unpredictability of research results - poor cooperation between universities and industry
<p>Opportunities</p> <ul style="list-style-type: none"> - increase competitiveness in the labor market - improvement of the financial situation of (grants, scholarships) - expanding of professional contacts - possibility development of innovative and unique solutions 	<p>Threats</p> <ul style="list-style-type: none"> - lack of professional experience - doctoral dissertation not finished with defense - worse financial situation

The dominant factor deciding about starting doctoral studies is willingness of self-realization, obtaining unique knowledge and academic title. This may be caused by the desire to distinguish themselves from the rest of graduate master students at labor market or desire to continue scientific career.

As the weaknesses of doctoral studies should be paid attention to the organization of the doctoral studies and the level of Polish, which is lower in comparison to the leading countries. There

can be seen the tendency to improvement of conditions for PhD thesis dissertation development by increasing financial resources for higher education and thus the quality of scientific results created at Polish universities. Also important is the aspect of overloading with amount of work, which significantly impedes research work.

The greatest opportunity offered by the defense of doctoral thesis is increase of competitiveness in the labor market and the possibility of taking

more interesting work outside the walls of the university. It is related with acquiring unique skills in the process of creating a doctoral dissertation, and familiarity with the latest technologies that are not available to the average worker in a production companies. These skills could also affect promotion opportunities and indirectly improve the financial situation. Another advantage is the opportunity to stay in a scientific institution after doctoral studies in order to continue the work of research and teaching, which would be impossible without a scientific degree.

The biggest threat was a lack of work experience, which can be necessary to find employment in a commercial enterprise. Skills acquired during the doctoral studies may be so specific and unique that it will not contribute in the industry. Moreover graduate doctoral student may be unprepared for the system of work in industry, which is different than at the university.

The main conclusions arising from the SWOT analysis are undoubtedly fear of unemployment after obtaining the academic title and system of doctoral studies that is not helpful in work under PhD thesis. Despite their doubts doctoral students highly appreciate the possibility of self-fulfillment and improvement of professional qualifications, which could open up new opportunities in the labor market in which they see the possibility to improve their financial situation.

Summary

This article provides information about doctoral studies at universities and in research units in the technical fields in relation to the existing law regulations. Most important aspects of the scientific, organizational and teaching work are presented. SWOT analysis of PhD studies at technical university is also shown.

The paper discusses the issues relevant to the doctoral students at technical universities, indicating the main problems connected with a study program. Analyses shown that the level and quality of education at doctoral studies do not meet the expectations of students, however they fulfill the basic requirements imposed by law regulations. It is appropriate to consider the changes in teaching programs for doctoral studies in order to better match the needs of students. PhD student unquestionable problem is the difficulty of completing a doctoral dissertation in the originally prescribed period of four years.

PhD students despite the many potential risks they see in their career at the university in the majority recognize the choice of such a path appropriate for them. Work on the doctoral thesis gives them an opportunity of self-realization and gaining the academic title that allows them to improve their position in the labor market. Skills acquired during doctoral studies could be the way to the better job, and thus improve the material status of graduate PhD student.

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