

Changes in the Polish education system and professional-demographic profile of teachers gaining qualifications at the Pedagogical University (UP) to teach Natural Sciences from 2000 to 2016

Introduction:

The specificity of the teaching profession requires not only thorough preparation to it in the course of study but also continuous training and improvement after its completion, during work. (Piróg & Jania, 2013). The need for such actions is intensified by social and economic changes, technological progress and the reform of the education system. It considerably broadened the scope of tasks to be performed and currently a teacher of a school subject / educator should perform a number of other roles, he should be ie .: a guide, a manager, a diagnostician, a creator, or a mediator (Buchcic, 2012). Enhancement of behavioral problems induces the need for a permanent development of psycho-pedagogical competence (Osuch, 2010). Moreover, the teacher in his work has a duty to shape students' beliefs about the need for learning throughout life and therefore he should serve as an example of lifelong learning. This creates a new challenge for teachers at all levels of education, and even more clearly puts them in front of the necessity of permanent professional training, to be able to attractively and effectively implement the objectives of teaching and education. This thesis seems to be confirmed by results of the diagnosis, made under the TALIS program, which indicates that as many as 97% of teachers working in lower secondary schools have declared using a variety of formal and informal forms of education and training (Piróg, 2012).

As shown by the studies conducted among teachers in Malopolska Province, the most frequently chosen forms of education are postgraduate studies, equipping them with new qualifications¹ (Kosiba, 2012; Piróg & Jania, 2013). This trend is also confirmed by ORE national research, which indicates that in the school year 2014/15 almost 45,8% of still learning teachers in Poland attended in postgraduate studies (Rachubka, 2015).

¹ Every fourth geography teacher was during or completed postgraduate studies. They also planned to make further efforts to improve and further training. As many as 81% of respondents took into account the start of postgraduate studies in order to obtain the qualification to teach another subject.

Objectives, subject of study and research methods

The main objective of this article is to analyze changes in the number, age structure, gender and territorial origin of teachers, who in the years 2000-2016 at the Pedagogical University of Cracow gained the qualification entitling them to teach Natural Sciences. The concomitant aim is the discussion on starting the reform of the education system in Poland and its consequences for those teachers, whose employment is based on teaching Natural Sciences in elementary school. The method of analyzing documents was used for data collection, ie. personal questionnaires of postgraduate students. These included complete information to achieve objectives of conducted research. Each questionnaire allowed to obtain the following information: age of teachers, gender, year of commencement and completion of studies, education (town, university, faculty), residence, place of study conducted by UP².

Data was entered into the prepared base and then subjected to quantitative, qualitative and spatial analysis.

Qualifying postgraduate studies for teachers - analysis of factors

The pedagogical and psychological literature usually indicate four groups of factors that affect teachers' decision to start qualifying postgraduate studies. These include socio-economic, systemic, institutional and individual factors (Błaszczewicz, 2001; Skarżyńska-Gasparski, 2001; Barnett, 2004; Higgitt 2012; Spronken-Smith, 2013).

The group of socio-economic factors highlights the importance of the situation in the educational labor market which remains in a close relationship with demographic trends. The decrease in the number of students brings closing educational institutions and branch offices resulting in job cuts for teachers. And so - according to GUS (Central Statistical Office) data - for example, school year 2013/2014 started in Poland, with 5916 branches, 1259 schools and 8145 teachers employed less than in the previous year. In this situation, the risk of loss of employment and increased competition in the labor market, often mobilize teachers start studies giving them additional skills and increase their chances on the market (Kołodziejczyk & Polak, 2011).

² Pedagogical University conducted Natural Sciences postgraduate studies in Krakow and long distance centers in Tarnów, Myślenice, Częstochowa, Bielsko-Biała, Nowy Sącz and Rybnik.

Table 1. Factors affecting teachers' decision to start qualifying postgraduate studies

<p>Socio-economic factors:</p> <ul style="list-style-type: none"> • unemployment rate (total) • unemployment rate (in the profession) • the attractiveness of the profession (financial; non-financial) • technological progress • demographic situation 	<p>Institutional actors</p> <ul style="list-style-type: none"> • the offer of studies • organization and the price of studies • the prestige of the university • location of the university
<p>Systemic factors:</p> <ul style="list-style-type: none"> • the structure of subjects • the hourly dimension of individual subjects • limits on class size • the dimension of time job • retirement age • rules of professional advancement • sources of financing improvement 	<p>Individual factors:</p> <ul style="list-style-type: none"> • internal motivations (intellectual development, meeting own interests, aspirations to be a master in own's profession) • external motivations (maintaining employment, strengthening the professional position, remuneration, the recommendation of management)

Source: own study based on Barnett, 2004; Higgitt 2012; Spronken-Smith, 2013.

Among systemic conditions - those on the structure of education, taken at the national level, seems to be the most important. Reforms of the education system bring not only structural and program changes, but usually, result in the need for further training of teachers so that they can either learn new school subjects or retrain in a situation where previously taught subject has been reduced in the number of hours or stages of learning. One of these subjects were in 1999 Natural Sciences in elementary school. By the time educational labor market filled with graduates of teacher training, which offered students a specialization in the field of Natural Sciences, people interested in teaching this subject could lead it formally only by graduating qualifying studies in this field. This interest in the possibility of teaching Natural Sciences was intensified by the phenomenon of declining student populations in schools, which threatened with difficulties in filling teaching load and even job loss. This situation mobilized and continues to be an important stimulus for the large community of teachers to acquire qualifications to teach at least two and often a larger number of school subjects.

Essential for taking postgraduate studies (giving additional qualifications) are formal rules of professional advancement and accepted recruitment procedures. If the proceedings promote this type of courses, usually they imply growth of interest in them among teachers. Also, increasing the teaching load and extending the retirement age are factors that induce the need for formal confirmation of new professional qualifications

Another factor launching the decision about starting postgraduate studies by teachers is an offer presented by the universities. The substantive scope, duration, the organization of conferences, tuition fees and additional costs related to the distance of the university from teachers' homes (travel, accommodation) as well as the prestige and brand of the university, are those elements which in the field of institutional factors may influence the decision to participate in such studies.

Finally, a very important reason for choosing this path of improvement may individual autotelic or instrumental motives of every man. For some of these people, the reason is the need for self-development, the experience of intellectual adventure. Teachers are ambitious people who are aware of the need for lifelong education, who want to improve their skills and become masters in their profession for their own inner satisfaction. They also want to strengthen their professional position, or to receive a higher salary.

All these factors are - with different intensity - reflected in the characteristics of quantitative and qualitative structures of people taking postgraduate qualification. In the light of previous studies, we can notice the regularity, **that the greater the difficulties teachers have in obtaining and keeping a job in education, the more intense training process and more diverse demographic and professional profile of people taking up this activity.**

Natural Sciences postgraduate studies at the Pedagogical University of Cracow - graduates' profiles analysis

The reform of the education system in Poland, which began in 1999, resulted in the introduction of Natural Sciences subject on the second stage of education in primary school. This triggered a large population of teachers, especially from old primary schools, willing to gain qualifications to teach the subject.

Qualifying post-graduate Natural Sciences studies have been carried out since 1999 by UP Faculty of Geography and Biology in Krakow and have been realized Institute of Geography, Institute of Biology and long distance learning centers.

1962 people, including 1813 women (92.4%) and 149 men (7.6%), completed qualifying post-graduate Natural Sciences studies at Pedagogical University of Cracow from 2000 to 2015. For comparison, in Poland, in the school year 2014/2015, 19889 teachers of Natural Sciences were employed, including 17929 women (Rachubka, 2015), which accounted for 90.1% of the Natural Sciences' teachers population. In addition, it is worth noting that during the school year 2014/2015 the number of Natural Sciences teachers was higher than both the number of employed biology (15900) and geography teachers (15308). To obtain complete data for science subjects: there were 14938 chemistry teachers and 14701 physics teachers employed (Rachubka, 2015). These figures show how large is the current population of teachers of Natural Sciences in relation to teachers of all

science subjects (biology, geography, physics, and chemistry) taught in general education schools, and so both gymnasium and lyceum. Such large occupational group as well as incurred huge costs of education, and basically training and retraining of such a large group of teachers should not be missed in planned new reform of the education system in Poland.

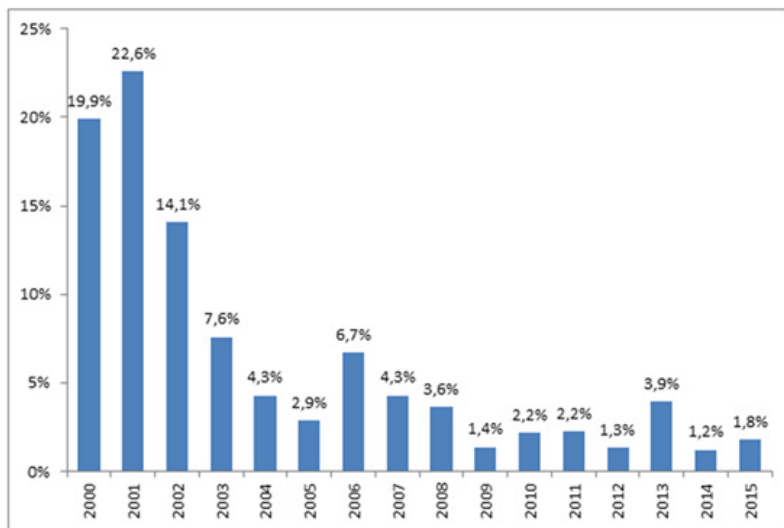


Figure 1. Graduates of Natural Sciences postgraduate studies in different years
Source: author's own study

Based on the obtained data it can be concluded that as many as nearly 57% of graduates gained the qualification in the first three years of post-graduate studies from Natural Sciences (2000-2002). It is worth noting that an important factor supporting the teacher's a decision on further education was the possibility of receiving a grant from school authorities. In the vast majority of the early years of the reform, teachers obtained such funding for postgraduate qualification and even, in some cases, it was very beneficial and up to 100% of all the costs.

An important factor to undertake postgraduate studies, as already signaled in the previous section, is the offer of higher education institutions (type of study, the price of study - tuition fees, travel costs, possible accommodation, as well as the program of study and a favorable schedule, selection of teachers, as well as opinions of university). As previously mentioned, the qualifying postgraduate studies from Natural Sciences were carried out regularly in Krakow (every year) and casually in the selected long distance centers, which was very beneficial for teachers who live in distant towns, often in peripheral areas, regions and have limited access to university offer. In this case, the university – the Pedagogical University of Cracow - went “outside” with this offer, what immediately met with

great interest and a positive opinion, because it did not generate additional costs for students. Proper selection of experienced staff and a favorable schedule, like no classes on Fridays in some long distance centers or earlier terminated classes on Sundays, encourage students to take up the UP offer of study. The positive opinion of the university since many years caused that up to 43% of postgraduate students of Natural Sciences are former graduates of the Higher School of Pedagogy in Cracow (WSP) and Pedagogical Academy (AP) – currently called the Pedagogical University of Cracow. Almost 10% of postgraduate students are graduates of the Jagiellonian University, less than 9% come from the Silesian University.

Among the postgraduate students the inhabitants of the Malopolska Province dominate (almost 70%), followed by the Podkarpacie Province (14%), the Silesia Province (13%), Świętokrzyskie Province (only 2%), which basically corresponds to the places of location of postgraduate studies (Kraków, Tarnów Limanowa, Nowy Sącz, Częstochowa, Bielsko-Biała, Rybnik) and only partly coincides with the distribution of students and graduates of the Pedagogical University.

Teachers are ambitious people who are aware of the need for lifelong education. Therefore they wish to refresh their knowledge, competence and decide to undertake postgraduate studies. This form of training is the most popular, also because of its importance in the promotion procedure from 1999 reform. Obtaining a degree appointed teacher usually provides a contract of indefinite duration and definitely strengthens the position of a teacher in the school. Therefore, postgraduate qualification from Natural Sciences gave many teachers such an opportunity.

Over the analyzed time period, the most numerous group of teachers undertaking postgraduate studies from Natural Sciences were graduates of the faculties of education - teachers with specializations: integrated, pre-school and early school education. The high interest in taking the studies by this group of teachers is the result of their interest in working in primary school as not only teachers in classes 1-3 but also in classes 4-6.

It is also important to remember about the demographic decline for the primary school and the reduction of classes, including the presence of many schools having only one class from the particular year (especially in small towns). Over the next 5-20 years, Poland will belong to the European countries with low fertility rates, and consequently, the size of the population aged 6-14 years will fall by about 15-16%. In the coming years the population aged 9-11 years (classes 4-6) - students having Natural Sciences classes will be maintained at a similar level to the present one. Although since 2014 the number of children in older grades of primary school will continue to grow, after 2020 the number of children enrolled in primary education will be gradually decreased. This fall will be the deepest in the early 30s of this century.

Table 2. Natural Sciences postgraduate studies graduates by selected fields of study

The direction of completed studies	Number of graduates	Percentage share
Pedagogy (Integrated, Pre-School and Early School Education)	377	19,2
Geography	372	19,0
Biology	323	16,5
Agriculture (agricultural economics, agrobiology)	78	4,0
History	69	3,5
Physical education	66	3,4
Mathematics	51	2,6
Gardening	46	2,3
Zootechnics	40	2,0
Economy	31	1,6
Chemistry	30	1,5
Technique (with computer sciences)	25	1,3
Theology	25	1,3
Russian, German, English and Roman Philology	24	1,2
Polish Philology	23	1,2

Source: author's own study

Another very large group of students are the teachers of geography (19%) and biology (16.5%), which seems understandable due to their interest in nature and desire (or maybe even the need) to preserve jobs after the “removal” of geography and biology from primary school to gymnasium. Especially teachers of municipal schools, where gymnasia were created, were looking for employment in elementary school, teaching Natural Sciences, to supplement their job time.

Natural Sciences postgraduate studies also aroused significant interest among history, physical education, and mathematics teachers. In this case, the main motive was to keep the current place of employment (by supplementing it with new hours of job time) and getting another promotion degree. Studies indicate that in recent years there has also been some interest in Natural Sciences postgraduate studies among foreign language teachers, which indicates a slow but steadily shrinking educational labor market, also for philologists. This trend seems to illustrate the growing difficulties not only in recruiting but also in keeping the job in education, which currently applies to specialists of almost all subjects. Secondly, it demonstrates the increasing competitiveness on the labor market in general, not only in education, because for many years, philology, and especially

the English philology and German philology graduates could easily count on interesting and varied employment offers.

Noteworthy is the presence of agricultural graduates (a total of approx. 9% of the audience) among Natural Sciences postgraduate students. Such a solution will be linked with their natural interests (agriculture, horticulture, animal husbandry), as well as the desire to work in school and resettle professional profile. Such a change is also connected with the need to obtain additional allowances by a teaching course or postgraduate studies. In most cases, such certificates of successfully completed course postgraduate students included in their documentation.

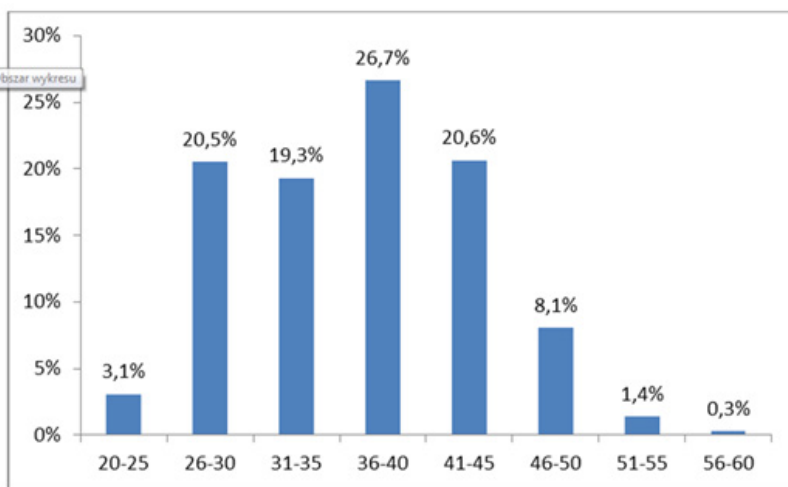


Figure 3. Age structure of Natural Sciences postgraduate studies graduates

Source: author's own study

The largest age group among the graduates were teachers with many years of work experience aged 36-40 years (26.7%) and 41-45 years (20.6%). This shows that the people who run the risk of losing their jobs in schools (no teaching load, etc.) often do not see for themselves any other alternatives in the labor market. Teachers think stereotypically about themselves and their competence, and even if they are tired of working in a school, they decide to undertake postgraduate studies to maintain employment in education and do not start looking for a job in other professions. It should also be noted that the number of teachers after 46 years (and older) was approx. 10%, which proves their precarious employment situation, despite such a large professional experience.

Unfortunately, the unstable situation on the teachers' labor market is not strengthened by the prestige of the profession, which is quite low, and the

competencies – usually preparing only for this type of work. This is another incentive for attempts to remain in education, instead of changing job. Teachers decide to undertake postgraduate studies in order to keep their jobs and also to improve their competence in the field of information and communication technologies (ICT). These are essential in ensuring quality education in the current conditions.

In recent years we notice more Natural Sciences postgraduate studies graduates aged 26-30 years old (a total of approx. 20%), and even 20-25-year-old graduates of bachelor studies immediately undertaking postgraduate qualification. This solution shows the willingness of today's students to the process of training and acceptance of an already formed model of lifelong learning, which contributes to the acquisition of additional competencies.

Summary

The specificity of the contemporary educational labor market, implemented reforms, new challenges for teachers, the risk of job losses in a situation of decreasing number of children and adolescents under the age of compulsory school and the nature of the profession, cause that teachers need to intensively take actions for further education and training.

A thorough analysis of the dynamics of change of specific attributes of the studied population seems to entitle to the conclusion that the structure of these teachers clearly illustrates each of changes mentioned. It also shows (like the pyramid of age and sex shows demographic changes) all changes in Polish schools and educational labor market, both positively motivating to activity, indicating openness to training, gaining successive degrees of career development and acquisition of new skills, including the communication and information, as well as those resulting from the need to study in order to keep jobs.

The collected material shows that a considerable influence on the involvement of teachers is a critical and uncertain position of educators, geographers, biologists or teachers of other subjects and the threat of job loss situation for those presenting qualifications to teach only one school subject. According to the research, it should be stated that currently the intense commitment of teachers, mainly in forms of training facilitating the acquisition and rights to teach another school subjects, seems inevitable and most effective way to adapt to the multiple challenges facing educational labor market.

According to growing difficulties of all teachers on the job market, we should expect an even greater commitment of this group to improvement and training. It is very important to take action, both in the area of building a high-quality offer corresponding to the needs of teachers and in supporting them in that regard at the central level.

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