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CHEMISTRY TEACHERS EDUCATION IN THE REPUBLIC OF BELARUS: ITS STATE, PROBLEMS AND PROSPECTS

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INTRODUCTION

Today, European higher education institutions have faced a number of critical challenges impacted by the introduction of new standards and new specialists training models. The motivation for Education Reform has been to improve the national standards of education and to get engaged in the Bologna Process. Education Reform affects all the subsystems of higher education sector, including would-be-teachers training. University would-be-chemistry-teachers training is a key factor to take into consideration as its efficiency influences chemistry training of both secondary school and postgraduate students.

ANALYSIS OF SITUATION

Considerable experience in chemistry-teachers training is accumulated in the Republic of Belarus. Mainly pedagogical institutions had been training chemistry-teachers for more than half a century. Later, in post-Soviet years, these institutions were reorganized into either Classical or Specialized Universities.

Today, would-be-chemistry teachers can undergo training at six Classical Universities (the departments where chemistry or biology is the core subject) and at one Specialized Pedagogical University (see Table 1). Meanwhile, there is a shortage of secondary school chemistry-teachers in the republic. Table 1 data reveal that there are only three departments (out of 11) where chemistry is the core subject. However, these departments' limited enrollment can't meet the growing need for secondary school chemistry-teachers. Nominally the Classical University Biology department graduates (research-and-pedagogy specialty area) are qualified as biology- and chemistry-teachers. However over the years the number of academic hours devoted to biology and chemistry teaching and learning at these universities has changed against chemistry. Academic hours spent on chemistry learning in accordance with the HEIs curricula are not enough to ensure chemistry-teachers proper training. About this testifies to the same problems faced by students during the passage of pedagogical practice in chemistry at school [2].

Pedagogical University entrants' poor knowledge of chemistry is another significant factor in terms of influencing on would-be chemistry-teachers training. Having compared the 2011 HEIs Biology and Chemistry departments' enrollment scores (see Table 1) with those of the previous year we've noticed that they are

getting lower. It should be mentioned as well that the entrance exams which would-be-chemistry-teachers are supposed to take vary depending on the specialty area. For those who want to apply for classical chemistry departments of BSU and MSU tests in chemistry, mathematics and either Russian or Belarusian are a must (the same tests are to take Chemistry and Technology departments' entrants). Those who want to enter Chemistry and Biology departments of pedagogical universities have to sit for tests in chemistry, biology and either Russian or Belarusian (the same tests are to take Medicine and Ecology departments' entrants).

We undertook a study to analyze chemistry teachers' qualitative composition in Minsk region and in Baranovichi (Brest region). While conducting our research we assessed such variables as chemistry teachers' education and the length of teaching experience (see Figure 1). The findings showed that only 27 % of Minsk region chemistry-teachers and 35 % of Baranovichi teachers of chemistry studied chemistry as their core subject at the universities. The main part of chemistry-teachers (64 % and 65 % respectively) has studied chemistry as an extra subject. Beyond this fact, there are 9 % of chemistry-teachers in Minsk region who haven't been specially trained at any HEIs to be chemistry-teachers; they are mostly teachers of biology, geography, pharmaceutical chemists, agronomists, industrial engineers.

Table 1

Higher Educational Establishments which train would-be-chemistry-teachers in the Republic of Belarus

Educational establishment	Department (specialty area)	2011 En-rollment	Passing score	Qualification
BSU, Minsk	Chemistry (research-and-pedagogy specialty area)	20	203	Chemist. Chemistry Teacher and Lecturer
	Biology (research-and-pedagogy specialty area)	100	253	Biologist. Biology and Chemistry Teacher and Lecturer
BSPU, Minsk	Biology. Chemistry	150	202	Teacher and Lecturer
BSU, Brest	Biology (research-and-pedagogy specialty area)	25	201	Biologist. Biology and Chemistry Teacher and Lecturer
	Biology. Chemistry	26	197	Teacher and Lecturer
	Chemistry. Biology	25	197	Teacher and Lecturer
VSU, Vitebsk	Biology (research-and-pedagogy specialty area)	28	195	Biologist. Biology and Chemistry Teacher and Lecturer
GSU, Gomel	Biology (research-and-pedagogy specialty area)	105	198	Biologist. Biology and Chemistry Teacher and Lecturer
GSU, Grodno	Biology (research-and-pedagogy specialty area)	90	217	Biologist. Biology and Chemistry Teacher and Lecturer

Educational establishment	Department (specialty area)	2011 Enrollment	Passing score	Qualification
MSU, Mogilev	Chemistry (research-and-pedagogy specialty area)	24	215,5	Chemist. Chemistry Teacher and Lecturer
	Biology (research-and-pedagogy specialty area)	28	219,3	Biologist. Biology and Chemistry Teacher and Lecturer

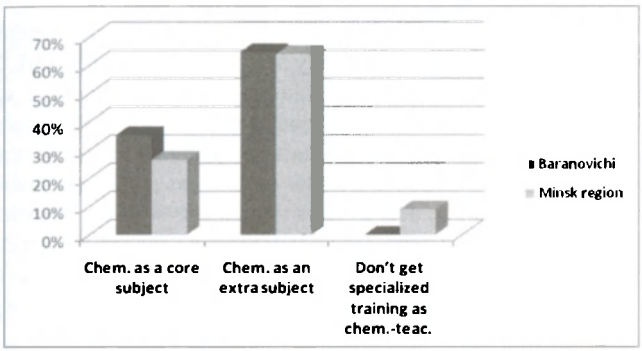

Fig. 1 **Chemistry-teachers qualitative composition versus training**

Chemistry-teachers ageing are another urgent problem. The major part of present day teachers of chemistry are those with 20–30 years of teaching experience. There are 39 % of chemistry-teachers in Baranovichi and 27 % in Minsk region who have taught chemistry for 20–30 years. For 30 years or more chemistry have been taught by 24 % of teacher in Baranovichi and by 23 % of teachers in Minsk region.

The percentage of teachers who have teaching experience less than 10 years is 14 % in Baranovichi and 26 % in Minsk region, the number of those with 10–20 years' teaching experience is 23 % and 24 % respectively (see Figure 2).

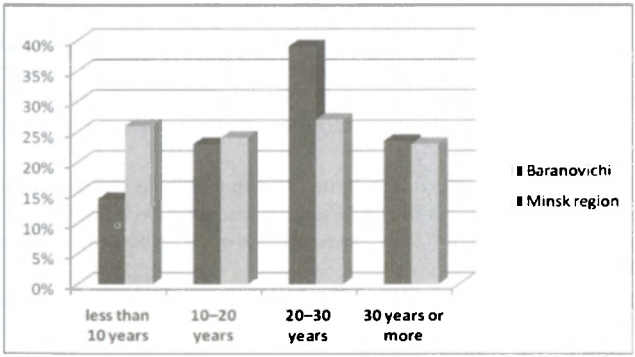

Fig. 2 **Chemistry-teachers qualitative composition versus the length of teaching experience**

Undoubtedly, long teaching experience positively influence the quality of educational process and even in a way compensates for the teachers' lack of specialized HEIs training. However, in the long-term outlook the problem of teachers ageing could result in chemistry-teachers famine in the education sector, in a situation when only 35–40 % of vacancies would be filled. This crucial situation would inevitably negative affect the quality of secondary school students' chemistry training.

CONCLUDING REMARKS

To overcome the aforementioned problems we suggest in alignment with the State Education Standards to introduce legally new pedagogical framework *Chemistry. Extra Specialty*, when students' will be additionally taught such extra sciences as mathematics or computer. The abovementioned combination of disciplines is rather popular in would-be-teachers training at the universities of Germany, the Ukraine and Latvia. For Belarusian higher education institutions such combination is also very urgent. First, HEIs will be able to cater for students who are interested in both mathematics and chemistry, for those who will have sat for these subjects national tests and will have been issued certificates. Second, mathematics as an extra subject will result in mathematical component improvement in would-be-chemistry-teachers training [2].

Great attention should be paid to the postgraduates' chemistry education under the circumstances. The Belarusian HEIs professors initiate the establishment of the unified chemistry education and information center. This center will strengthen coordination and managerial capacity within secondary school teachers and HEIs lecturers and professors, helping teachers to improve and upgrade practical component of their professional skills [3].

To upgrade chemistry-teachers professional skills one should stimulate new, productive and efficient HEIs educational activities, facilitate the reassessment of would-be-chemistry-teachers teaching and learning practices and training content.

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ХИМИКО-ПЕДАГОГИЧЕСКОЕ ОБРАЗОВАНИЕ В РЕСПУБЛИКЕ БЕЛАРУСЬ: СОСТОЯНИЕ, ПРОБЛЕМЫ И ПЕРСПЕКТИВЫ

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Резюме

В Республике Беларусь накоплен значительный опыт подготовки учителей химии в университетах. Между тем проблема нехватки учителей химии для общеобразовательных школ стоит достаточно остро. Как показывают статистические данные по учителям химии Минской области и г. Барановичи (Брестская область), только у 1/3 из них "химия" является основной специальностью по полученной квалификации. Число аудиторного времени, отводимого учебными планами по специальности "Биология. Химия" (химия – дополнительная специальность) на изучение химических дисциплин, однозначно не может обеспечить адекватную подготовку преподавателя химии . Дополнительным негативным фактором является низкий уровень подготовки по химии у абитуриентов, поступающих на педагогические специальности. Острой проблемой является также явное старение педагогического состава учителей химии. В качестве способов решения вышеназванных проблем белорусские специалисты в области химического образования предлагают: введение новых педагогических специальностей в рамках Образовательного Стандарта "Химия. Дополнительная специальность", где в качестве второй специальности выступают дисциплины математического блока; создание единого учебно-информационного центра по химическому образованию, который бы координировал и согласовывал деятельность шольных и вузовских преподавателей химии, обеспчивал практическую часть повышения квалификации и переподготовки учителей.

Ключевые слова: *химическое образование, педагогические специальности, подготовка учителей химии, повышение квалификации и переподготовка учителей.*