An Important Factor of Research University Development: the Role of a pre-Masters Program for International Students

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ABSTRACT

This paper considers the important practicality, scientific and methodological principles in the design of the pre-masters program in National Research Tomsk Polytechnic University (or simply TPU). TPU is a university that mainly provides technical education, particularly education in engineering, science and technology disciplines. The design of the pre-masters program also considers the incorporation of educational technology for its realization for the international students, who received the bachelor's degrees in other countries in English language and want to study masters programs in Russian language in Russia. According to the results of a comparative analysis that explored the experiences of the international students from English-speaking and Russian-speaking universities in the world within their pre-bachelors and pre-masters programs, this paper explains the differences between these programs and the specific features of the pre-masters programs. Further, this paper reports the analysis results of the implementation, monitoring and outcomes of the pre-masters program in TPU. It also presents some proposals for its further development.

Keywords: *International students, pre-masters programs, adaptation, educational technology.*

INTRODUCTION

The development strategy of the National Research Tomsk Polytechnic University (TPU) is formulated by considering the global trends in science and education, and also by the global challenges towards humanity. TPU has a strategic goal to develop into a research university and one of the world leaders in the field of resource-efficient technologies. The strategic goal (reflected in the Program development of TPU) decomposes into some sub-goals, where one of them is “transformation of TPU predominantly to expand masters and postgraduate programs by means of internationalization and integration of research, education and training of engineering elite”. Nowadays, TPU rates among the 15 leading universities of the Russian Federation and it is one of the leading Russian universities participating in the project for competitiveness enhancement among the world leading scientific and educational centers (National Research Tomsk Polytechnic University, 2015).

To reach such goals, TPU updates the available masters programs (MP) and develops new ones. They are interesting not only for the Russian and international students who received bachelor degrees in the Russian universities, but also for those of overseas countries. International students, who were trained through bachelor programs in Russia universities, enter a masters program with good knowledge in Russian. However, the international students with Bachelor degree of other countries encounter a so-called language barrier in using Russian language in their studies of masters programs in Russian universities. Consequently, they need in a special preparation program before commencing a masters program. The Russian universities and TPU in particular have an extensive experience in conducting the pre-university training (pre-bachelor programs) of international students including teaching Russian language as an integrated element before the commencement of Bachelor degree studies (Surigin,2000; Surigin,2001; Izotova,2007; Petrovskaya & Guzarova,2010). However, pre-masters programs (PMP) for international students have not been specifically designed, developed, widely integrated and applied as those within the framework of Bachelor degrees.

This paper reports scientific and methodological principles in the design of TPU pre-masters program. The design of such program focuses on the engineering education and also considers the incorporation of educational technology for its realization for international students, who received the bachelor degrees in other countries in English or native languages (other languages besides Russian) and want to study masters programs in Russian language in Russia. According to the results of a comparative analysis that explored the experiences of training international students from English-speaking and Russian-speaking universities in the world within their pre-masters programs, this paper explains the differences between these programs and the specific features of the pre-masters programs in Russian universities. Although the analysis is not considered to be extensive and in-depth, it went through some technically rigorous processes to explore and discuss many important and basic principles towards the design of a pre-masters program in TPU. The resources used for analysis involved different publications of foreign and domestic universities, as well as, numerous articles covering several essential aspects of the topics.

ANALYSIS OF WORLD EXPERIENCE IN THE PRE-MASTERS PROGRAMS

The studies (University of Huddersfield, 2012-13; 7. Widener University in Philadelphia, 2014; King's College London, 2014; University of Sussex, 2014; University of Kent, 2014; University of Sheffield, 2014; University of Southampton, 2014; Soon, 2013& 2013a) of foreign experience in the world leading universities in Germany, Canada, Great Britain, Australia and the USA revealed the fact that pre-masters programs (PMP) exist since 1990's in the last century. The major objectives of these programs are as follows:

- Improving English language skills for academic purposes (writing, reading proficiency, note-taking, discussions, presentation skills);
- Acquiring research skills needed for masters programs;
- Improving Information Technology (IT) skills;
- Learning professional skills and knowledge needed for a particular type of enrolled masters program;
- Cultivating positive relationships between staff and students within a new academic and social environment.

Regardless of the type of university, the well-structured pre-Masters programs include the following three basic modules:

Module 1 aims to enhance a foreign language (in this case, English) used by each student for academic purposes (English skills for university study), which embraces the research module, depending on specification.

Module 2 focuses on improving the proficiency of student academic skills and abilities before commencing a masters program. This module includes trainings in writing, reading professional texts, note-taking, discussion skills, information surfing and its systemization, and critical thinking useful for academic reading and writing. The module provides trainings to bring the students' skills up to a high adaptation level (e.g. introduction to University campus environment, cultural and social traditions and customs of the country).

Module 3 is a 'Specific Module' that aims to professionally train the students in their prerequisite subject areas to prepare them for their masters program. For example, the discipline "Computing" would include the courses such as 'Research Methods', 'Hardware' and 'Network, Programming (Software Engineering)', 'IT Management', and 'Information Management Systems'.

Furthermore, a pre-masters program sometimes includes the following basic trainings: 'Research Methods', 'Business Quantitative Models', 'Introduction to Economics', 'Business and Management', 'Operating Decision- Making' and 'Strategy Management'. In comparison, pre-masters programs in the English-speaking universities are well-structured which often targeted at the students who have already known some English or known English well. These students could improve English within such programs. The experience and the realization of pre-masters programs in foreign countries however may

not be completely suitable for the Russian universities. It is because international students have to both learn Russian (beginning with a zero level or close to zero level) and meanwhile undertake foundational knowledge training to be effectively prepared for the masters program within a short term of 8-10 months.

RUSSIAN AND TPU EXPERIENCES IN THE IMPLEMENTATION OF THE PRE-MASTERS PROGRAM

The implementation of the pre-masters programs for international students is not widely presented on the websites of different Russian universities, although this problem has been discussed at different universities, such as Lomonosov Moscow State University, Moscow State Technical University, St. Petersburg State Polytechnic University, and Bauman Moscow State Technological University “STANKIN”. Nevertheless, the perfect and complete designs of pre-masters programs for international students in Russia do not exist. As such, the existing programs include only Russian language courses. It should be noted that some authors (Gilevaya, 2005; Avdeeva, 2005; Loktionova & Allakhverdieva, 2012; & Pinevich, 2012) consider the course “Academic Style” as a very important component within the framework of the pre-masters programs. Within the framework of such programs, pre-masters students study each subject and its subject terminologies in Russian together with pre-bachelor students. In recent years the number of international students who want to receive the masters degree in Russia significantly went up. At the same time, the experience of Tomsk polytechnic university indicates that there is a need for creating profile pre-masters programs for different disciplines like engineering, economy, natural sciences, humanitarian, medico-biological and others (Guzarova, Kashkan & Shakhova, 2013).

Table 1: A sample curriculum of the pre-masters program preparing students for the engineering masters program.

Subjects	Class hours		
	1 semester	2 semester	Total
MODULE I «Language training» (a base level)			
Russian language (general)	312	264	576
Academic style (for Russian language)	24	-	24
MODULE II «Professional skills» (a base level)			
Researches in the field of natural sciences – special chapters of math, physics, chemistry (electively)	84	264	348
Modern researches in the field of technical equipment and technologies (electively)	12	132	144
Philosophy of science	-	44	44
MODULE III «Adaptation practitioners»			
Introduction to masters program (electively)	-	22	22
Russian language for special purposes (electively)		66	66
TOTAL			1224

In 2012-2014, a new pre-masters program curriculum for engineers as in Table 1 was developed and implemented.

RESEARCH METHOD FOR EXPLORING THE EXPERIENCES OF THE FIRST YEAR MASTERS STUDENTS IN TPU

Through the above two sections, they have provided an important basis for a comparative analysis. It was discovered in the former section that pre-masters programs are not new and they are widely used in many foreign countries. However, through the latter section, there are some salient needs for a different type of pre-masters programs in Russian and TPU. Clearly, the needs and requirements in Russian higher education truly differ from those in the higher education contexts in the foreign countries.

Figure 1: Research processes in this research.

In Figure 1, the top rectangle shows that the comparative analysis discussed above was performed in this research. Following its results, as in the second rectangle, a curriculum for a pre-masters program of an engineering masters program is developed closely observing the following principles:

1. Intensity of teaching Russian language as a foreign language;
2. Maximum integration of language and pre-masters training into masters program;
3. learner-centered approach;
4. Modular programs;
5. Interdisciplinary approach in designing specifically-based teaching aids and guidelines as a tool in the harmonization of pre-master academic adaptation and key factor in developing their professional competence (Bushkovskaya, 2010; Kashkan & Provalova, 2009);
6. Priority in Russian language training as a foreign one for professional and specific purposes (Eremina & Eremina, 2007);
7. Seminars with research advisors to forward the training process;
8. Wide application of an intermediate language (i.e. English) during the pre-masters training stage; and

9. Examination after a pre-masters program.

The curriculum aimed to help first year masters program international students who come to Russia to effectively undertake their studies using Russian language in all their learning activities, like reading, writing, listening and speaking. The program consists of three modules, namely, 'language and language-subject preparation', 'vocational training', and 'the adaptation practitioners'. 55% of classroom times are allowed for the development of Russian for the academic and professional purposes with possibility of a "sub-language" choice of profile subjects within the professional module. The program content of the second and third modules is determined by the future masters training programs and coordinated by the research advisors. The meeting with the research supervisor of future masters theses is organized too.

A monitoring system of educational activity of pre-masters students in TPU was designed with respect to the principles underlying a competence-based approach. The monitoring reveals that there were alignments between the learning process, the planned objectives and the learning outcomes in the pre-masters program. Monitoring also helps to identify the academic learning difficulties of students, during both the pre-masters and masters programs, and to find ways to overcome them. Annually, the first year pre-masters students are questioned to explore their academic learning difficulties as PMP graduates. The issue of their academic learning difficulties is complex. There are many factors which influence their learning, such as the complexity of a learning material, the teachers' education and skills, the ability of students, their readiness to learn and their self-motivation towards training. Nevertheless, the questioning of students helps collect some important data about the productivity and relevance of PMP.

As in the bottom rectangle in Figure, to establish feedback between implementation of this pre-masters program and the expected outcomes, two surveys of the same international students in their pre-masters program and their first year masters program were conducted. The two questioning surveys aimed to obtain some comparative data. The questioning results from the graduates of pre-masters programs in years 2012 and 2013 were checked and compared against the questioning results from the same students in their masters programs in years 2013 and 2014. The purpose of the questioning before and after the pre-masters programs aimed to confirm whether the academic learning difficulties which they experienced in their pre-masters program were still what they had in the first semester of their masters programs.

12 students took part in a survey in 2013 and 11 in 2014. Most of them (9 persons in 2013 –or 75% and 7 persons in 2014 –or 64%) were trained in the engineering masters programs. A vast majority (83-91%) were from the East Asia countries. 84-90% of them did not know Russian language at the beginning of PMP, but at the end of PMP, 100% of the graduates received certificates B1 and B2 (B1 and B2 are the levels of Russian language. The same applies to English levels B1 and B2). Such result indicates that the pre-masters program graduates (age about 24-26) have the self-motivation to go through the intensive training in the program. They differ in their levels of diligence but their diligence yields excellent results.

ANALYZING THE EXPLORED EXPERIENCES OF THE FIRST YEAR MASTERS STUDENTS IN TPU

The survey results showed different subjective perceptions of the international students about their academic learning difficulties in the first semester of masters educational program. When they were asked a question "How well do you know Russian after your training in the PMP program?" they provided different answers as in Table 2.

Table 2: International students' perceptions about their academic learning difficulties in pre-masters program.

Questions	Answers of premasters students (% to the total number of answers)	
	2013 year	2014 year
I can freely communicate	20%	19%
I can communicate, but it is difficult to study	20%	27%
I know insufficiently to study	40%	27%
I do not have enough knowledge in core subjects (the higher mathematics, physics ...)	20%	27%
I know some phrases	0%	0%

Through the provided data in the last two years, it demonstrates a slight decrease in the number of answers about language difficulties in the masters program students (from 60% in 2013 to 54% in 2014). In general, a little more than half of the graduates of PMP revealed that, in their opinion, there were difficulties in study because of their insufficient knowledge and skills in Russian language. As a reflection from all the analyzed answers, the students improved their Russian over time when they actively used Russian in their education, e.g. at conferences, round tables, in competitions, etc. The analysis of survey questionnaires (Kashkan & Provalova, 2009) have showed that, in general, the masters program students had rather high level of the general knowledge of Russian, but they were uncertain about their Russian language proficiency for the professional purposes. The survey was designed with different rating scales for the student to indicate their subject difficulties that they experienced when studying them. The introduction of Russian language in general professional courses such as "Introduction to geology", "The economic theory", "Economy of firm", "Fundamentals of linguistics" that were fitted into the PMP curricula has benefited the international students. The elementary courses helped the students improved their professional Russian language skills, etc.

RESULTS AND DISCUSSIONS

The most important aspect of pre-masters program is audition training which would equip them with the skills to understand their lectures on hearing. Participants of the two surveys never answered that they "hear nothing and understand nothing about what a teacher speaks". In 2013, 20-40% of survey participants answered that they "hear all words, but not always understand about what the teacher speaks". In 2014, all masters program students

did not answer that he or she "hears familiar words, but not always understands what the teacher speaks". 45% of pre-masters students answered that they "understand well what the teacher speaks", 55% answered "hear not all words, but understand what the teacher speaks". It should be noted that one of the reason for obtaining the positive results was to have practically added a phonetic training in the pre-masters program and to have improved the teaching technique of the subjects. However, the problem of training in Russian for the professional and special purposes actually continues. One of the survey questions was for these same pre-masters students to explain the kinds of difficulties which they met in the first year of masters program on a 10-point Likert scale. For each group of students, the rates of the same rated item from all the related students were summed first and averaged out. Their average rates (presented as weight point e.g. 7,3 on a 10-point Likert scale) for each item of the two groups of students in 2012 and 2014 are shown as follows in Table 3.

Table 3: International students' perceptions about their academic learning difficulties in first semesters of masters program.

Academic difficulties	Assessment of difficulties (10-point Likert scale) (1 point – I have no difficulties, 10 point – I have very great difficulties)	
	2013 year	2014 year
I know insufficient terms in my subjects	6,5	7,6
Insufficient baccalaureate preparation	6,3	5,6
It is difficult to speak in Russian	5,6	4,6
It is difficult to listen and understand a teacher	5,3	4,8
It is difficult to do written tasks	5,1	6,2
It is difficult to read textbooks and manuals	4,6	5,0
Difficult climatic conditions of Russia	3,9	4,8
The educational system of Russia considerably differs from an education system in the native land	3,6	3,7
Manuals of TPU are not helpful	2,3	2,4
Not enough electronic resources	2,2	4,4
Difficulties with Russia culture	2,0	2,6
Difficulties with Siberian climate	2,0	2,0
Difficulties with Russian educational system	2,1	1,9
Teachers are not approachable	1,9	2,2

The comparison on results in the table above has the following implications. Firstly, none of the masters program students indicate any kind of difficulty at 10 point. As in Table 2, the first item 'knowing insufficient terms in my subjects' shows more difficulties in a masters program than in a pre-masters program seeing the point change from 6,5 to 7,6. This fact indicates a rather high level of academic challenge and adaptation through a PMP

to a masters program. Secondly, language difficulties decrease over time, e.g. speaking difficulty drops from 5,6 to 4,6 and audition decreased a little from 5,3 to 4,8. Thirdly, a lot of undergraduates highly appreciate manuals (from 2,3 to 2,4) and electronic resources (from 2,4 to 4,4). The students are provided with electronic resources, but did not search for more related electronic resources themselves. It suggests some future training to teach them how to conduct individual information seeking for useful electronic resources in their subject areas. Fourthly, the students do well in their learning to listen (from 5,3 to 4,8) and speak (from 5,6 to 4,6) Russian than in their reading (from 4,6 to 5,0) and writing (from 5,1 to 6,2) in Russian. It suggests more training assistance and teacher attention are to be given to improve the students' reading and writing skills. Lastly, in general, they do not consider the climatic conditions of Siberia (from 2,0 to 2,0; no change) and the Russian educational system (from 2,1 to 1,9) as great challenges to them.

The survey results, to some extent, reflect some self-assessment of the masters students and how they thought proudly of their academic achievements. For example, for the question: "What educational activities did the students take part in?" The answers were as follows: 100% of participants have presented reports at the scientific conferences; 90% have conducted presentations at the scientific and creative exhibitions; 60% have made speeches in the club of Russian language; 30% have taken part on round tables. In closer and more careful examination, we found that the students associate their non-participation and no actions in activities not so much with language problems, but more with their psychological barriers (fear of a public statement, etc.).

CONCLUSION

Through this research, the approach in implementing the pre-masters program described above is an integrated part of the masters Program that contributes to an effective and successful training of engineers. Taking this approach could increase the quality-level of the education not only for the pre-masters program, but also for the masters programs. The pre-masters program plays an important role in helping the international students achieve academic successes. It is also a key factor in TPU's development of Russian higher education internationalization.

The efficiency of PMP, as demonstrated in the survey outcomes, helped us comprehend the academic learning difficulties of international master students in their first year of study. In general, the survey outcomes indicate a rather high level of international master students adaptation in their given training conditions and their formation of a necessary minimum level of language competence for training continuation. Having known from the surveyed students that they felt unready for professional subjects (it is not enough of Russian terminology), TPU could help the future masters students who start with zero Russian knowledge to better acquire sound language and speech competences of language and profile preparation within the short term (8-10 months) of PMP.

The greatest academic difficulties are related to the understanding of difficult texts in textbooks, especially, for special subjects. The solution of this problem would be to create textbooks with specific language features and semantization in a necessary format for

international students. Development of such textbooks by a group of teachers of special subjects and the teachers of Russian as foreign language will need to take into account the specific international students training. The survey outcomes also showed that the update of curricula within PMP had to be carried out by further considering the organizational and methodical improvement of language and vocational training within the pre-masters program. In the organization of PMP, it is probably necessary to consider using IT technologies to (1) specially prepare the international students in Russian language even before their arrival to the university, (2) to expand a set of special subjects in the professional module of the curriculum with accordance to master programs and (3) to expand possibilities of independent work of international students with audio-, video resources, language exercise machines, electronic textbooks.

Teaching staff who deliver different subjects (besides Russian language) should improve their professional levels of research and education, i.e. they should apply the latest technology to improve the academic performance and improve the English language level (as intermediate language for English-speaking students), as well as enhancing the Russian language teaching.

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