



## **Cross-Cultural Communication Training for Future Engineers - a model developed at the Kazan National Research Technological University to prepare students for mobility programs and the global market place**

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## **Abstract**

The paper addresses preparation of engineering students for the global market. The following issues are discussed: the most important attributes of academic mobility; cross-cultural competence as a determinant of successful global professional communication; experience of the Kazan National Research Technological University (Russia) in cross-cultural competence development.

Academic mobility is considered as a social phenomenon and as a personal quality, an integral unity of four basic components: cognitive, communicative, pragmatist and reflexive. Within cross-cultural competence we point out motivational, cognitive, personal, and communicative/behavioral components.

National Universities in Russia intensify efforts to integrate into the global academic community. There is still a plurality of problems regarding mobility, second language fluency and cross-cultural competence. In this paper we propose introducing an additional degree (Russian equivalent to the Western minor degree) as one of the tools for preparation of students for mobility programs. Results of cross-cultural training are presented and discussed.

## **Introduction**

Global communication and interaction is increasing. This trend spans different nations and cultures, including people's professional and personal lives. This poses challenges to cross-cultural contacts, the origins of which stem from a low level of cross-cultural communicative competence, intolerance, prejudice, and cultural insularity. The contemporary world is characterized by a strong tendency for globalization on the one hand, and the widespread increase of nationalism, self-comprehension, and ethnic identity on the other hand. Fostering the development of mankind, modern technology, and global communication requires an open mind and cross-cultural communicational competence. This is especially true for engineers. Labor and academic mobility is one of the key factors in global scientific and technological development. As a tool of the Bologna Process, mobility establishes the basis for a system of education and for an efficient global labor market.

## **Academic mobility: Approaches and Methodology**

There is substantial research on the formation and development of university students' academic mobility [2]. Various definitions of the term show different aspects of academic mobility as a phenomenon.

Globalization in engineering is an up-to-date issue and is a topic of international discussions. US, European and Asian researches suggested many innovative ideas that allow for better international engineering interaction and students' readiness for the open world [1], [3], [6], [8], [9]. For example corporate education presented by Herman Schneider more than a hundred years ago was successfully implemented as the option for students to gain second language proficiency and international job experience [3].

Leading Russian universities also take part in the global integration process. The number of international students is increasing from year to year. However Russian universities encounter some difficulties in this area. E.g., in spite of overall growing inflow of international students, Russian participation in the world market of educational services is decreasing. There are several problems that make the process of international integration more complex. For many decades Russia as a part of the Soviet Union was a “closed” country and therefore has a poor free market experience. The main obstacles for academic mobility are overall low level of second language proficiency, absence of wide international cooperation habits, rigid traditional system of higher education, etc. [1]. For example it is rather challenging to make individual educational trajectory for Russian students as alterations are possible only on the macro-level of choosing the major and not on the level of specific courses as the curriculum is set by Federal Educational Standards and not really subject to changes. Unlike the Western educational system, in Russia students usually do not select particular courses within their major. During the semester they study disciplines suggested to them by the educational standard. To some extent the problem of individualization may be solved by the system of additional certificates to higher professional education (equivalent of minor degree) where students may develop social, psychological, linguistic competences that will help his future international marketability.

One of the main requirements for a mobile person is to master a second language sufficiently to allow for efficient social, cultural, and academic exchange [1], [11]. Language communicative competence is the key factor for successful social and professional communication in a cross-cultural environment. However, in practice linguistic knowledge itself is a necessary but insufficient determinant of cross-cultural interaction. Psychological attitude, or readiness to communicate with people speaking another language, is also important.

International academic mobility means more than just the possibility to study abroad. The mutual recognition of diplomas and qualification does not guarantee graduates’ competitive ability in the professional sphere. Only professional competence assures a successful career in the global labor market. Furthermore, the most talented employees are the ones with the greatest opportunity to be mobile. In this context, academic mobility requires a wide variety of personal qualities: talent to interact efficiently with other people; analytical thinking; communicative skills that include cross-cultural communication; the capacity for self-awareness and self-reflection; a willingness to act in the cross-cultural environment; as well as respect and tolerance.

An academically mobile student is ready for life changes. This quality is revealed in specific socio-psychological attitudes [4]. Among other factors that allow for academic mobility, it is necessary to note a students’ capacity for independent design of their educational trajectories. This includes the ability to choose courses, disciplines, and universities within his major according to his specific aptitudes and needs. While mobility was considered mainly in the spatial-temporal context initially, today it includes more pragmatic activity [12]. From this point of view, mobility is one of the forms of adaptive activity of a contemporary person in response to an unstable socio-economic environment and constant inner changes. Academic mobility of students is expressed not only in traveling internationally or within one country, but also in their capacity and readiness for constant self-development and self-education in a cross-cultural environment. Thus mobility as a concept may be researched in two aspects: as a process and as an integrative individual trait. Academic and labour mobility includes development of such qualities as leadership,

responsibility, independence, self-reliance, goal-setting ability, tolerance and respect, need for constant self-development, etc. [5].

Therefore, the academic mobility of a person may be considered as an integral unity consisting of four basic components: cognitive, communicative, pragmatic, and reflexive (Table 1). At the same time, the structure of academic mobility may be analyzed as a system including professional training, linguistic training, and a set of personal qualities, motives, attitudes, and skills comprising socio-psychological competencies that are necessary for the development of academic mobility.

Table 1 – Student academic mobility matrix

Academic mobility components			
Cognitive	Pragmatic	Communicative	Reflexive
To know socio-cultural and professional terminology in the second language. To master the language system. To know social and cultural peculiarities of the hosting country. To understand challenging social and professional situations.	To perceive, select, analyze, and generalize information. To set goals and determine strategies to achieve them. To have professional skills and experience.	To be able to work in teams, to cooperate, to be tolerant and respectful. To be ready for executive decisions and responsibility. To use another language in the real situations of cultural and professional oral and written communication.	To be able to take stock of a situation and of one's own achievements and failings, to strive for self-development and professionalism in the global context.

Job expertise, knowledge, and skills make it possible to exchange professional information and to form the basis for acquisition of new knowledge. Language proficiency makes international mobility possible, thus allowing contact with professional specialists and students from outside of the home country. Socio-psychological competence provides an added basis for professional and social communication. This allows for additional learning, work motivation, self-development skills, and professional and personal growth. Development of the above-mentioned components, in addition to professional experience, transforms academic mobility into labor mobility, thus allowing for a successful career.

Developing readiness for academic mobility of engineering students is becoming important. This is because academic mobility is closely correlated with professional mobility, meaning the ability to apply the acquired expertise, knowledge, and skills in various industries and to shift easily from one professional activity to another.

Thus students' academic mobility may be considered not only as a social phenomenon (traveling and making joint projects), but also as an integrative personal trait (the ability and readiness to adapt easily to the diversity and the dynamism of the educational process). It is evident that all levels of the professional education system should meet both social and

personal requirements. The academically mobile person is active, constantly developing, and possesses flexible, creative thinking. At the same time, self-improvement is impossible without introspection and the ability to conceive of and to apply behavioral strategies that solve challenging issues. Thus added language communicative competence is not the sole key factor of a student's academic mobility, but is instead an important determinant of cross-cultural interaction, during which time they will face a plurality of other demands.

Academic mobility provides students with the freedom to plan independently an educational trajectory that takes into account the contemporary professional demands that are placed upon an engineer. This includes developing a set of personal characteristics, such as being hard-working, enthusiastic, devoted to the profession, self-actualized, relatable, honest, articulate, creative, capable of initiative, and decisive. All these traits comprise the socio-psychological competences of future engineers that form an integral part of global competence.

### **Cross-cultural competence of engineering students**

Speaking about the socio-psychological skills of a future engineer, it is necessary that they form integrated personal characteristics that reflect an independent readiness to acquire and to apply technical knowledge; professional, linguistic and psychological skills; successful relations and interactions with other people; efficient behavior in various social situations; and mastering personal self-regulation mechanisms for successful professional and social performance.

On the basis of psychological and pedagogical bibliographical analysis on the topic of developing socio-psychological competences, we point out the following structural components: motivation-values, pragmatism, cognition, personality, and communication [4]. The motivation-values component includes needs, motives, a values system, attitudes, and the general personal orientation of future engineer. Pragmatism equates to coping strategies, ways of solving problems, behavior in professional situations, and operating style, etc. The cognitive component includes professionally specialized and psychological knowledge. Personal traits that form socio-psychological competences of the future engineer are diverse: leadership, emotional-volitional traits, social responsibility, self-discipline, sense of purpose, ambition, perseverance, creativity, the ability for self-development, etc. The communicative component includes community relief, interpersonal skill, tolerance and respect, good manners, negotiation skills, etc.

The context of academic mobility requires specific socio-psychological competence. Namely, this equates to cross-cultural competence, meaning the individual's ability to contribute to intercultural effectiveness, regardless of the particular intersection of cultures. Although some aspects of cognition, behavior, or affect may be particularly relevant in a specific country or region, evidence suggests that a core set of competencies enables adaptation to any culture [7]. Tolerance, inter-cultural dialogue, and respect for diversity are essential in a world where people are becoming closely interconnected (Kofi Annan, 2009). In fact we are here speaking of the so-called "global competence".

Global competence as an up-to-date necessity for engineers is widely studied. Alan Parkinson in his paper "The Rationale for Developing Global Competence" presents a thorough analysis of the concept of global competence and lists 13 attributes of global competence. According to his model global competence means engineering graduates: 1. Can

appreciate other cultures; 2. Are able to communicate across cultures; 3. Are familiar with the history, government and economic systems of several target countries; 4. Speak a second language at a conversational level; 5. Speak a second language at a professional (i.e. technical) level; 6. Are proficient working in or directing a team of ethnic and cultural diversity; 7. Can effectively deal with ethical issues arising from cultural or national differences; 8. Understand cultural differences relating to product design, manufacture and use; 9. Have an understanding of the connectedness of the world and the workings of the global economy; 10. Understand implications of cultural differences on how engineering tasks might be approached; 11. Have some exposure to international aspects of topics such as supply chain management, intellectual property, liability and risk, and business practices; 12. Have had a chance to practice engineering in a global context, whether through an international internship, a service-learning opportunity, a virtual global engineering project or some other form of experience; 13. View themselves as “citizens of the world,” as well as citizens of a particular country; appreciate challenges facing mankind such as sustainability, environmental protection, poverty, security, and public health [10]. Thus we may see that global competence is a multi-dimensional complex phenomenon that includes various personal and professional attributes, skills and abilities. It is evident that global engineers need social and psychological skills alongside with high engineering qualification to be able to fulfill their professional and personal potential.

Cross-cultural or global competence is the ability to interact and to communicate effectively in a culture different from one’s own. Within cross-cultural competence we point out motivational, cognitive, personal, and communicative/behavioral components (Table 2).

To promote international educational programs in engineering universities, it is necessary to develop the cross-cultural competence of students and researchers. Humanities, especially psychology and language courses, play an important role in developing cross-cultural competence. It is known that cross-cultural competence needs to be developed gradually; it is not achieved in one short course or a single workshop setting [8]. There are good reasons to develop socio-psychological (including cross-cultural) competence of future engineers step-by-step throughout the whole educational process at the university. Humanities in the engineering education allow students to evaluate the significance of innovations, to implement them, and to overcome obstacles and difficulties in social contacts. Besides, education in psychology and linguistics reveals the potential for personal growth, and it influences motivation, general outlook, values, and consciousness as a whole. Therefore, humanities contribute to the development of an independent, creative, socially active person, while responding to the leading trends of the global civilization process itself.

### **The case of the Kazan National Technological University**

Kazan National Research Technological University introduces courses aimed at the development of cross-cultural competence. Kazan National Research Technological University (KNRTU) is one of the oldest universities in Kazan. Its history dates back to 1890. Today university is the largest Russian center of higher education in technology. KNRTU offers over 150 training areas in Bachelor’s and Master’s Degree Programs. The University aims at promoting global cooperation; being engaged in a number of joint projects, international programs, student and staff exchange programs. To promote the further internationalization and to help the university graduates to participate in the global engineering environment the university suggests cross-cultural training for its students.

Although the Russian Federal State educational Standards for universities allow for the inclusion of some disciplines aimed at the development of the socio-psychological competence of future engineer, as it has already been mentioned, the typical engineering curriculum does not focus on the arts and social sciences. Instead, it pays main attention to engineering.

The lack of academic hours that are allotted for cross-cultural development may be solved in the process of attaining an addition to higher professional education (APE) (minor). In the contemporary context APE is an effective tool to develop significant social competences that cannot be fully developed in the engineering major. To increase the external competitiveness of graduates the Faculty of Additional Education (FAE) of the

Such courses are suggested in the following curriculums: “Professional psychology,” “Human resources,” “Enterprise management,” and “Professional translation and interpretation.” Besides, there is an option for all the University students to take a 24-hour long group training “Cross-cultural interaction and intercultural communication” at the FAE. The main shortcoming of this approach is that only a few students from the huge university may attend the courses, so it cannot be considered a pervasive university practice. One the other hand, the students of the FAE are among high achievers in their majors, so they are the most ambitious and oriented for a successful career and the mobility that results. Besides, as it has already been mentioned, cross-cultural competence is not something that may be established at once. It requires systemic and gradual development. This is why we have included elements of cross-cultural information and training into various courses of the 6-semester long “Professional Psychology” curriculum (see Table 2).

The competence of individuals and organizations may be measured on a continuum developed by James Mason [9]. The five progressive steps in his continuum are:

Cultural destructiveness: The most negative end of the continuum is indicated by attitudes, policies, and practices that are ruinous to individuals and their cultures.

Cultural incapacity: The system or agency does not intentionally seek to be culturally destructive; however, the system may lack the capacity to assist different minority cultures of individuals and/or communities.

Cultural blindness: At the midpoint of the continuum, the system and its agencies provide services with the expressed intent of being unbiased. They function as if the culture makes no difference and all the people are the same.

Cultural pre-competence: Individuals and organizations move toward the positive end of the continuum by acknowledging cultural differences and making efforts to improve.

Competence: The most positive end of the continuum is indicated by acceptance and respect of cultural differences, continual self-assessment of cultural awareness, and expansion of cultural knowledge and recourses, attention to the dynamics of cultural differences, and adoption of culturally relevant service delivery models to better meet needs of various cultural groups.

Table 2 – Development of cross-cultural competence of students

	Cross-cultural competence
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Components	Motivational	Cognitive	Personal	Communicative/behavioral
Component outline	Motivation to learn more about cultural diversity, curiosity and interest for multicultural interaction, strive for self-development, etc.	Understanding of similarities and differences between countries and ethnic groups, recognition and respect for cultural diversity, knowledge about traditions, mentalities and ways of living	Tolerance, cross-cultural awareness, strategic thinking, adaptive ability, and readiness for introspection in multi-cultural context, etc.	Language proficiency, communicative skills, active networking with people worldwide, flexibility in interactions, ability to recognize and adapt to cultural nuances in professional and social situations, ability for conflict resolution in the multi-cultural environment
Courses where it is developed	Social psychology (3 <sup>rd</sup> semester), Ethnic (Cross-Cultural) Psychology (4 <sup>th</sup> semester), Socio-psychological training (6 <sup>th</sup> semester), Psychology of Diversity (6 <sup>th</sup> semester)	General psychology (1 <sup>st</sup> semester), History of psychology (2 <sup>nd</sup> semester), Social psychology (3 <sup>rd</sup> semester), Ethnic (Cross-Cultural) Psychology (4 <sup>th</sup> semester), Psychology of Diversity (6 <sup>th</sup> semester)	Social psychology (3 <sup>rd</sup> semester), Ethnic (Cross-Cultural) Psychology (4 <sup>th</sup> semester), Socio-psychological training (6 <sup>th</sup> semester), Psychology of Diversity (6 <sup>th</sup> semester)	Social psychology (3 <sup>rd</sup> semester), Ethnic (Cross-Cultural) Psychology (4 <sup>th</sup> semester), Socio-psychological training (6 <sup>th</sup> semester), Psychology of Diversity (6 <sup>th</sup> semester)

The system of gradual development of cross-cultural competence within the minor “Professional Psychology” curriculum is only just now being implemented. Therefore, it will probably undergo some changes and corrections over time. Thus it is premature to make generalized conclusions on the educational model. During the years 2014-2016 the authors plan to carry out a complex empirical study of communicative competence and its development at the Research University. At this stage a self-assessment questionnaire to evaluate the level of cross-cultural competence of engineering students and their readiness for international integration was carried out. The questionnaire is based on the above-mentioned 4-component model of cross-cultural competence (Table 2), the components of which are understood as an integral part of socio-psychological and communicative competence and efficient academic mobility. The students answered 28 questions that were aimed to reveal their level of understanding of the multicultural environment, their motivation for intercultural interaction, their personal attitude, their readiness, and their communicative skills necessary for such interaction. We also analyzed objective and subjective difficulties



(obstacles) that prevent cross-cultural communication and efficient interaction. Empirical data was acquired in the sample interview of 86 engineering students 20-21 years old. 43 of them attended the aforementioned FAE course for two semesters (the experimental group) and 43 were only enrolled in the engineering major (the control group). Both groups have similar ethnic and gender structure. The results of the initial survey showed no significant difference between them in the studied parameters. Subsequently, preliminary results show that after one year of study according to the suggested model the students in the experimental group have higher cross-cultural motivation (See Table 3). The difference in personal traits and communicative skills between two groups is slight and has no significant difference.

Table 3 – Self-assessment of development of cross-cultural competence (5-grade scale)

	Cross-cultural communication components development			
	Motivational	Cognitive	Personal	Communicative/behavioral
Experimental group	4,1	3,9	3,6	3,8
Control group	3,5	2,8	3,4	3,2

Therefore, we suggest that the acquired cultural knowledge is not yet interiorized and is still on the surface level of “knowing,” but not “doing”. However, high motivation for cross-cultural competence development and self-development gives hope for further internalization. Although by the end of the second semester there were still no specialized courses aimed at improving motivation, awareness of its importance is increasing. This may be explained by the fact that new cross-cultural information itself, and psychological studies in general, make people more curious and open to the diverse world. We should bear in mind that all of the components of cross-cultural competence are closely interconnected. Excellence in one is conditional on the existence of the others. As pointed out by students from both groups, the most significant difficulties in the process of cross-cultural interaction are a low level of second language proficiency and different behavioral patterns.

The study of the model of cross-cultural development in the system of additional education will be continued, and more results will be discussed in further publications. In the presented research it was shown that being more flexible in curricula and syllabus, in addition to higher professional education, is an effective instrument to develop the cross-cultural competence of students. This competency is expected to increase the academic mobility of future engineers.

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