Modeling the formation of Chinese students' readiness to study at a Russian university using Orange Data Mining

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Abstract. In a study using a systematic approach to describe the learning process, based on intellectual analysis of the opinions of the students themselves using Orange Data Mining and the scientific literature describes the factors and related problems that influence the readiness formation of the Chinese students to study specialties in Russian. Based on the analysis, a model for the readiness formation of Chinese students to study at a Russian university was built. The model can be used as a tool for regulating the process of readiness formation, which affects the success of the learning process, and, ultimately, the quality of professional training of Chinese students.

1 Introduction

An important place among the areas of Russian-Chinese cooperation is occupied by the sphere of science and education. Over the past few years, more than thirty thousand Chinese students have been studying in Russia annually, most of them in the commercial department. For the 2022/23 academic year, the Russian government allocated 940 places for Chinese citizens to study at Russian universities, and for the next academic year, this quota amounted to a thousand places [1]. With the expansion of cooperation, the requirements for the quality and flexibility of educational services at the university become relevant and a scientific analysis of emerging problems is necessary.

Before starting their studies at the university, students pass remote or full-time training at the preparatory faculty. This stage of education is very important. It is associated with the readiness formation, which can be considered as the ability of an individual to overcome a number of adaptive difficulties and acquire and / or not lose motivation, activity and methods of activity and communication for teaching a specialty in Russian. The process and results of training largely depend on the level of readiness.

2 Materials and methods of research

In order to understand the factors and analyze the problems and features that influence the process of readiness formation, the study examined the opinion on the learning process of a

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group of Chinese students studying at the preparatory faculty of a Russian university. They expressed it by answering 50 questions. The survey results were analyzed using Orange Data Mining, intellectual analysis tool. We will present the results of the survey by describing the pedagogical system, the subjects of which are Chinese students. It is known that the pedagogical system includes the subjects of the learning process, the processes of teaching and learning, the educational and pedagogical environment, factors and connections that determine their educational and pedagogical interaction.

3 Students

The survey involved 49 Chinese students from 12 cities and provinces of China (Jinan, Linyi, Qingdao, Shandong, etc.) (Fig. 1), studying at the Preparatory Department of the Technical University. Their age is from 17 to 20 years (Fig. 2).

80% of respondents are men, 20% are women (Fig. 3), there is a gender imbalance. It could be assumed that the imbalance is associated with the specifics of the university. But about half of the girls want to acquire a technical specialty. Therefore, we conclude that girls are less willing to receive higher education abroad. Men have an age of 18 to 20 years, women - from 17 to 19 (Fig. 4). Most students strive to get higher education in Russia immediately after graduation.
53% of respondents speak Russian, 39% - English, 4% - Japanese. Approximately 45,000 Chinese schoolchildren study Russian as a foreign language in more than 250 schools in China. Since the beginning of the seventies, English has taken the position of the most studied foreign language. As Russian-Chinese cooperation grows, Russian is becoming one of the most promising languages in China, as our survey confirms.

The majority of respondents have secondary (69%) and higher (bachelor) (29%) education, 2% have specialized secondary education (Fig. 5, 6). Masters did not study at the preparatory faculty.

Fig. 5. Distribution of students by education
Fig. 6. Distribution of respondents by age and education

4 Students’ goals

Inexpensive education, high-quality education, shortage of Russian specialists, interest in Russian culture [2] are among the main reasons why Chinese students study in Russia.

The main sources of information about the Preparatory Department, where the respondents study, are: school teachers (24%), friends (18%), school (14%), Shandong Transport University (PRC) (14%), acquaintances (6%), Internet (6%), teachers (4%) and the opinion that the chosen university is good (6%) (Fig. 7). It should be noted that in order to come to Russia and enter the university, foreign citizens need to receive an invitation from other students of the university. Many students learned about the preparatory department from the teachers of Shandong Transport University. This university is a strategic partner of the Technical University, which actively attracts Chinese students to receive education within its walls.

Often the main goal of Chinese students studying in our country is to learn the language and culture of Russia, gain knowledge and diplomas. The study of the language and traditions is especially needed for those students who want to get a job in Russia in the future. Students who come for knowledge or a diploma explain their desire to study in Russia by the fact that in China there is a high competition in the university not only for state-funded, but also for paid places [3].

Russia seeks to use the academic mobility of foreign citizens to replenish its workforce with qualified specialists from among foreign students who have been trained in Russian universities. Therefore, foreign students are welcome in our country and quotas are allocated for them. Also, foreign students are considered as an investment of public resources in the potential political loyalty of their countries of origin [3].

For the majority of respondents, the main goal of studying at the preparatory faculty is to study the Russian language (22%), acquire knowledge (16%), obtain a bachelor's degree (12%), obtain education in Russia (10%) and university (8%), obtain knowledge to continue education (10%) in magistracy (8%) and postgraduate studies (6%) (Fig. 8).
It is known that in Soviet times, engineering and technical specialties were the most popular among foreign students, and economic ones were less popular. Currently, Chinese students choose economics, management and humanities [3]. The main specialties in which they are trained include philology, linguistics and literary criticism, economics, electric power and electrical engineering, pedagogy, international relations, heat and power engineering and heat engineering, applied mathematics and computer science, and management [3]. Planned areas of respondents’ training - engineering, economics, biomedical and humanitarian. They are listed in order of demand. Most men and women want to study engineering (78%) and economics (16%). As we have already noted, the university where the respondents study is technical. There are men who want to get humanitarian and biomedical specialties in equal proportions. 2% of respondents did not decide on the direction of studying (Fig. 9, 10).

At the same time, the demand for an economic specialty among bachelors is lower than among students with a secondary education (Fig. 11, 12). Probably many economists have recently been trained.
73% of respondents want to work in the engineering and technical industry, 16% in the economics, 6% in the humanitarian and 4% in biomedical (Fig. 13). Respondents with secondary specialized education would like to work in the humanitarian sector. According to the answers, most of the students plan to work in their specialty. Thus, foreign citizens immediately choose programs of the preparatory stage of education that correspond to their future profession, which is not without meaning, since the corresponding program eliminates gaps in knowledge in the necessary disciplines and allows you to successfully pass the entrance exams.

59% of respondents plan to work in China after receiving their education, 24% - in Russia, 16% have not yet decided on this issue (Fig. 14). More often than students from other countries, Chinese students indicate getting a job as the main goal of studying in Russia [3].

5 Teaching

The goal of preparatory faculty teachers is to teach students the Russian language, the basic disciplines that are needed for admission to the main faculty of the university, and to form a readiness to study in the system of a Russian university.
One of the main problems of education is related to the students' poor knowledge of the Russian language, its complexity, and the need to study the disciplines of the curriculum in Russian.

More than half of the respondents noted that they speak Russian. At the same time, 57% of respondents name the language, the language barrier as the main difficulty of the learning process. Indeed, there are objective difficulties for Chinese students with the study of the Russian language. First of all, this is due to the difference between the Russian and Chinese languages: Russian writing belongs to the phonetic type, and Chinese - to the ideographic type. In addition, there is low motivation in learning the Russian language due to the presence in Russia of a large and well-organized Chinese diaspora. It allows to satisfy the needs of students in social communication through communication with compatriots and makes it possible for them to know the Russian language in an amount that is sufficient for contacts with administrative bodies [2]. This leads to the inability of Chinese students to decipher the cultural information encoded in non-verbal communication signals, to their psychological incompatibility with the bearers of culture and the inability to understand and accept their values [4]. Which, in turn, determines the slow integration of Chinese students into Russian society [4]. At the same time, according to studies, knowledge of the Russian language is assessed as “good” by 9%, “can be understood” by 66%, “poorly spoken and understood” by only 7%, “know the language at the level of the cultural code” by 25% of Chinese students after studying in Russian universities [4]. Therefore, the most important task of readiness formation is the study of the Russian language (Fig. 15).

Some teachers note that Chinese students have such positive qualities as efficiency [2], diligence, endurance, perseverance [5]. But the lack of discipline and poor knowledge of the Russian language, even after a long period of study, hinders their success [2]. For example, teaching is negatively affected by absenteeism and failure to complete homework. When asked what prevents them from systematically attending classes, the students answered: 73% - nothing; 10% - problems of networks and software (probably with distance learning); 12% - health problems; 4% - indiscipline (Fig. 16). It is necessary to use the high level of performance of Chinese students, increasing their motivation and activity. Also, teachers need, taking into account the interest of these students in art and creativity, the problems of the meaning of life and intellectual issues, to be interesting for them and prepared for communication [2].

In general, Chinese students studying at the Preparatory Faculty demonstrate a high level of knowledge in the disciplines they study. But the organization of work with them requires some preparation and elaboration of the material, maintaining interest in learning in the form of selecting tasks of high complexity, focusing on language practice in the discipline.
When teaching Chinese students, there may be methodological difficulties associated with the difficulties of perceiving abstract principles and building logical connections. It is necessary to skillfully introduce generalized rules and models into the educational content, bearing in mind the high objectivity of Chinese students’ way of thinking [5].

Respondents noted that in all disciplines they receive new knowledge, teachers suggest their help if there are problems with completing assignments.

Some researchers note that there are problems for Chinese students in communicating with Russian students, which hinders their integration into the student community [2, 4, 6]. As we see from the survey, the majority of respondents are satisfied with educational communication and communication with other foreign students (Fig. 17, 18). But according to available research, every fifth student from China pointed to the lack of special programs for the interaction of Russian and Chinese students that would facilitate the process of adaptation, and another 17% of the respondents would like more active student associations in the field of socio-cultural interaction between Russian and Chinese students [4].

According to the results of the survey, all respondents are satisfied with the format of training, the content of disciplines (Fig. 19) and the quality of teaching (Fig. 20). It can be assumed that the curricula are designed in accordance with the level of knowledge and needs of foreign students. Perhaps the Chinese students are really satisfied with their studies, or maybe they don’t want or afraid to express their honest opinion. Students from China try to avoid troubles, conflicts and problems when interacting [2]. It is possible that many problems are not reflected in the answers due to some closeness of the respondents.
Despite the positive feedback about the learning process, there is a number of objective problems that respondents pointed out in their answers to the question "What will improve learning?".

6 Learning process

The learning process for foreign students, especially if they are not studying remotely, is very difficult, as it is influenced by many factors.

In our case, it turned out that 56% of respondents with secondary education find it easy to study, and 41% find it difficult. 29% of respondents with higher education do not find it difficult to study, while 57% find it difficult (Fig. 21). More than half of students with secondary education noted that it is not difficult for them to study. On the contrary, among students with higher education there are 2 times more students who find it difficult to study at the preparatory faculty. This result can be explained by a small sample, on the one hand. On the other hand, we can assume that school graduates have become more prepared and they cope with their studies more easily. Especially if you consider that these are graduates of the past and present years.

Note that in Chinese schools and universities, training takes place in large groups - from forty to one hundred people. Such educational communication does not imply feedback from the student, the emphasis is on the lecture form of presenting the material, its mechanical memorization without joint discussion and analysis, in contrast to studying in Russia. Therefore, the format of education at a Russian university may cause difficulties for Chinese students [6] and the need to restructure.

Also, Chinese universities have a two-hour lunch break in the middle of the day, and most students use it for afternoon naps. In a Russian university, such a break between classes is not provided, sometimes there are four classes a day with short breaks, which is physically difficult for students [6]. On the other hand, Chinese students have to be at school in their country from morning until late at night [7].

In Russian universities, students are given independence, which implies internal motivation and responsibility [6]. But Chinese students are at a loss when faced with a democratic style of pedagogical communication; it is easier for them to obey authoritarian teaching methods [2].

35% of respondents did not encounter any difficulties in the learning process. It should be noted that more than 16% of respondents studied remotely. For 57% of respondents, the main difficulty is language, the language barrier. The rest complained about their own
laziness and lack of time for rest (Fig. 22). Overcoming the language barrier in distance learning is especially difficult, since after the end of classes, students are immersed in their familiar language environment.

Fig. 21. Mosaic graph (age - education) "Is it difficult to study?"

Fig. 22. Tag cloud “What difficulties did you encounter during the training?”

For foreigners studying abroad, living conditions are especially important, which affect the learning process. 73% of respondents are satisfied with the hostel they live in, 8% have not decided on the assessment, 16% do not live in the hostel, 2% noted that sometimes electricity is turned off in the hostel. Students who study remotely at the preparatory department could indicate that they are satisfied with the quality of living in the hostel of Shandong University.

41% of respondents note that there is no need to improve anything in the hostel, because everything is fine. 22% propose to improve living conditions (including better soundproofing and equipment), and 4% - to reduce the cost of living; 10% - recommend keeping order, and 4% - silence.

It can be concluded that the respondents do not have any special difficulties associated with living (Fig. 23, 24). There is an opinion that students from China are less whimsical, easier to adapt to a different environment [8], and our survey confirms this opinion.

Fig. 23. Tag cloud “Does the hostel satisfy you?”

Fig. 24. Tag cloud “What can improve living?”

From the point of view of the students’ emotional and psychological state, communication with the city is of great importance. 92% of respondents like the city (Fig. 25) where the university is located. In general, the respondents have enough time to get acquainted with the sights of the city (Fig. 26).
7 How to improve readiness formation

The answer to the question of what factors are more significant for successful adaptation and formation of readiness, we will get from the respondents.

23% of respondents believe that nothing needs to be improved in terms of training. 8% did not decide on an answer. The rest made the following recommendations: work in class (14%), make an effort (14%), teach the language slowly (10%), pay attention to teaching literature (8%), organize effective educational communication (6%), work conscientiously (4 %), attend classes, take notes, introduce scholarships for students, get used to it, ask questions to the teacher (Fig. 27). Also, some students ask to reduce the amount of material studied in the classroom, to help them with the phonetics of new words.

It can be noted that the language barrier for Chinese students is a serious obstacle in the formation of readiness to study at a Russian university. It is associated with problems expressed in a lack of communication, in the difficulty of understanding and accepting the values of our society, in establishing interaction with other students, in the difficulty of mastering educational information in Russian [4]. On the other hand, Chinese students do not seek to quickly integrate into Russian society, they are closed and localized in their environment [4]. Therefore, especially at the first stages of education, successful adaptation requires technologies for optimizing the socio-cultural interaction of Chinese students in a Russian university, involving them in the active life of the university and society. Such technologies can be associated with educational work, with the work of student associations, and special programs for the interaction of Russian and Chinese students. At the same time, it should be taken into account that Chinese students do not show particular initiative in such communication, they need an invitation and motivation from outside [6].
73% of Chinese students of the preparatory faculty would like to continue their studies at the university, 4% do not want to continue their studies, and 18% have not made a decision.

After studying 39% of respondents would like to stay in Russia, 37% would not want to stay in Russia, and 24% did not decide on an answer.

8 Model of readiness formation of Chinese students to study at a Russian university

On the basis of the analysis carried out, it is possible to propose a model for the readiness formation of Chinese students to study at a Russian university.
The model reflects only part of the process of adaptation and formation of readiness, which is directly related to Chinese students as subjects of the pedagogical system of the preparatory faculty. This process is complex, included in the pedagogical system of the university, and requires great effort from all its participants. Adaptation agents, people, groups, bodies, organizations are of great importance because they help to get used to the new community, provide the necessary support and information, and help establish social contacts [9]. The information and educational environment of the university is also important.

9 Findings

Teaching Chinese students at the preparatory faculty is an important and difficult stage during which the readiness to study a specialty in Russian is formed. We consider readiness as the ability of an individual to overcome a number of adaptive difficulties and acquire and/or not lose motivation, activity and ways of activity and communication in order to achieve the set goals. The formation of readiness is influenced by psychological, social, pedagogical, temporal factors, national characteristics and regulation of the pedagogical system. The main task of the preparatory stage is to eliminate the language barrier that leads to a lack of communication, difficulties in understanding and accepting the values of our society, establishing interaction with other students, and difficulties in mastering educational information in Russian. To solve it, even before the start of the adaptation stage, Chinese students need to have information about Russian-Chinese cooperation organizations and special programs for interaction between Russian and Chinese students, and take the initiative to interact with them. Chinese students need to focus their activity on strengthening motivation, mastering new forms of learning activities, developing self-organization and logical methods of cognition, developing communication methods and actively participating in extracurricular activities of the faculty and the university.
10 Conclusion

Study using a systematic approach to describe the learning process and based on intellectual analysis using Orange Data Mining the opinions of the students themselves and the scientific literature describes the factors and related problems that influence the readiness formation of Chinese students to study specialties in Russian. Based on the analysis, a model for the readiness formation of Chinese students to study at a Russian university was compiled, which has practical significance for the organization of education. The model can be used as a tool for regulating the process of readiness formation, which affects the success of the learning process, and, ultimately, the quality of professional training of Chinese students. The tool has practical significance, as we observe a significant number of students who want to continue their studies at the university and stay after their studies in Russia.

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