

Formation of Cultural Fluency among Foreign Students, Future Chemistry Teachers

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Abstract. This article is devoted to the issue of the formation of cultural fluency of foreign students, future chemistry teachers. The levels of formation of the cultural fluency components are specified, recommendations how to use design technologies in the formation of cultural fluency of future chemistry teachers are presented.

1 Introduction

Today, one of the urgent tasks in the educational system of the Russian Federation is the recruitment and training of foreign students. According to the document "List of the Effectiveness Evaluation of Federal State Educational Institutions of Higher Professional Education and Their Branches" developed and adopted by the Ministry of Education and Science of the Russian Federation, one of the key indicators of the higher educational institutions effectiveness is the percentage of the number of foreign students from CIS countries [1]. Therefore, the issue on the admission of foreign students becomes relevant for domestic higher educational institutions every year that, according to the above document, raises the status and effectiveness of the higher educational institution.

Moscow and St. Petersburg definitely take leading positions in the recruitment and training of foreign students. However, it is worth noting the success of Kazan (Volga Region) Federal University in this issue, which currently trains foreign students from neighboring countries: Turkmenistan, Tajikistan, Uzbekistan, Kyrgyzstan and Kazakhstan, etc. Foreign students study mainly in the bachelor's and master's degree programs on a full-time basis.

The structural division of Kazan Federal University, Chemical Institute named after A.M. Butlerov, has also been developing international relations with neighboring countries in recent years to attract foreign students to study in the Chemistry, Chemical Education bachelor's degree programs and the Chemistry and Methods of Its Teaching master's degree programs [2].

Thus, due to the increase in the number of foreign students, an issue arises about their motivation to study, to possibility of successful development of the program, the most comfortable adaptation in a new environment, the socialization in society, etc [3]. To do this, in our opinion, it is necessary to develop new approaches to teaching, taking into account the peculiarities of the culture of foreign students, language proficiency and skills of mastering the program [4].

The time of studying at a higher educational institution is a time of deep formation and development of one's own world-view, certain views on the world and deepening of students' own value orientations, which in the age period coincides with the period of student life [5]. A dynamic assimilation of social norms of behavior, ways of rational interaction, including in intercultural relations occurs at that time.

Multiculturalism is one of the most important characteristics of Russian education. According to V. I. Bondarenko et al., the multicultural space of an educational institution is an objectively existing system of intercultural, social and educational relationships that contributes to the interiorization of national culture, the formation of universal human values through multicultural education; it is a social and educational category distinguished by structural and functional features [6].

The most significant contribution to the issue of the formation of cultural fluency was made by I. A. Zimnyaya, V. V. Vorobyov, T. G. Grushevitskaya, G. V. Yelizarov, L. I. Grishayeva and L. V. Tsurikova, S. K. Miloslavskaya. The issue of the formation of intercultural communicative competence, taking into account its educational impact on the student, is reflected in the research by N. D. Galskova, Yu. N. Karaulov, V. V. Safonova, P. V. Sysoyev, S. G. Terminasova, I. I. Haleyeva, T. K. Tsvetkova.

In view of the foregoing, the aim of our study is to form cultural fluency in teaching foreign students, future chemistry teachers [7]. The objectives of the study are to identify the level of formation of intercultural communication components, to recommend how to use design technologies in the formation of cultural fluency of future chemistry teachers within the course History and Development of Chemistry.

2 Materials and Methods

The experimental part of our work on the study of the formation of cultural fluency of future chemistry teachers was carried out in several stages in the premises of the Kazan (Volga Region) Federal University federal state budgetary educational institution of higher education. The participants of the empirical study were foreign students majoring in Pedagogical Education within Chemistry area of expertise, and first-year undergraduates of the Chemical Institute named after A.M. Butlerov majoring in Chemistry within Chemistry and Methods of Its Teaching area of expertise. The main objectives of the experiment were: 1) experimental verification of the level of formation of the cultural fluency of future chemistry teachers; 2) to show how to use design technologies in teaching in order to form the cultural fluency of students, future chemistry teachers.

The key goal of our experiment was to obtain research insights of the research issues, namely, to identify the level of formation of cultural fluency among foreign students, future chemistry teachers. Based on the three main components of cultural fluency.

Table 1. Competence assessment criteria

Component	Criteria
Axiological	respect for another culture and realizing it as a value
Cognitive	possession of knowledge and its critical comprehension
Communicative	effective practical application of knowledge and skills during intercultural communication

Table 2. Diagnostic methods

Components of cultural fluency studied	Diagnostic methods
Axiological	Business Orientation Questionnaire (V. Taranenko), the cultural and value orientations test (test by L. G. Pochebut), Value Orientations Methodology by M.

	Rokich, Ultimate Meanings Methodology (A.A. Leontiev)
Cognitive	Competence in Cultural Fluency Methodology (A.V. Matveev), Communicative Social Competence Diagnostics (N. P. Fetiskin, V. V. Kozlov, G. M. Manuilov).
Communicative	Are You Sociable? Questionnaire (I.G. Leonova), a methodology for assessing communicative and organizational inclinations (V.V. Sinyavsky and B.A. Fedorishin).

In our work, we have established the following levels of formation of the three components of cultural fluency we have chosen:

A low level implies that a foreign student uses materials on intercultural interaction prepared for educational purposes, has an idea of the system of cultural values of other peoples, but cannot use it in intercultural communication, does not have clearly formed stable motives that are directed towards the formation of cultural fluency using design technologies.

A middle level indicates that a foreign student has the skill of acquiring knowledge about cultures and intercultural interaction of their own and other countries, intercultural interaction, but at the same time he may experience difficulties in developing cultural fluency when using design technologies.

A high level of formation is determined by the student's full possession of materials, information about the cultural characteristics of other countries, freely uses them in intercultural interaction, accepts the cultural values of a representative of another culture, resistant to the development of cultural fluency with using design technology.

The first stage of the work was a ascertaining stage of the experiment, during which the levels of formation of intercultural communication components among foreign students, future chemistry teachers were identified.

The second stage of experimental work was a formative experiment with the use of design technology within the History and Development of Chemistry course.

One of the main criteria for choosing a discipline for the formation of cultural fluency was the competence formed during the study of this discipline, the YK-5 "Able to perceive the intercultural diversity of society in social and historical, ethical and philosophical contexts."

The purpose of the History and Development of Chemistry course is, above all, to organize the idea of science and chemical science in particular, as a logically unified, continuously and naturally improving system of scientific knowledge about the material world, which has been formed over several centuries by a large number of scientists.

Students learn historical information about the origin and development of the world chemical science. The main emphasis is on the students' mastering of knowledges about the development of chemistry in Russia, historical information about the foundation of Kazan University and one of its oldest departments, the Faculty of Chemistry (now the Chemical Institute named after A.M. Butlerov). The course covers in detail the topics about the history of discoveries, the activities of Kazan chemists and the teaching of chemical science at Kazan University, since it is the first laboratory of Kazan University that is called the cradle of Russian organic chemistry. The staff and professors of the Department of Chemistry, later the Faculty of Chemistry were such outstanding scientists as K. Klaus, N.N. Zinin, A.M. Butlerov, V. V. Markovnikov, A.M. Zaitsev, A.E. Arbuzov, B.A. Arbuzov, A.I. Kononov and others. The History and Development of Chemistry discipline is included in the section Б1.О.03 Disciplines (Modules) of the main professional educational program 04.04.01 Chemistry (Chemistry and Methods of Its Teaching) and refers to compulsory disciplines. It is mastered in the 1st semester of the 1st year. During the History and Development of Chemistry course, at the beginning of the semester, an

assignment is issued for the implementation of a project, which implies work during the semester and subsequent defense in the test.

At the final stage, after the end of the course a repeated diagnostics was carried out for foreign students using the design technology, and the results of the students showed that the level of formation of the cultural fluency components increased.

3 Results and Discussion

At the first stage, when diagnosing the level of the axiological component, we conducted a test of cultural and value orientations by L. G. Pochebut; the Value Orientations method by M. Rokich was applied. According to the results obtained, 46.2% have a low level of realizing the system of cultural values of participants from another country.

I.G. Leonov's Are You Sociable? questionnaire, V.V. Sinyavski and B.A. Fedorishin's methodology for assessing communicative and organizational inclinations was used to study the level of the communicative component. The communicative component level diagnostics allowed us to determine that 46.7% of respondents have a low level, 30.2% have a middle level and 23.1% have a high level.

The level of the cognitive component of the cultural fluency of foreign students was specified using the following methods "Competence during Intercultural Communication" (A.V. Matveev), Communicative Social Competence Diagnostics (N. P. Fetiskin, V.V. Kozlov, G.Manuilov) [8]. They showed that in the group researched, 24.2% of students had a high level of cognitive development, i.e. the cultural fluency component was determined, 30.5% of participants had a middle level, and 45.3% had a low level.

Thus, according to the results obtained, while diagnosing the formation of cultural fluencies, we discovered that foreign students have a low level, namely:

- there is no clear idea and understanding of the importance of intercultural interaction, as well as the value and importance of knowing the peculiarities of the culture of one's own country and the culture of foreign countries;
- students are not ready enough to show empathy for peoples with a different culture;
- obvious lack of motivation to study the culture of other peoples and countries;
- they have no strong skills of critical reflection and self-knowledge; they do not fully demonstrate a high level of knowledge of a foreign language culture; they do not express flexibility in interpreting and applying knowledge about a language and another culture;
- they are not ready for effective intercultural communication.

The results of the experiment showed us that the level of formation of the cultural fluency components among foreign students is quite low, and we should increase it in order for foreign students to comfortably enter the educational space of universities of the Russian Federation.

Table 3. The results of the assessment of the cultural fluency formation level (the ascertaining stage and the forming stage of the experiment)

Components of cultural fluency	Ascertaining stage			Forming stage		
	Low level	Middle level	High level	Low level	Middle level	High level
Axiological	46.2%	29.5%	24.3%	34.6%	35.7%	29.7%
Cognitive	45.3%	30.5%	24.2%	35.4%	37.5%	27.1%
Communicative	46.7%	30.2%	23.1%	33.9%	38.1%	28%

The second forming stage of the experimental part of the study included the integration of the application of design technologies into the educational process in order to form the

cultural fluency of foreign students. We hypothesized that the formation of the cultural fluency of foreign students can be more effective when using a design technology.

Within the History and Development of Chemistry discipline, from the beginning of the semester, an assignment is issued to develop a project that implies performing the work during the entire period of the course, i.e. one semester, and subsequent public defense in the test.

The work on the project is carried out in pairs. The theme of the project is as follows: "Integration of historical knowledge in the field of chemistry into the educational process". The section is selected based on one's own ideas about the need to solve a particular problem within the topics they study during the History and Development of Chemistry course. While implementing this method, the requirement to use the maximum amount of the course content comes to the fore.

In this article, we will consider, as an example, a master's educational project developed by future chemistry teachers, during which foreign students consolidated their theoretical knowledge, as well as developed intercultural communication skills, deepened historical knowledge about the world chemical science, the Russian and regional ones, and developed their cultural fluency.

The main stages of the development and implementation of the project were as follows: it was necessary to choose one of the chemical discoveries of any country, patterns, and so on, which can be implemented when studying certain topics in chemistry by students at school; argumentation of their assumptions and determination of the proposed implementation options; discussion about the hypotheses put forward; designing the results of future work, they should be presented in the form of a lesson or an extracurricular activity; defense of final projects.

At the final stage, a repeated diagnostic was carried out and the results of the students showed that the level of formation of the cultural fluency components increased at the end of the course. The results can be seen in Table 3.

4 Conclusion

Based on our research, we can draw the following conclusions:

1. Cultural fluency is a part of the professional competence of a future chemistry teacher. It reflects the degree of readiness of a student, including a foreign one, for professional pedagogical activity, and is considered as the ability to apply the acquired knowledge, skills, and capabilities for successful pedagogical activity, in order to achieve effective communication with future colleagues and students of other cultures based on the principles of mutual respect and understanding of each other.

2. Such criteria for the formation of the cultural fluency of future chemistry teachers as respect for another culture and understanding it as a value, the ability to effective intercultural communication, knowledge and its critical comprehension are defined.

3. The application of design technology within the framework of the History and Development of Chemistry discipline contributes to the formation of all components of the cultural fluency.

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