The Use of Problem-Based Technologies in Multicultural Education of Future Teachers

Valerian F. Gabdulchakov[a], Elvira G. Galimova[a], Olga V. Yashina[a]

[a]Kazan (Volga region) Federal University, Kazan, RUSSIA

ABSTRACT

The relevance of the problem under study is determined by the necessity to intensify practical effect of multicultural education when future teachers education on the one hand and the absence of algorithms of effective use of pedagogical technologies at universities on the other hand. In this respect the aim of the research presented in the article is to define the appropriate algorithm of using pedagogical technologies in multicultural education. The leading method in the problem research is project method which allows grouping the system of active methods and identify the best algorithm (curriculum) for using problem-based technologies. As as a result of examining different combinations (algorithms) of using these technologies we established that optimality (effectiveness) of multicultural education at university can be achieved at the teaching level by progressing from communicative technology to critical thinking technology, then to case-study technology, module learning, project technology, problem-based learning and moderation technology with an expert problem seminar at the end; at the level of study - by progressing from understanding the problem, determining the ways for solving the problem, selecting arguments before discussing the ways of problem solving and summing up at expert problem seminar. The article materials can be useful for pedagogical university teachers.

Introduction

Urgency of the problem

In the context of carrying-out a strategic academic unit destined to raise effectiveness of higher education (including multicultural education of future teachers) we refer to StrAU's recommendations (StrAU's, 2015). Strategic academic unit are understood to mean individual structural subdivisions

CORRESPONDENCE   Valerian F. Gabdulchakov   ✉ Pr_Gabdulhakov@mail.ru

(schools, departments, institutes, centers of excellence, RECs and others) or their associations ("consortiums") which are characterized by: effective administration system focused on solving practice-oriented educational and scientific and technological problems. But more often these units are understood only as the structures oriented on solving practical-oriented tasks. The structure itself can neither manage nor solve, if it doesn't have functional content. This content can provide technological filling of the structure that is filling this structure with definite functional technologies. Now the technologies activating cognitive, developing and creative processes include the technologies connected with problem definition, problem situation analysis, effective ways of solving practical (including pedagogical) problems (Venguer, 1973; Davydov, 1986; Lloyd-Jones, Margetson & Bligh, 1998; Spencer & Spencer, 1993; Teodorescu, 2006; Terenzini & Reason, 2010; The Engineer of 2020, 2004 and others).

Materials and Methods

The research methodology is activity. It is based on L.S. Vygotsky 's (1997) cultural and historical concept, V.V. Davydov's (1986) activity approach, L.A. Venguer's (1973) creative abilities development, problem-based developmental education by A.M. Matyushkin (1980), M.I. Makhmutov (1975), study of effective forms of education by scholars abroad G. Lloyd-Jones, D. Margetson & J.G. Bligh (1998). T.A. Mc.Gregor, L.M. Spencer, & S.M. Spencer (1993), T. Teodorescu (2006) and others.

Methods of the research: monitoring, questioning, testing, education content projecting, creative work - essays, reports, discussions (seminars, conferences), mathematical data processing.

Results

Hypothesis

We have formulated the hypothesis: professional specialized competences of future masters develop successfully if best configuration of active technologies are used in multicultural education.

Questioning

In the course of questioning students and professors of Kazan federal university in 2014-2016 (124 professors) we defined a group of technologies, which had the highest rating. The task was to take a look at a list of technologies used by teachers and select the ones that were the most effective and practical-oriented. These technologies were communicative technology; case-study technology as a method of case analysis; critical thinking development; module teaching; project technology; problem-based learning technology; moderation technology; expert problem seminar technology.

Experimental techniques

We illustrate the influence of these technologies on effectiveness of teaching the master students in the course of "Theory and practice of multicultural education".

We should note that sequence and combination of these technologies were changed if there was no steady progress in the acquired professional-specialized competences.

Professional-specialized competences (according to the developed by Gabdulchakov V.F.,2015 master program) include the following abilities:

- to demonstrate good understanding of universalism and national-cultural specific features of linguistic world image;

- to use theoretical and practical knowledge on reflection of sphere of concepts of ethnic awareness in linguistic world-image;

- to use theoretical and practical knowledge in cross-cultural communication for development and using original ideas in project activities;

- to have communicative abilities and be able to use them when solving the problems of cross-cultural communication;

- to demonstrate deep understanding of universalism and national-cultural specific features of linguistic world image;

- to demonstrate tolerance and be able to find solution of nonstandard situations under the conditions of multicultural and multi-ethnic environment;

- to know linguo-didactic essentials of Russian (and second official - Tatar) language, both native and non-native in multi-ethnic and multicultural environment;

- to use the knowledge in comparative study of cultures when in interpreting literary texts;

- to interpret specifics of communicative behavior of different nations representatives on the basis of cross-cultural research;

- to examine the conditions of cross-cultural communication problems and demonstrate critical assessment of the knowledge in this area;

- to use the acquired knowledge in the context of multi-ethnic education.

The competencies were formed in the course of studying the following modules: "Modern linguistic world-image", "Specifics of ethnic awareness of people in Russia and across the world", "Cross-cultural communication in project activities", "The challenges of cross-cultural interaction", "Nonstandard situations in the context of multicultural and multi-ethnic environment", "Russian, Tartar and foreign languages at home and in teacher's professional activity", "The point of literary texts in the context of modern cross-cultural studies", "The status of modern cross-cultural communication in Russia", "A teacher in modern multi-ethnic education space".

The competences development was estimated in three levels: 1) I know (have an idea); 2) I understand (conscious); 3) I act (use in practice).

The competences were diagnosed by professors when checking essays. The students were to write a short essay after completing a module. After checking and mathematical data processing (in three levels) the average results on all competences were entered into a table. In this way 5 students' groups were checked, total number of students was 127. Each of them wrote 10 essays during the course and the examiners recorded what the students know, understand and what they can use in their teacher's work.

The topics for the essays were: 1) Me and modern linguistic world-image; 2) My ethnic awareness; 3) My cross-cultural communication in project activities; 4) The way I solve the problems of cross-cultural interaction; 5) Me in modern linguistic world-image; 6) How I solve nonstandard situations in multicultural and multi-ethnic environment; 7) How I use Russian, Tatar (or foreign) languages at home and at work; 8) How I understand the point of literary texts in modern cross-cultural studies; 9) My critical assessment of modern condition of cross-cultural communication in Russia; 10) What knowledge and competences must a teacher have in modern multi-ethnic educational environment.

Traditional psychology describes personality core. Few people know what communicative core is. Communicative core of academic interaction (Valerian Gabdulchakov, 2014, 2016) is defined as a speech situation that bears several features: 1) interaction is presented in the form of a monologue and dialogue; 2) the content of monologue and dialogue has a contradiction, problem; 3) interaction is of argumentative or polemical character; 4) communicative core develops according to the scheme: motivation of interaction – introduction to speech act – evolvement of speech act – climax of the act (interaction) – resolution – consequence (conclusion, moral); 5) the core neutralizes speech control effect and makes interaction free and easy.

In our experiment communicative core determined the sequence of technological interaction with students. This sequence was also confirmed by the questionnaire survey results. Students and university teachers were questioned on the technologies efficiency. The experiment algorithm included the following sequence: 1) technology of communicative core; 2) technology of critical thinking development; 3) case-study technology as a method of situation analysis; 4) technology of module learning; 5) project technology; 6) technology of problem-based learning; 7) moderation technology; 8) technology of expert problem seminar.

Changes in this algorithm negated the effectiveness of the whole curriculum. We tried 12 possible combinations in different students' groups. But this combination proved to be the most effective.

The technology of communicative core

We record the success of communicative core fulfillment when another result of speech act marked with information load falls into the "memory trap" of an interlocutor (student) and becomes his/her personal possession i.e. makes a significant effect upon education results.

If educational activity is regarded in accordance with general scheme "motive – analysis – synthesis – interiorisation", the latter phrase "interiorisation" (translation of internal activities into external ones or speaking and speech control) seems to be quite problematic.

The truth is that traditional higher education practice fail to consider speech control mechanism although almost 80% of students´ mistakes can be classified not as traditional (actual or speech) mistakes but mistakes of speech control (mistakes caused by the fear to be mistaken).

The paradox is that a teacher is a guardian of speech control who is unaware of the fact that by correcting student´s speech he/she involuntarily contributes to rolling-up of productive thinking and intellectual activity

mechanisms. Here it is worth to mention the thesis that a student is a person and he/she has a right to be mistaken: he that never climbed never fell.

That is why the point of communicative core (central communicative situation of a lecture, seminar, colloquium or workshop) is in maximal neutralization of speech control effect. Experiments show that correct realization of communicative core (when an educatee cannot but speak, when nobody interferes with his speech, no one corrects and stops him) gives a powerful boost for intellect, cognition and speech development as well as for establishment of moral and other personal features.

In the communicative core situation, a student can certainly make a mistake and give the wrong answer. A competent teacher should let him/her speak out. Other students should also express their opinion (including the right and wrong answers). Mistakes can be corrected in another situation, for instance answers' expert check situation. In this case students take correction in a positive way which makes a positive effect upon education results.

Questionnaire survey of correspondence-course students at Kazan federal university (those who study and also work at school) has revealed that the majority of students (90%) realize the importance of communicative core for the purpose of gaining higher education results, although only 32% of them try to apply it intuitively in practical work.

88% of students think that classroom use of communicative score requires profound preparation for the class and only 12% of them believe that communicative core is a natural attribute of classes.

Accordingly, creative self-development as a person's type of activity of subject-subject nature aimed at positive changes in personality and cognitive features must be taken on the basis of well-thought-out communicative core: the core activates self-actualization, self-determination, self-management, self-improvement and creative self-fulfillment.

On examination of the level of maturity of multicultural competences in the context of communicative core (before and after) we got the following (see Table 1).

Table 1. The maturity of multicultural competences in the context of communicative core

Average values of multicultural competences maturity	Before the experiment	After the experiment
I know	8%	23%
I understand	7%	33%
I act	8%	19%
I know nothing	43%	15%
Don't know/No answer	34%	10%

The following (according to the efficiency of multicultural competences training and to the rating made by students and teachers) technology is the technology of critical thinking development.

Technology of critical thinking development

The technology was worked out by International reading association at Iowa State University and Hobart and William Smith colleges. The authors of

the program are Charles Temple, Jeanne Steele and K. Meredith. This technology is a system of strategies and methodic methods. It helps to develop ability to express the thoughts (oral and written) clearly, confidently and correctly to others; ability to make own viewpoint based on understanding different experience, ideas and notions; ability to solve the problems; ability to self-study (academic mobility); ability to cooperate and work in a team; ability to establish relationship with other people.

Evocation. If we let a student analyze what he/she knows on the topic, it will stimulate his/her own motives. This task is solved at the stage of evocation.

In the course of realization of the evocation stage students can express their own viewpoint of the topic and they can do it free, without being afraid to make mistakes and to be corrected by a teacher. It is important to record all the statements, each of them will be necessary for further work. There are no right or wrong answers on this stage.

Realization of meaning stage. On this stage students try to put together this information with the knowledge and experience they have; they prepare to analyze and discuss.

Reflection stage. The new information becomes student's personal possession, his/her own knowledge. Reflection on the third stage is the main purpose of student's and teacher's work.

The results of multicultural education on the stage of critical thinking fostering are the following (see Table 2):

Table 2. Maturity of multicultural competences in the context of critical thinking development

Average values of multicultural competences maturity	After the experiment
I know	25%
I understand	37%
I act	29%
I know nothing	5%
Don't know/No answer	4%

As we can see "I know" index increased by 2 % (23% to 25%), "I understand" index increased by 4% (33% to 37%), "I act" index increased by 10% (20% to 29%).

"I know nothing" and "Don't know" indexes decreased essentially (by 10% and 6% respectively).

Case-study technology

On the following stage we applied case-study technology.

This is a technology of active problem-situation analysis based on learning through solving particular situations (cases). The distinctive feature of case - study method is creating a problem situation from real life. The two following conditions are essential to make the case-study academic activity effective: an appropriate case and a special technique of its application in academic activity. In our experiment this method was used to develop knowledge in different

aspects of multicultural education where truth is pluralistic, i.e. there is no unambiguous answer to a question, but there are several answers which can differ in their truth degree; teaching task is then differs from the classical one and aims at getting not one but many truths and their order in problems field, i.e. we don't aim at getting ready knowledge but its creating, co-creation. The point of the class is the following: A model of an exact real-life case is worked out right in the lesson and the complex of the knowledge to get is formulated; the teacher is the leader in this case, who generates the questions, records the answers, encourage discussion, i.e. the teacher is the operator of creative process.

The results of multicultural education on the stage of case-study application are the following (see Table 3):

Table 3. Maturity of multicultural competences in the context of case-study

Average values of multicultural competences maturity	After the experiment
I know	23%
I understand	39%
I act	38%
I know nothing	0%
Don't know/No answer	0%

As we can see "I know nothing" and "Don't know" indexes nullified. "I understand" and "I act" indexes increased significantly.

Module learning technology

The aim is to create (after critical thinking been fostered) selection condition for complete mastering the content of main sections of multicultural education in different sequence, extent and temp through separate and independent modules with due consideration of individual interests and abilities. An academic module is a unit having relative independence and entirety on the level of academic program and defining logic of the process of its mastering structure.

For the successful realization of this technology it is necessary to provide variability of the content, choice of conditions and work speed, variability of modes of interaction for the participants of the academic activity, create conditions for independent decision making about the levels and ways of mastering the academic modules.

The results of multicultural education after applying module learning technology are the following (see Table 4):

Table 4. Maturity of multicultural competences in the context of module learning

Average values of multicultural competences maturity	After the experiment
I know	15%
I understand	43%
I act	42%
I know nothing	0%
Don't know/No answer	0%

As we can see "I understand" and "I act" indexes increased.

Project technology

We used the following stages of students' project activity: organizational-preparatory stage - problematization, project task choosing and development; project development (planning); technological stage (the way of carrying out the research); final stage (execution of the results in a form of an essay, article, presentation, report).

The results of multicultural education after applying project technology are the following (see Table 5):

Table 5. Maturity of multicultural competences in the context of project learning

Average values of multicultural competences maturity	After the experiment
I know	11%
I understand	47%
I act	42%
I know nothing	0%
Don't know/No answer	0%

As we can see "I understand" index increased but "I act" index didn't change.

Technology of problem-based learning

The technology supposes organizing educational process in the way that a student is regularly involved by a teacher in finding solution of new problems. The process of problem-based learning is a system of related and complicated problem situations. That is why classes included the stages of creating problem situations, teaching the students in the process of solving the problem, combining searching work and digestion of knowledge in ready state.

The algorithm of solving the problem task included four stages: 1) realizing the problem, students reveal the contradiction in the question; 2) hypothesis formulation; 3) hypothesis proving; 4) conclusion formulation, when the studied cause-effect relations were deepening and new aspects of the studied object or event were revealed.

The results of multicultural education after applying problem-based learning technology are the following (see Table 6):

Table 6. Maturity of multicultural competences in the context of problem-based learning

Average values of multicultural competences maturity	After the experiment
I know	8%
I understand	37%
I act	55%
I know nothing	0%
Don't know/No answer	0%

As we can see "I act" index increased significantly (55%), other indexes decreased.

Moderation technology

Moderate comes from Latin and means "bring to equilibrium, manage, regulate". Moderation is a way to conduct a lesson or a meeting which helps to achieve the results quicker and gives all the participants opportunity to take decisions as their own. That is why moderation is a structured according to special rules process of panel discussion aimed at problem identification, searching the ways of its solution and taking general decision; moderator is an organizer of group work, who stimulates and regulates the process of group members' interaction in respect of democratic principles. The main didactic purpose of applying moderation in education process is to develop the ability to independent and responsible problem solving. When using moderation technology, the teacher's role differed fundamentally. We were consultants, guides, senior partners, so the students' attitude changed completely.

The results of multicultural education after applying moderation technology are the following (see Table 7):

Table 7. The maturity of multicultural competences in the context of moderation

Average values of multicultural competences maturity	After the experiment
I know	0%
I understand	31%
I act	69%
I know nothing	0%
Don't know/No answer	0%

As we see "I act" index increased significantly (69%), "I know" index nullified (i.e.all students knew the theory and practice of multicultural education), "I understand" index decreased (some of them moved from those who know and understand to those who can act, use theory in practice).

Expert problem seminar

We conducted the seminar as a resume of "Theory and practice of multicultural education" subject learning. Seminar helps to guarantee good quality, thorough justification and complete reasoning of solutions worked out in the course of moderation; chance to find a solution in short terms (1-5 days), a solution which predetermines multicultural education development strategy, and plan the program of their realization; creating pre-conditions for coordinated and harmonious actions of the seminar participants - people who take decisions at educational institutions, municipal areas, republic. That is why experts - scholars, heads of educational institutions, teachers, heads of municipal Local Education Authority, people in charge of national education at kindergartens and schools - took part in our seminar.

The results of multicultural education after organizing and conducting expert problem seminar are the following (see Table 8):

Table 8. Maturity of multicultural competences in the context of organizing and conducting an expert problem seminar

Average values of multicultural competences maturity	After the experiment
I know	0%
I understand	13%
I act	87%
I know nothing	0%
Don't know/No answer	0%

As we can see "I act" index increased up to 87%, index of those who think they understand but are not ready to use multicultural competences in practice) decreased to 13%.

Discussions

Present-day discussions are not about the meaning of technologies but about the algorithms and curriculum of their application (Porcher, 2004; Hanushek, 2010; Schleicher, 2011; Baum & Payea, 2011; Heilig & Jez 2010). A technology in education is in our opinion both algorithm and art of intersubjective and subject-object interaction aimed at more efficient use of didactic means of education, development and upbringing. That sort of understanding allows us to consider any education curriculum from functional side. Though each subject and each educatee community requires different algorithms.

Conclusion

In the course of working-out different models of combination of active technologies we established that technological effectiveness of multicultural education (its aspects as efficiency, effectiveness, practice-orientation) is defined at the teaching level by progressing from technology of communicative core to critical thinking technology, then to case-study technology, module learning, project technology, problem-based learning and moderation technology with an expert problem seminar at the end; at the level of study - by progressing from understanding the problem, determining the ways for solving the problem, selecting arguments before discussing the ways of problem solving and summing up at expert problem seminar.

Recommendations

The carried out research proves that professional specialized competences develop successfully if best configuration of active technologies are used in multicultural education. Effective curriculum provides rather high efficiency of multicultural education at university, contributes to lowering latent national aggression among students, teachers and nursery school children.

These competences are based on the ability to demonstrate deep understanding of universalism and national and cultural specificity of linguistic world-image; to use theoretical and practical knowledge about reflection of sphere of concepts of ethnic awareness in linguistic world-image; to use theoretical and practical knowledge about cross-cultural communication for development and application of cute ideas in project activities; to have

communicative abilities and be able to use them when solving the problems of cross-cultural communication; to demonstrate deep understanding of universalism and national-cultural specificity of linguistic world-image; to demonstrate tolerance and being able to solve nonstandard situations in the conditions of multicultural and multi-ethnic environment; to master linguistic-didactic essentials of using Russian (and second state - Tatar) language, both native and non-native in multi-ethnic and multicultural environment; consciously apply knowledge of comparative study of cultures in the process of interpreting literary texts; to interpret the specifics of communicative behavior of representative of different nations on the basis of cross-cultural researches; to study the status of cross-cultural communication problems and demonstrate critical assessment of knowledge state in this area; consciously apply the acquired knowledge in multi-ethnic education.

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No potential conflict of interest was reported by the authors.

Notes on contributors

Valerian V. Gabdulchakov is doctor of pedagogical sciences, professor of Kazan (Volga) Federal University, Kazan, Russia.

Elvira G. Galimova is a senior lecturer of Kazan (Volga) Federal University, Kazan, Russia.

Olga V. Yashina is a senior lecturer of Kazan (Volga) Federal University, Kazan, Russia.

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