

Multilingual programs in mathematics education: the case of Kazakhstan

Programas multilingües en educación matemática: el caso de Kazajstán

Umitzhan KOSYBAEVA [1](#); Marzhan SHAYAKHMETOVA [2](#); Issatay UTEBAYEV [3](#); Nazym SYZDYKOVA [4](#); Zhandos ABISHEV [5](#); Raushan ORAZBEKOVA [6](#)

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ABSTRACT:

The relevance of the research problem is caused by the modern discourse of educational multilingual programs development as an influencing the competitiveness framework development for education. Hence, the purpose of the study is to analyze the features of mathematics education in the context of multilingualism by the experience of the Republic of Kazakhstan. The article provides the analysis of the national project "Trinity of Languages" principles as a basis of multilingual education in Kazakhstan. Moreover, we have examined the experience of America, Russia, France and South Africa. The activity of different clubs, courses on math teaching in English shows that the issues of teaching development in foreign language have been of prime importance in Kazakhstan for the last years. The multilingual courses in math school were mostly designed to increase the efficiency of students' preparation for final certification in mathematics, as well as to develop their skills in English for specific purposes (ESP). The submissions can be useful for further research on the development of multilingual courses and programs in mathematics and other STEM fields.

RESUMEN:

La relevancia del problema de investigación es causada por el discurso moderno del desarrollo de programas educativos multilingües como una influencia en el desarrollo del marco de competitividad para la educación. Por lo tanto, el propósito del estudio es analizar las características de la educación matemática en el contexto del multilingüismo por la experiencia de la República de Kazajstán. El artículo presenta el análisis del proyecto nacional "Trinidad de las lenguas" principios como base de la educación multilingüe en Kazajstán. Además, hemos examinado la experiencia de América, Rusia, Francia y Sudáfrica. La actividad de los diferentes clubes, los cursos de enseñanza de matemáticas en inglés, demuestran que los temas de enseñanza del desarrollo en lengua extranjera han sido de primera importancia en Kazajstán en los últimos años. Los cursos multilingües en la escuela de matemáticas fueron diseñados principalmente para aumentar la eficiencia de la preparación de los estudiantes para la certificación final en matemáticas, así como para desarrollar sus habilidades en Inglés para fines específicos (ESP). Las presentaciones pueden ser

Keywords: mathematics education; multilingualism; international educational space; communicative competence; the Republic of Kazakhstan.

útiles para investigaciones adicionales sobre el desarrollo de cursos y programas multilingües en matemáticas y otros campos STEM.

Palabras clave: educación matemática; Multilingüismo; Espacio educativo internacional; capacidad de comunicación; La República de Kazajstán.

1. Introduction

In the context of rapidly changing society due to global challenges in the 21st century, we have to expand the scope of activities in all spheres of human life (Edwards, Raggatt & Small, 2013). Thus, new strategic plans are designed for the country to be committed to the dialogue of cultures and civilizations (Halai & Barwell, 2015; Halls, 2014). The younger generation regards multilingualism as one of results of achieving these objectives (Nikula & Dafouz, 2016; Bialystok, 2016; Ospanovaa et al., 2016).

Nowadays Kazakhstan's society is characterized by transparency to the world community and expansion of communication with representatives of various world countries in all fields of professional activity (Tungatarova, 2015). The entry of the Republic of Kazakhstan into the world educational space rises the issues of multilingual education in a special way, the efficiency of which largely depends on the continuous interaction between all levels of education system (The Conception of the Development of Foreign Language Education in The Republic of Kazakhstan, 2006).

In this regard, single multilingual education system introduction based on fragmented practices to private Universities and Schools of the Republic of Kazakhstan that will provide the educational program continuity will lead to multilingual personality development of high quality and efficiency as one of significant factors in developing intellectual potential of the country.

2. Literature review

Multilingual education system development in secondary schools and universities of the Republic of Kazakhstan is devoted to conceptual and holistic approach to multilingual education problem solution (Maudarbekova, Mizikaci & Dyusembinova, 2015), methodological base formation, staff-problem-solution, raising the issue of School and University Multilingual Education Program continuity, including language teaching (Kovaleva & Lee, 2016).

Currently, there is a particular interest in Mathematics Education Programs (Hunter et al., 2016; English & Kirshner, 2015; Craig & Morgan, 2015).

As far as science and education concern, significant advantages in expanding international cooperation opportunities in these fields, as well as full participation in the international educational space, have been offered with Bologna Process introduction and the consistent implementation (Gorgorió & Planas, 2001; Halai & Clarkson, 2016). Bologna Process is essential for a high level of education in terms of foreign language teaching (Barwell, Barton & Setati, 2007).

Foreign language education should be enhanced due to certain changes in Kazakhstan's education system orientated to international activity of higher educational institutions and increasing academic mobility of students and teachers (Pak, 2010), providing possibilities for Kazakhstan's citizens to participate in international educational and scientific projects, etc. (Kenderov, 2006). All these factors have led to multilingual education program introduction and development in the education system of the Republic of Kazakhstan.

3. Methods and Materials

The analysis of pedagogical documents and national educational projects provides objective data on the pedagogical process organization in country's educational institutions.

Thus, we have considered the following documents and educational materials:

- Algebra and foundations of mathematical analysis for 10-11 forms: Textbook (basics) (Alimov et al., 2012);
- The Conception of the Development of Foreign Language Education in The Republic of Kazakhstan (2006);
- State Program for the development and functioning of languages in the Republic of Kazakhstan for 2011-2020 (2011).

Kazakhstan's standards of higher education of recent years were analyzed in order to reveal the disadvantages of multilingual programs.

The theoretical research was conducted to study both the purposes and the goals of multilingual programs in mathematics education in RK.

4. Data, Analysis, and Results

Multilingual education program implementation is described in the State Program for the development and functioning of languages in the Republic of Kazakhstan for 2011-2020 (2011). It highlights the necessity of state language teaching methodology improvement and standardization.

Different courses on math teaching in English in schools were also developed in the framework of the Conception of the Development of Foreign Language Education in The Republic of Kazakhstan (2006).

The aforementioned programs were created in order to fulfill two main functions:

- to increase the efficiency of students' preparation for final certification in mathematics;
- to develop their skills in English for specific purposes (ESP).

These training courses provide an expanded theoretical material study with video- and audio-materials. They ought to improve the proper use of basic math concepts in English in parallel with Russian and Kazakh languages. The classes are held mainly once a week. Course hours allow to study main topics and to develop Conversational English.

Students' individual characteristics, their rate of perception and training status were taken into account. Lesson modes include group work and work in pairs for students in order to present their projects (providing the prior distribution of students' responsibilities in class).

The main methodological features of the course are as follows:

- selected non-standard tasks;
- problematic texts in English.

Finally, students make a report that provides statistical data on course development: methods of individual teaching, task solution.

Evaluation system includes the assessment of mental, logical, creative and linguistic indicators. Current achievements are verified by independent testing.

Multilingual education program in Kazakhstan is also based on the principles of the national project «Trinity of languages». According to the project, multilingual education in the context of Kazakhstan's education system implies the compulsory acquisition of three languages in training: Kazakh as the state language, Russian as the language of interethnic communication in the country and English as the language of successful integration into world economy and international community (The state program of functioning and development of languages in the Republic of Kazakhstan for 2011-2020, 2011).

Language teaching related to these languages is not considered only as subject teaching directed on linguistic competence formation and personal development of students, but also as gaining knowledge and skills for effective professional activity in each of three languages. In addition, in Kazakhstan's education policy, the study of foreign languages (not only English) is

one of the most important criteria for practical and professional life activity of an individual in the modern multilingual and multicultural world (The concept of Development of foreign language education Republic of Kazakhstan, 2006).

The essence of professional-oriented foreign language teaching also lies in its integration with subspecialties in order to gain additional professional knowledge and professionally significant traits (Maudarbekova, Mizikaci & Dyusembinova, 2015; Pak, 2010).

The basis of these requirements and standards is related to the Common European Framework of Reference for Languages (CEFR) describing foreign language proficiency level unifying requirements for the level of language learning for all of Europe. Hence, according to the Conception of the Development of Foreign Language Education in The Republic of Kazakhstan, professional-oriented foreign language studying can be presented under following formula: level B2 + LSP (language for specific purposes) that corresponds to the international standard level of foreign language proficiency (Kovaleva & Lee, 2016).

5. Discussion and Conclusion

Despite the growing number of students with diverse language backgrounds attending multilingual school, systematic and structured vocational preparation of teachers and educational managers for multilingual schools is still a relatively rare phenomenon in the RK (Tungatarova, 2015).

If there is no shortage of language teachers in the country, universities are experiencing a lack of teachers of other subjects, including mathematicians, who are able to teach in a foreign language (Yergebekov & Temirbekova, 2012). We can see the same tendencies in Latin America (Parra et. al., 2016).

Thus, there are only few education programs for educational managers that address the challenges of running multilingual educational establishments (Setati & Adler, 2000).

To sum up, math teaching should focus on facilitating the students' transfer from exploratory talk to discourse-specific talk, as well as on the information about why this transfer is still incomplete.

Multilingual education program development related to secondary schools and universities of the Republic of Kazakhstan is based on the Conception of the Development of Foreign Language Education in The Republic of Kazakhstan and the State Program for the development and functioning of languages in the Republic of Kazakhstan for 2011-2020.

Foreign language teaching is facing a number of factors negatively affecting the quality of education. These are poor language knowledge and skills of the majority of school leavers entering higher education establishments and the mismatch of methodological, technological, organizational and human resource bases of educational establishments with modern modernization requirements and international standards.

6. Implications and Recommendations

In studying Kazakhstan's standards of higher education, it should be noted that there are strict foreign language proficiency requirements for the students of non-linguistic faculties. Hence, foreign language teaching has to encourage integrating linguistic, socio-cultural and methodological instruments that contribute to successful communicative competence development especially in professional fields. Consequently, the purpose and the content of training should be focused on communication profile.

New teaching technologies for improving professional competence of future specialists are to become an important part of modernization policy higher education. Professional-oriented educational technologies will make it possible to organize the educational process in the view of professional specialization, as well as to focus on student personality: attitudes and abilities.

It is noteworthy that participation in such competitions as International Mathematical Olympiad (IMO) can improve students' achievements in mathematics and modern information technologies; it helps to develop professional competencies and skills of English language perception.

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1. Mathematics and Information Sciences Teaching Methodics Chair, E.A.Buketov Karaganda State University, Karaganda, Kazakhstan; E-mail: umit1980@mail.ru

2. Department of Pedagogy and Methodology of Elementary Education, E.A.Buketov Karaganda State University, Karaganda, Kazakhstan

3. Department of Transport and Vocational Training, E.A.Buketov Karaganda State University, Karaganda, Kazakhstan

4. Mathematics and Information Sciences Teaching Methodics Chair, E.A.Buketov Karaganda State University, Karaganda, Kazakhstan

5. Department of Theory and Methods of Physical Culture and Sports Medicine, , E.A.Buketov Karaganda State University, Karaganda, Kazakhstan

6. Mathematics and Information Sciences Teaching Methodics Chair, E.A.Buketov Karaganda State University, Karaganda, Kazakhstan

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