MATHEMATICAL EDUCATION WITHIN BELARUSIAN INTEGRATED SYSTEM OF THE TYPE "COLLEGE – UNIVERSITY"

Liudmila Maisenia
Belarusian State Pedagogical University, Republic of Belarus
E-mail: maisenia@tut.by

Abstract

The article is about the modification of the main educational aim, which is urgent for Belarusian colleges nowadays: integration of general education, technical education and higher professional education. Diversity of set tasks and multilevel character of educational system distinctive for colleges imply quite complex pedagogical problems. Success in tackling arisen problems depends on success of realization of systemic approach that directs pedagogue-researchers on disclosure of object's integrity, on detection diverse types of ties in it.
In terms of increasing requirements to level of mathematical education in technical college, modeling of integrated mathematical course, which creates the basis for permanent education and for achievement of a key goal – mathematical training of professionally competent graduates becomes issue of current importance.
Key words: *permanent technical education, innovations, mathematics.*

Introduction

Formation of the Republic of Belarus as an independent state brought to conversion of education system with taking into account strategic goals of the country. "Educated person, able to self-education and become proficient in new knowledge, becomes the most important value and capital asset of modern society" (Radykov, 2005, p.5).

Major task of development of Belarusian education sphere is improving quality of education that makes possible in prospects creation of high-tech, competitive country's economy. Modernization of educational system and its inclusion in the context of the whole-European and global processes occurs.

Basic types of educational institutions in Belarus are: 1) general schools, 2) vocational schools (for getting working profession), 3) middle-technical schools 4) high schools. But there is development, gradation and unification within each of these educational institutions' types.

Along with general schools, work lyceums and gymnasium, which carry out the same functions. Wide application of specialized education (in the senior school), transition to 12-year educational period becomes typical.

Belarusian vocational schools rearrange in bi-level schools, originates second level of education, which allows getting middle technical education. Rapid and prospective modernization process of mostly outdated system of vocational educational institutions inherited from the soviet period began. Origination of colleges is among innovations in this sphere. As is well known, such educational establishments are distinctive for Anglo-American educational area, but they are also widespread in other countries. Colleges in Belarus appeared for a good reason. Formally it happens through changing former soviet names on conditions, that educational establishment has fulfilled certain requirements. There are 150 colleges in Belarus and they constitute more than 70% from

total amount educational establishments, where it is possible to get professional education. Formation of colleges caused a lot of research issues in sphere of management, pedagogy, psychology and teaching methods of certain subjects.

High schools are unified as University, local entrance examination is annulled, and enrollment is carried out through centralized testing. New superstructure in the form of magistracy is being established.

General clauses of reformation of all types of educational establishments are: transfer to 10-score system of evaluation, renewal of contents of education and working out of study literature by Belarusian authors, wide promotion of application of computer technologies, stress on permanent (long-life, continuous) education trend. Changed realities require development of professional level of pedagogical stuff, revision and extension of contents of education, perfection of forms and methods of education.

Methodology of Research

In terms of intensive reforms of Belarusian educational system empirical and theoretical researches play increasing role. Objective research of practical results, study of public opinion and then correct social prediction and appropriate working out new approaches together with following monitoring of their efficiency - this is the way to new successful innovations.

As every scientific research, this one is being carried out on two levels – empirical and theoretical. As is well known, base components of empirical level are accumulation of new facts, their analysis, synthesis and summarizing for getting empirical regularities, which further approved in pedagogical practice. On theoretical level synthesis of knowledge is executed and as a result distinctive regularities are formulated (in this case - for organization of mathematical education in college).

Results of Research

As the social experience performs, demand for education in technical schools has rapidly increased. Modification of educational establishments, i.e. formation and development of colleges stimulates popularity of technical schools system. Earlier maturation of young people occurs, psychological willingness to self-choice of profession arises, and that is why more than a half of school juniors (after 9-th form) try to enter technical schools. Most of them have already self-determined their professional future. At the same time many young people realize their choice not only for budgetary funds but also for fee (in spite they have an opportunity to proceed with education in senior school for free). Quantity of students, who get fee-paying education in state technical schools, increases. There are sound grounds for the prognosis that in the near future percentage of young people, who would like to take leave of general school at the age of 15-16 years old will rise. This tendency will intensify after ultimate establishment of 12-year learning period in general schools in Belarus. Early professional self-determination of young people and long-life education becomes reality.

Deformation of technical schools, i.e. their transformation into colleges brings to changes in the essence of their activities. Particular activation of this process occurs in those colleges, which are integrated with universities of corresponding type and profile. Creation of complexes of educational establishments of the type "college - university" is one of the vital factors, which facilitate attractiveness of education in colleges, as the opportunity of permanent higher education is being created. It is necessary to note, that such educational system is conditioned by country's economy and is being regarded as a prospective in the country's scale. Furthermore it is considered to be prospective from the point of view of an individual as young people are provided with a wide choice of individual educational paths.

Tendency to creation of complexes of educational establishments of the type "college-uni-

versity" is a key question of Belarusian educational policy. But in practice this is still a new path in educational area of a country. Empiric research and search for optimal ways of implementation of this idea in a wide scale begins. Such approach is forecasted to be efficient.

Openness of professional education and of the whole system facilitates the popularity of technical education. "Under open system of professional education we understand first of all freedom of a person in his choice of profession, in its forms and methods, time and place of getting it, and also in combination and level of qualification, which are obtained. To ensure freedom of such choice - means to give an individual the opportunity to get professional education without external enforcement and limitations" (Kalitski, 1996, p. 10).

Implementation of principles of continuity and succession in the educational system of the country takes on special urgency nowadays. It is necessary to note, that such system of education has great advantages: doubling in learning of subjects on different levels is evaded, level of theoretical and practical study of specialized subjects is being raised, terms of getting higher professional education are being shortened.

Appearance of educational establishments of the new type (colleges) signifies not only change in names, but also systemic reorganization of the whole teaching process. First of all this was caused by modification of the main educational aim, which is urgent for Belarusian colleges nowadays: integration of general education, technical education and higher professional education. Diversity of set tasks and multilevel character of educational system distinctive for colleges imply quite complex pedagogical problems. Their complexity is intensified by specific psychological problems caused by age-specific features of students and conservatism of the old educational system. Success in tackling arisen problems depends on success of realization of systemic approach that directs pedagogue-researchers on disclosure of object's integrity, on detection diverse types of ties in it.

Here are details of certain results of research, concerning organization of mathematical education in the system of integrated educational establishments of the type "college-university" (further integrated system "college - university").

Precondition of carrying on permanent education in integrated system "college – university" (entering the 3-rd year in university) is teaching basic courses of subjects, which are included in university curriculum, in college and their through standardization according to common goals of permanent education (the problem was considered by Maisenia, 2006).

This circumstance along with other obstacles causes also significant pedagogical prospects, brings to search of innovations and to necessity of enabling reserved opportunities of this type of educational establishments. Origination of a number of research issues, including teaching mathematics methods, becomes reality. Now we determine basic trends in realization of methodical researches and their practical implementation of above-mentioned issues.

First. Selection and systematization of contents of mathematical education correspondingly to age-conditioned opportunities of students and aims of continuity within system of educational establishments "general school-college- university."

Second. Search for efficient ways of implementation (with age-conditioned advance) of typical course of mathematical subjects included in university curriculum in college.

Third. Creation of working programs of integrated course of mathematical subjects, included in college curriculum.

Fourth. Working out the content of mathematical education according to aims of professional directivity and competence.

Fifth. Preparation of textbooks and manuals of new generation with contents, complying with actual requirements to level of education, in terms of continuity of professional education. (It is necessary to note, that this problem is highly actual. Extremely small amount of textbooks for colleges was published on the state level within the latest decade in contrast to situation in general schools and universities).

Sixth. Application of forms and methods of education typical for university (first of all, lectures) in colleges.

Seventh. Implementation of differentiated mathematical teaching according to different initial grounding of students in mathematics.

Eighth. Working out methods of diagnosing of level of mathematical knowledge, skills and abilities of college students.

Ninth. Analysis of quality of university student grounding in mathematics (graduates of colleges), comparison with regular students of universities and analysis.

In terms of increasing requirements to level of mathematical education in technical schools, to which college belongs, arises exigency of training and retraining of teaching stuff for this type of educational establishments. Implementation of educational process according to university curriculum requires training of teaching stuff of higher qualification (masters, candidates and doctors of sciences). Realization of scientific-pedagogical researches on college base is also necessary, because only in terms of real practice successful solving of emerged modern problems is possible.

Analyzing status of mathematical education in colleges of Belarus it is necessary to note, that thorough transformation in the whole system of Belarusian colleges has not happened yet. In many respects approach, distinctive for former soviet system of technical schools, is still preserved here.

Peculiar for Belarus research, concerning methods of teaching of mathematical subjects, was organized in Minsk State High Radio Engineering College. Peculiarity of this educational establishment is in training of personnel (with middle technical education) in information technologies and radio electronics, who can continue their education at Belarusian State University of Informatics and Radio Electronics beginning from 3-rd year. Planning is the fundament of the whole teaching and methodical complex. At the same time, modeling of integrated mathematical course for college, which creates the basis for permanent education and for achievement of a key goal – mathematical training of professionally competent graduates, becomes issue of current importance.

In research process we differentiate between inner and outer integration ties. Under inner integration we imply achievement of integrity of mathematical contents in teaching process for each certain profession and educational stage. Under outer integration we distinguish two types: 1) integration that ensures integrity and continuity of mathematical education while transition from school to college and from college to university educational level; 2) integration that ensures sufficient mathematical background for learning specific disciplines.

Indispensable condition for implementation of permanent education is including in college curriculum such disciplines as higher mathematics (374 teaching periods), theory of probability and mathematical statistics (68 teaching periods), which traditionally were taught in specific technical university. Issue of professional orientation of mathematical course is on the sight of experts and researches (Matskevich, 2006). Mathematical schooling in college is regarded as fundamentals for further studying of specialized disciplines in university.

Peculiarity of mathematical teaching in college integrated with university generates a number of specified approaches to forms of teaching. Teaching in college is being held in form of lections and practical training, by two teaching periods for each subject (a "couple"), likewise realization of teaching process in university. Taking into consideration age-conditioned features of students a lecturer works with audience from one group (25-30 students). Studies may be conducted either only in form of lecture or in form of practical training, or sometimes in form of mixed studies. We judge, that such approach to organization of studies is the most efficient. Its advantage caused by dynamic alternation of methodical approaches, efficient diagnostics of quality of learning, implementation of differentiated approach while teaching, organization of self-education.

Conclusion

Creation of entire educational system on the ground of complex of educational establishments of different types, keeping and strengthening this integrity are main checkpoints in the process of transformation according to continuity principle. This concerns not only whole pedagogical process

entirely, but particularly the process of training in certain subjects.

Detailed study of results of education takes place in terms of empirical and theoretical research of the problem of efficiency of mathematical training in college. Analysis of findings performs that college graduates are among best students of the university.

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Adviced by V.I Bernik,
Institute of Mathematics of the National Academy
of Sciences of Belarus, Republic of Belarus