

Comparison of Programs of Teaching Physics in Kazakhstan and Turkey

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Abstract: The natural sciences are essential in the technological development of countries. Therefore, special attention is given to learning natural sciences. Characteristics and differences in natural science education in Turkey is that all students must be proficient in the field of science and technology. The program of teaching physics is aimed at education of creative person, who is able to identify the physical laws in any area of life activity and at the expense of existing knowledge to develop their competence and erudition. Between the education systems of Kazakhstan and Turkey, there are some similarities and differences.

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1. Introduction

Kazakhstan and Turkey - are the countries that are similar in education. If we ignore this distinction, as many cultural structure of Kazakhstan (where, depending on the school the language of instruction is changed), education of Turkey is national, while the Kazakhstan education is governmental, ministries and relevant departments have a different structure. The most basic difference in the education systems of Kazakhstan and Turkey is the organization of lessons on natural science. That is, subjects such as physics, chemistry, biology, etc. in these countries carry out differently.

The main purpose of this research is to compare the programs of teaching physics of Kazakhstan and Turkey. In order to achieve this goal, it is necessary to compare the programs of Kazakhstan and Turkey in the following paragraphs,

- Methodology and period of the development of the program of teaching physics;
- The advantages of the programs of teaching physics;
- Thematic and separate programs of teaching physics.

2. Methods of the research

This research compares the available programs of teaching physics in Kazakhstan and Turkey. The theme of the work is a cross-national comparative educational research. Comparative education includes a comparison of the two educational systems or the comparison of the educational system in one country with the educational system of another country [1].

In comparative education the most controversial question, is "What must we compare?" there are two main views. The first of them is a comparison of the education system with a foreign education system; the second is a comparison of different systems of education among themselves. Currently, teachers work by combining these two directions [2]. In this paper, due to the fact that the education system of one country is compared with other educational system, taken as a basis for the first direction in which the program of teaching physics in Kazakhstan and Turkey are compared in terms of forms, terms, benefits, and thematic organization.

When comparing education systems important starting point is the method of comparison, which points to two types:

The first is the method of direct comparison of the educational systems of two countries through a variety of measurements. For example, when comparing the goals, policies, administrative structure, methods, processes of the educational system of the state A with the educational system of the state B, at first goal and policies of the educational system of the state A is compared directly with the purpose and policies of the educational system of the state B. Furthermore, these systems are compared to the others spheres. The second method is when the education systems of the A and B are portrayed objectively, i.e. the goals, policies, administrative structure, methodology and processes in the educational system of the state A are described fully. Then we give a complete description of the educational system of the State B. In conclusion, the comparison of systems in the shown measurements is given [3].

At the present research the first method is taken as a basis, which examines the methods and the development period, the advantages, thematic and division of the organization of the programs of teaching physics of Kazakhstan and Turkey. Then each element of the received data is compared and commented.

In comparative studies two kinds of methods are stood out - horizontal and vertical. When using the horizontal method, inherent in that time, all measurements and changes in the educational systems are contrasted, highlighting the differences. In using this method the observation of historical evolution is held [4]. In this paper, the horizontal method is applied in the study of the programs of teaching physics in Kazakhstan and Turkey.

As well as the work was focused on the collection, the study by observing and comparing the similarities and differences of documents, preference was given to the descriptive method.

One type of scanning model- a comparison is used in this paper [5] which defines a model for scanning as "a method of research that aims to describe the state of an event in the past or present in the real form."

The model of scanning describes the events, person or thing that is the subject of research, as it is in real time. With this aim, at first each condition is described in detail in terms of certain variables, and then in accordance with the general description of these criteria is compared [6] therefore, for research and comparison of program of teaching physics on the above mentioned countries one type of model of scanning – comparison is chosen, in this case a comparison of relationship.

In this study data were collected through the study of documents by qualitative research [7] which point out that the study of documents also includes an analysis of written materials that include information about the event or events that are the purpose of the study.

3. Result of research

The method of implementation and the period of carrying out the program of teaching physics

In accordance with sub item 6 of the 5th article of the Law of the Republic of Kazakhstan on July 27, 2007 "On Education" and in order to implement the state compulsory standards of secondary education (primary, basic secondary, general secondary education), approved by the Government of the Republic of Kazakhstan on 23 August 2012 number in 1080 was approved by the Minister of education and science of the Republic of Kazakhstan to the present order was put into effect from September 1, 2013 and the fact that according to the standard curriculum of primary and secondary

education in Kazakh, Russian, Uyghur, Uzbek, Tajik languages the natural science and math and socio-humanitarian directions were distributed hours on Physics for this routine ;

- 5th grade - natural science lesson is included, which is conducted once in a week
- 6th grade – there is no physics lessons
- 7, 8, 9th grades - 2 hours a week
- 10,11th grades - 3 hours a week with a natural science and mathematical direction
- 10,11th grades - 1 hour a week with the socio- humanitarian direction [8]

The education system in Turkey first educational period consists of 8 years, the average period - 4 years. In primary education, from the 4th grade the subject of natural sciences and technology is included in the program. The 4- year program of secondary education there are lessons in physics, chemistry and biology.

With the transition to four-year schools training program, it was decided to conduct physics lessons at 1, 2 and 3 courses (9, 10, 11th grades) for two hours a week, and at the 4th year (12th grade) for three hours a week. In addition, in the 9th grade physics lessons conducted for two hours a week had to go all the students, and in the 10th, 11th and 12th grade physics classes attended only by those to whom this discipline is relevant because of the chosen specialty.

The advantages of Programs of teaching physics Kazakhstan

In the study of physics in Kazakhstan in primary school an abstract theoretical and practical thinking, creativity, communication skills, and analytical skills are formed.

1. The aim of the study of physics course is to form in students the foundations of the scientific worldview, cognitive interests, intellectual and creative skills , critical thinking based on the knowledge and skills acquired in the study of natural phenomena, familiarity with the basic laws of physics, and their application in technology and everyday life.
2. Achieving this goal is ensured by solving the following issues:

1)to acquire knowledge about the physical phenomena, concepts, laws and theoretical conclusions of the underlying modern physical picture of the world, knowledge of the methods of scientific knowledge of nature, abilities to observe, perform experimental tasks, build up hypotheses and carry out project activities;

2) to develop the skills of implementing the physical experiment , the ability to research, cognitive interests, intellectual and creative skills in the process of using the acquired knowledge and skills to solve practical, everyday problems;

3) to bring up responsible attitude to the educational and research activities, skills of rational management and protection of the environment, the skills to ensure safety of human life and society, skills to participate in the social, cultural, political and economic activities on the basis of basic knowledge.

3. The content of the basic study material for physics is practically preserved, material completed, that is, covering all sections of the course of physics, but more aimed at the application of the knowledge gained in practice and students adapt to life situations in modern .

4. The program provides opportunities for practical activities of students, revealing the essence of the physical laws of nature, the processes of globalization and the application of knowledge in a new context, taking into account their age features.

5. The content of education on the subject of "Physics" is made on the basis of principles such as solidity, consistency, integrity, cultural conformity, availability, continuity [9].

Turkey

Acquisition, received on the program of teaching physics in Turkey can be divided into two groups: acquisition of skills and acquisition of knowledge. The acquisition of skills is occurred in 4 ways:

- *Problem-solving skills: PSS*

- *Physics - Technology - Society - Environment: PTSE*

- *IT and communication skills: ITCS*

- *Communication skills and values: CSV*

Problem-solving skills include scientific process skills, creative thinking skills, critical thinking skills, analytical skills, and spatial thinking skills and digital data processing, higher-order thinking skills. Examples of problem-solving skills:

1. Problem is determined to solve, and a plan is created to solve this problem.

a) The problem is determined.

b) Using the prior knowledge and experience from a variety of sources, the data are collected to begin the process of researching the issue.

2. To solve the problem the experiments are carried out and the data is collected.

a) Reliable materials and equipment for implementing experiments are defined and used.

3. To solve the problem the obtained information is processed and analyzed.

a) Information obtained by experiment and observation, is analyzed by plotting graphs, tables, using statistical and mathematical techniques.

b) Through digital processing in the process of analysis and simulations a computer, calculating spreadsheets, graphics programs, and other means are used[10].

Physics - Technology - Society - Environment: includes achievements, providing understanding, analysis and improvement of the relationship between physics and society, technology and the environment. In this section, the following are examples can be given:

1. Understanding the nature of physics and technology

a) Defines physics as one of the main science

to help understand the events taking place in the world
b) Defines physics as experiencing, asking, wrong or based on the experience proving structure

2. Analysis of Interaction between physics and technology

a) Study of the historical development of the mutual influence of Physics and Technology

b) Investigation of the negative and the positive impact of physics and technology on the individual, society and the environment (social, cultural , economic, political , moral, and other fields) in the past, present and future.

IT, computer and communication skill includes the following:

1. Searching, finding and collecting necessary information and data

a) Uses a variety of sources of information

b) Controls whether the source is reliable, permanent or temporary.

2. The development of information in accordance with the intended purpose

a) Implements synthesis of information and creates a new one

b) Forms a development strategy in accordance with the intended purpose

3. Provides information in the most efficient manner

a) Prepares a presentation properly selected and the corresponding targets of the product

b) If possible, it uses a variety of forms of presentation: text, graphics, photographs, graphs, charts, tables, etc.

4. Develops communication skills

a) Listens to speeches and lectures on physics carefully and with interest

b) Develops skills to work with the operating systems for the effective use of software related to physics.

Skills of self-control and self-improvement, organizational and work skills, behavioral skills, and scientific values are included in the group of "skills and values of communication." Here, the following are examples can be given:

1. The development of appropriate attitudes to themselves and their own values a)interest, curiosity, sincerity, honesty, openness, entrepreneurship/creativity

b) The ability to listen to the criticism and take it into account in their actions[10].

2. The development of appropriate behavior in relation to the physics and the world around them, bringing up values

a) Monitoring and evaluation of progress in physics

b) Knowledge of the current limits of physics and technology, display an appropriate attitude

3. The development of positive attitudes to lifelong learning throughout life

a) Understand the importance of continuous learning throughout life and a desire to learn

b) Develop skills of lifelong learning throughout life

The content of themes of the programs of teaching physics

In Kazakhstan, for the 7, 8, 9, 10 and 11th grades different training programs are prepared which take into account the capacity and ability of pupils. And for the 10, 11th grades, a separate program is prepared which take into account the educational direction as the natural sciences and mathematics, social and humanitarian.

Table 1. The content of themes of the programs of teaching physics for the 7,8,9,10,11th grades

№	7th grade (total 68 h., 2 h. per week)	8th grade (total 68 h., 2 h. per week)	9th grade (total 68 h., 2 h. per week)
1.	Physics and astronomy, the science of nature	Electromagnetic Phenomena	Principles of Kinematics
2.	Movement	Electric Phenomena	Principles of Dynamics
3.	Forces	Thermal Phenomena	The laws of conservation
4.	Pressure and etc.	Light Phenomena	Oscillations and waves and etc.

№	10th grade social and humanitarian direction (total 34 h., 1h. per week)	10th grade science and mathematical direction (total 102 h., 3 h. per week.)	11th grade social and humanitarian direction (total 34 h., 1 h. per week)	11th grade science and mathematical direction (total 102 h, 3 h per week)
1.	Mechanics	Mechanics	Electrodynamics	Electrodynamics
2.	Molecular physics	Molecular physics	Modern Physics	Light waves and optical instruments
3.		Electrodynamics	Universe	Elements of the theory of relativity
4.				Quantum physics
5.				Universe

In Turkey, for the 9, 10, 11 and 12th grade various programs of teaching physics are prepared. As well as at the 9th grade physics subject is compulsory for all students in subsequent classes, some students will not be possible at all to deal with physics, at the 9th grade special approach is given to this subject. This grade includes such themes on physics with which person will encounter throughout life. And at the 10th, 11th and 12th grades themes on physics are presented in the form of a spiral – in according with how necessary they will be in later life.

The content of themes of the programs of teaching physics for the 9,10,11 and 12th grades (Table 2):

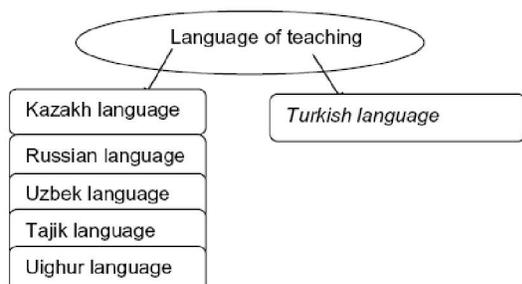
Table 2. The content of themes of the programs of teaching physics for the 9,10,11 and 12th grades

№	9th grade (total 68 h., 2 h. per week)	10th grade (total 68 h., 2 h. per week)	11th grade (total 68 h., 2 h. per week)	12th grade (total 102 h., 3 h. per week)
1.	Nature of physics	Matter and its features	Matter and its features	Matter and its features
2.	Energy	Force and movement	Force and movement	Force and movement
3.	Matter and its features	Electricity	Magnetism	Electricity and electronics
4.	Force and movement	Modern physics	Modern physics	Waves
5.	Electricity and magnetism	Waves	Waves	Modern physics
6.	Waves		From stars to quasars	From atoms to quasars
7.				Nature of physics

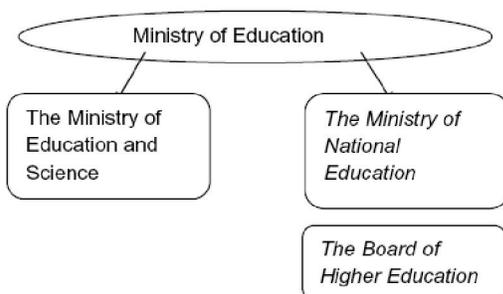
4. Conclusion and discussion

When comparing the programs of teaching physics in Kazakhstan and Turkey, we can see a lot of difference. In Turkey, the physics is begun to teach in grade of 9, and the subject is compulsory for all students, and in the 10th, 11th and 12th grades it is a selective subject for science majors. Whereas in Kazakhstan, the subject is taught from grades 7 to 11, the last two years, hours are being changed from 1 to 3 depending on the educational direction. This in turn affects the difference of the program, its general structure, performance, goals and content. As a result of the comparison of programs of teaching physics of the two countries the following conclusions are reached:

- Because of many cultural structure of Kazakhstan (where, depending on the school the language of instruction is changed).



- education of Turkey is national, while the Kazakhstan education is government, ministries and relevant departments have a different structure.



- Comparing the philosophical foundations of the programs of teaching physics in Kazakhstan and Turkey can be said that one of its main goals is literacy in the field of physics. In addition, special attention is paid to the realization that physics is a necessity of our time, which forms the foundation of society and able to ask, learn, create, solve problems, educate the person owing the ability to learn and to move the scientific process.

- Methods of teaching time of the programs of teaching physics in Kazakhstan and Turkey also have differences. In Kazakhstan, the physics is taught from grade 7. While in Turkey, the physics is begun to teach in grade of 9, and the subject is compulsory for all students, and in the 10th, 11th and 12th grades it is a selective subject for science majors. In Kazakhstan physics is taught 2 hours at the grades of 7, 8, 9, and at the grades of 10, 11 it is taught from 1 to 3 hours a week depending on the direction. In Turkey at the grades of 9, 10 and 11 physics is taught two hours, and at the 12th grade - three hours a week. In addition, being selective, in some schools the number of hours in physics can be increased.

- Structure of the skills acquired in Turkey is very different. While all of the skills in Turkey are collected in four groups: problem solving skills, scientific process skills, creative thinking skills, critical thinking skills, analytical skills, skills, data processing and digital processing, higher-order thinking skills.

- From the point of organizing themes of those sections between the programs of teaching physics of Turkey and Kazakhstan, there is a significant difference too. In Kazakhstan 24 themes are united, the contents of which are different from each other. During 4 years of teaching physics in Turkey 24 themes are studied. The method of spiral is used, where each year the main themes are more deeply explored - matter and its features, power and movement, waves, etc.

- Again, if you look at the organization of themes and sections, then some of the themes that exist in the program of Kazakhstan (the Law of radioactive decay, Line spectra), There is no program in Turkey, and the themes that are available in both programs.

RECOMMENDATIONS

In accordance with the received results we can recommend the following:

- The goals of programs are specially selected for the development of the students. Among them there are three groups: erudition, emotional and psychomotor, which have their own characteristics. In the program of Turkey main emphasis is made on erudition and emotion. Thus the program should include development of psychomotor.

- In our comparison it is clear that the themes studied in the program of Turkey, are more complex and broad. Thus it is desirable to introduce the section "Introduction to Physics" program in Kazakhstan such themes available in the program of Turkey as "The pressure and the ability to still buoyant liquids", "Particles and antiparticles".

- From the point of view of organization and order of sections and the number of hours the program in Turkey is more extensive and detailed than the program of Kazakhstan. Therefore, we propose to increase the number of hours taught per week.

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