

Innovative Technologies in School Geography Classes as a Part of a State Education Policy in Kazakhstan and Kyrgyzstan

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Abstract

The second half of the 20th century in teaching can be characterized as a time constant changes in the educational structure, which tried to adapt to external influences. Schooling process in Kazakhstan and Kyrgyzstan, along with similar processes of most European's countries, has undergone numerous changes, including radical ones. The 21st century brought to these Central Asian countries new guidelines in the education system, which are consistent with the global target perspective of the state. The methods and approaches that provide the evolutionary leap in the educational system and help to cultivate the necessary qualities in students became priority.

Keywords: Education policy, Kazakhstan, Kyrgyzstan

I. Introduction

Scientific literature accounted lots of researches on the problem, which examined the precedent of the emergence and development of innovative technologies in conjunction with economic development. But over time, the researchers concluded that the problem of assessing qualitative innovative properties in various fields cannot be fully studied only from the standpoint of economic theory. It required a totally different approach to consider innovations, which included not only scientific and technical parameters, but also factors of governance, law, education, and culture.

Kazakhstan and Kyrgyzstan are two neighboring countries with young population. One-fourth of population in Kazakhstan is under the age of 15, and in Kyrgyzstan nearly one-third of population is under age 15 (Allworth & Sinor, n.d.; Hambly et al., 2020). Though Kazakhstan is the largest country in Central Asia problems in educational system there have the same soviet origin as in Kyrgyzstan. The 20th

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century in Kazakhstan and Kyrgyzstan in the context of pedagogical evolution can be described as catching up with the educational process.

Both countries are successors to the methodological base of the USSR, which only in the modern period began to transform and adapt to new conditions. Of course, the abrupt development changes took place in this period and were isolated from the total mass of approaches. The main stage is “post-perestroika” time. However, these changes, directed to the future, are often held in isolation from the achievements. Which, in our opinion, is incorrect and short-sighted: a new type of education should develop on the basis of cultural and pedagogical traditions, while being ahead of current circumstances, considering strategic perspective goals.

The 21st century is the time of pervasive information flows that are rapidly updated, adjusted and change their relevance. Therefore, school education should give students the basic skill: the ability to find the information they need, consider it from the perspective of the question raised, analyze it, filter out the main and secondary points, and, finally, apply knowledge in practice.

This requires a strategically significant need for the transition from a passively illustrative to a new activity method of transferring knowledge, which is characterized by a change in the role of the student, becoming an active subject of the learning process.

The implementation of innovations in the public education system of Kazakhstan and Kyrgyzstan is the key to their future competitiveness. The level of their creative potential and the potential of the whole society regarded as an investment of capital depends on how well qualified, responsible, competent the specialists will be.

There is a steady increase in requirements for employees from the position of an unusually rapidly developing information environment on the world labor market. Based on this, it can be concluded that a properly built, advanced educational system will be able to ensure the release of such personnel that will compete in the world market and will be in demand in the European education system (Strategy “Kazakhstan-2050”, 2014).

Innovations in the educational system should be considered as a response to social challenges formed as a result of social and cultural, economic and political changes. In this regard, it is necessary to focus on achieving the strategic goals of a multi-level learning process when building an educational state system and selecting effective methods for its implementation. Also, one should focus on the formation of a creative, thinking, and active personality of the learner, beneficial to their country, being able to solve emerging social and professional problems.

II. Method

Innovations from the pedagogical point of view mean changes in the pedagogical system that improve the course and results of the educational process (Makhmudova, 2019).

The main criteria for innovation are a major, important change in style, mode of activity and thinking. Innovations according to Matyash (2012) always carry the following features:

- have a new solution to pressing problems;
- their implementation significantly changes the quality of personal development of students;
- affects all components of the school system.

The necessity to improve and adapt the Kazakh and Kyrgyz education systems to the present-day realities determines the purpose of the study: to select main directions of using innovative teaching technologies appropriate to state strategies for the development of education in Kazakhstan and Kyrgyzstan.

To do this first of all we need to clear up the meaning of innovations in school education, and then we consider the content of government educational strategies that set the development directions.

We examine geography lessons as a case for implementing innovative technologies in Kazakhstan and Kyrgyzstan schools. Geography is a unique science that allows students to provide a goldmine of useful and relevant information in the future.

The diversity of the content of geography as a subject makes it one of the most difficult subjects both to teach and to learn (Abdullahi, 2019). Learning geography contributes to the formation of intellectual experience in a student, and also develops the ability to process and analyze information flows.

Since the effectiveness of teaching geography directly depends on the quality of the student's cognitive activity, innovative technologies are involved in its activation and comprehensive development in the educational system.

A modern, active lesson in geography stimulates the cognitive interest of students, makes it possible to develop cognitive search skills, improve creativity and initiate the development of proactivity.

This approach to selection of the innovative teaching technologies for the state strategies from the scientific point of view makes the novelty of the research.

When writing this article, we were guided by his own pedagogical experience and materials obtained as a result of the analysis of the scientific and legal literature on the problem.

III. Results and Discussion

There are three *types of education*, correlated with the socio-economic development of the state and the world system as a whole (Krasnov, 2013):

- 1) catching up or lagging (it follows the development of the social circumstances, meeting its requirements);
- 2) synchronous (operates in the up-to-date realities of life, responding to the slightest changes);
- 3) leading (with the goal to achieve future benchmarks, anticipating the development of the social and economic situation).

The best tool to leave behind the catching up type and to move forward to leading type of education is innovations.

In general, Dodgson & Gann (2019) define innovation is ideas, successfully applied. Innovative education technologies have to prepare a person for life in the changing world that means the orientation of the learning process on the potential capabilities of the person and their realization (Zhusupova, 2018).

According to Dzhumayeva & Khayrullayeva (2019) innovations in pedagogies are fundamentally new methods of interaction between teachers and students that ensure the effective achievement of the result of pedagogical activity.

For every type of project and for all levels of an organization Molloy (2019) suggests the following *steps in the innovation process*:

- 1) spot opportunities for innovation (to discover what problems need solving and where do opportunities lie);
- 2) prioritize opportunities;
- 3) test potential innovations;
- 4) build support for your innovations (the stage involves all stakeholders, including those whose resource backing are needed and those who will directly benefit from this innovation);
- 5) learn from innovation efforts.

State Education Policy in Kazakhstan and Kyrgyzstan

At the level of the state some of innovation process steps both in Kazakhstan and Kyrgyzstan are implementing. Based on the known problems, the state determines the range of opportunities and directions of development of the education system. The government documents of Kazakhstan and Kyrgyzstan also identified key priorities. Both countries are in the process of testing potential innovations.

Strategy “Kazakhstan-2050” (2014) states the need to modernize teaching methods and to develop online education systems, creating regional school centers. This strategy requires introducing innovative methods, solutions and tools into the education system, including distance learning and online learning, accessible to all comers.

In State program “Digital Kazakhstan” (2017) the need to completely review the content of all levels of education through the development of digital skills of all specialists is defined along with the need for revising the content of secondary education through the development of creative thinking and technical skills.

This strategy also contains a plan for continuing education of teachers on new digital technologies. In order to expand educational opportunities for all who wish to acquire the necessary skills, a national platform for open education with online courses is to be created.

The Strategy for the Development of Education in the Kyrgyz Republic for 2021–2030 contains thematic (substantial) lines that unite all levels of education. The most important of them for our research are the content of education, focused on the development of skills and competencies of each student; and digitalization of education (both teaching information communication technology skills, and creating an electronic learning environment, using distance and other technologies and creating digital management) (Kanimetova, 2019).

As we can see from this short review of the legal sources, governments of Kazakhstan and Kyrgyzstan make an accent on two main opportunities for innovations: digital technologies and development skills and competencies of each student.

Potential innovations are in the process of testing in both countries.

In Kazakhstan some schools have to become a platform for approbation of multilingual model of education and innovations in education. The number of schools rendering the education services in three languages has to be increased from 33 to 700; the network of the Nazarbayev Intellectual Schools will be expanded from 6 to 20 in accordance with the State Program of Education Development (2010).

At the same time as the digitization of the entire education system in Kyrgyzstan is one of the priorities in the development of education, the Ministry of Education and Science of the Kyrgyz Republic organizes the experimental sites for the development and testing of new education methodologies, methods and approaches for the implementation of digital (electronic) education. The goal is the creation of a new educational practice, the development and testing of legal, organizational and economic conditions for the implementation of pedagogical initiatives (Kanimetova, 2019).

Innovative Technologies in School Geography Classes

In this study, our task is to contribute to prioritizing the use of opportunities at the school geography lesson level. The main question is what are the appropriate innovative technologies are worth to be tested as potential innovations for Kazakhstan and Kyrgyzstan schools.

The theoretical and methodological level of innovation, considering and analyzing the structure, essence and classification of all internal processes, has been actively studied by such scientists as M.M. Potashnik, N.B. Pugacheva, A.V. Khutorskoy, V.I. Zagvyazinskiy.

Potashnik (2010) made numerous researches on the innovative approach to teaching. He raised the main problem of modern pedagogy: the lack of interest in learning among students. In his work Potashnik examined the reasons for children's disinterest in learning, on the basis of which he developed clear criteria for a quality modern lesson, which involved innovative technologies (Potashnik, 2010).

Khutorskoy (2019) considered modern innovative teaching technologies, including heuristic training, competency-based, system-activity and meta-subject approaches. In addition to analyzing the application of the above methods, he presented the specifics of the implementation of approaches in the context of the functioning of new education standards (Khutorskoy, 2019).

Pugacheva et al. (2011, 2012) highlighted the major educational problems of introduction of innovation in the school practice in her works on the establishment and description of the innovative educational environment with specification techniques used.

Zagvyazinskiy (2011) revealed the laws and principles of the innovative development of education, outlined the values, goals and results of education. Besides the strategic goals, Zagvyazinsky also studied the practical implementation of innovation: the problems of applying the competency-based approach in a modern school, ways of organizing individualized learning for schoolchildren (Zagvyazinskiy, 2011).

Lazarev (2004, 2008) gave great importance to the psychological readiness of teachers for innovation, recognizing the issue of the quality of teacher readiness as the most important in the process of transforming the educational system.

Next, we consider a range of innovative technologies of interaction between teachers and students that was used in school practice all around the world and in the context of a geography lesson in the secondary school of Kazakhstan and Kyrgyzstan. Among these technologies we need to identify the proper decisions for the achieving the mentioned tasks from the state strategies of Kazakhstan and Kyrgyzstan.

Ataeva (2018) defines pedagogical technology as a set of psychological and pedagogical settings that define a special set and layout of forms, methods, methods, teaching methods, educational tools. The teaching technology provides for the interconnected activities of the teacher and the student, taking into account the possibilities of individualization and differentiation of training, and the use of technical, including computer-aided learning tools.

The varieties of innovative pedagogical technologies include the following (Panfilova, 2012):

1. Design method.
2. Competency-based approach.
3. Problematic learning.
4. Interactive methods.
5. Discussion method.
6. Project methods.

Design Method

Design methods for teaching students geography effectively help at the stage of creative activity and can adapt to subject realities. The basis for the implementation of the project method in teaching students is posed a problem for which solutions must not only have knowledge of geography but also master intersubject knowledge (Ayashev, 2013).

This deepens the relationship of modern geography with history, chemistry, algebra, biology and even literature, this fact must be used in teaching children using innovative technologies. Activation and

accumulation of inter subject knowledge contribute to the formation of interdisciplinary competence, that is, it enables the student to use integrated versatile knowledge in solving the problem.

The Competency-Based Approach

The competency-based approach is a continuation of the activity-oriented approach and a way of implementing a personality-oriented approach (Lazarev, 2015). It implies the orientation of students by the teacher to be included in a conscious, active, diverse, and gradually complicated activity.

The implementation of this activity requires from students the intensification of will, the efforts made to achieve the desired result. But, at the same time, it allows students to build a unique competence necessary to society in the future and in the current circumstances.

The peculiarity of organizing a competency-based approach in a geography lesson can be considered as building up a special lesson structure (in comparison with the traditional lesson). It should be noted that we formed the structure of the lesson, starting from the system of A.V. Khutorskoy. The lesson contains the following stages (Khutorskoy, 2013):

- 1) implementation of educational tension;
- 2) specification of the object of education;
- 3) clarification of tasks;
- 4) solution of a problem situation;
- 5) review and presentation of the resulting educational product;
- 6) analysis and product ordering;
- 7) involvement of cultural and historical precedents and analogues;
- 8) general reflection.

During the lesson the teacher notes the educational, cognitive, value-semantic, general cultural, personal, general labor and communicative competencies that students build during the lesson. Analytical activity includes (Khutorskoy, 2016a):

- 1) analysis of static materials on the topic;
- 2) analysis of maps, atlas;
- 3) subsequent material ordering.

The student's assessment activity in a geography lesson comprises the following:

- information assessment of the topic by students (for example, when studying the natural conditions of Kazakhstan and Kyrgyzstan, its climate, soil structures, topography, and internal waters are evaluated);

- students' substantive assessment of information on a topic in the context of the development of agriculture and industry, the prospects of tourism development, a road map, i.e. everything related to the

topic studied (for example, the natural conditions of Kazakhstan or Kyrgyzstan from the perspective of improving tourism in a particular region).

Creative activity, which includes the formation of their own educational product (Khutorskoy, 2016b):

- 1) project on the topic;
- 2) presentation of the student's own opinion on the topic;
- 3) participation in the discussion and giving their own opinions.

Reflexive activity initiated by the teacher and containing the development of self-esteem by students of their approaches and opinions. Reflexive activity can be divided into (Aronova et al., 2013):

- 1) intention (conscious voluntary direction);
- 2) design;
- 3) co-organization.

Problematic Learning

Problem-based learning trains the students to think critically, to be involved in the process of learning. This technology can improve students' reasoning ability (Ruhimat et al., 2018). So use of the technology of problematic learning in geography classes is appropriate to the state educational policies in Kazakhstan and Kyrgyzstan.

Ruhimat et al. (2018) report that with a help of this technology during geography lessons it is possible to investigate environmental issues which have direct impacts to the students. It is significant that students can use their personal experience in the process of finding the solution of the problem.

Problem-based learning trains the students to solve environmental problems that occur around them. The role of environmental issues in a problem-based learning can improve their reasoning ability. Geography teachers can raise the problems that exist in their local environment in the learning material, so the students can find the solutions of the problems since they are directly interact with those problems. (Ruhimat et al., 2018)

Interactive Method

The interactive methods that are used in the modern school of Kazakhstan and Kyrgyzstan in teaching geography. Interactive methods can be attributed to a significant means of implementing a competency-based, system-activity approach, as well as to an element of entire innovative technologies (Mynbaeva, 2012).

The inclusion of interactive methods in learning stimulates cognitive activity, increases the motivational attitude, and activates the ability to independently and creatively solve arising problems (that is, take responsibility for finding an effective way to achieve this goal in an unfavorable environment).

All these qualities contribute to the formation of creative, divergent thinking of future specialists, develop a proactive approach and independence.

When teaching geography to students, the following interactive methods can be successfully used based on our experience:

- 1) simulation games;
- 2) role playing games;
- 3) “brainstorming”;
- 4) picturesque diagnostics;
- 5) synectics;
- 6) cluster.

Game techniques (both role-playing and imitation) are conducted according to the following scheme:

- 1) introduction to the gameplay;
- 2) division into groups;
- 3) game “immersion”;
- 4) implementation of the game process;
- 5) summarizing the results;
- 6) reflection.

You shouldn’t forget about motivation in the implementation of the game stages. Motivational impact is made when introduced into the gameplay and during division into groups.

The advantages of interactive methods are widely known; however, they have some drawbacks. While evaluating the effectiveness of interactive techniques, many teachers of present days start to actively use them during the lesson. This often leads to distortions in the structure of the active lesson and the transformation of the lesson into a game activity.

In our opinion, the teacher should clearly realize the appropriateness of applying these methods, the degree of completeness of their implementation into the lesson plan, and consciously limit the use of interactive task increasing the quality of its implementation.

On the other hand, we should note about the directly interactive tools for teaching the geography to students (for example, an interactive board, projector). Thanks to them, it is much easier to organize capacious, effective, holistic lessons, which are highly comprehensible. Developed computer technologies related to innovative ones facilitate the presentation of material to the teacher and act as a significant element in the formation of modern active learning.

Discussion Method

In the research of Nurwahida (2018) the discussion method was considered as a part of a model of Cooperative Learning type Project Based Learning. The result of this research showed that using discussion method in geography classes can improve students' learning.

Teaching Geography Using the Project Method

Teaching geography using the project method should be based on a clear logical structure (Ayashev & Ibashova, 2015).

Stage 1. "Problem Definition"

It includes the formation of a problem situation by the teacher, after which the students determine the problem itself and identify project tasks:

- description of situations that contribute to highlighting one or more problems on a given topic;
- discussion with students of the problem and their proposed design tasks.

Stage 2. "Hypothesis formation"

It includes a discussion of the issue and the hypotheses put forward by students with subsequent argumentation. The teacher acts as a passive assistant who doesn't control, but rather coordinates the course of the debate:

- conversation with students on the development of a hypothesis;
- controversy between students, leading to the determination of the final version of the hypothesis.

During this stage, students develop the ability to lead a discussion, defend their own opinions, while hearing an interlocutor; the ability to compromise and briefly communicate their thoughts.

Stage 3. "Organization of the project"

It includes the planning of work by students, the distribution of areas of responsibility between them. The teacher makes corrections in the proposed options:

- teacher helps to correctly plan the project;
- students divide the course of the project into elements, form a sequence of their implementation;
- students discuss the planned results of the project.

During the stage, students improve their skills in working with the information space, with facts and reference materials on the topic. An important point is to gain experience in participating in collective distribution activities.

Stage 4. "Project implementation"

Students perform tasks previously set under the supervision of a teacher:

- teacher accompanies the activities of each child and, if necessary, provides support;
- students are working on implementation with a search for facts and arguments.

During the stage students get the skill of group work, learn to clearly perform the tasks of the project.

Stage 5. "Results reporting"

The teacher takes an active part in the discussion and presentation of the project results. Students are advised on issues of design, decoration, connecting the visual range in the project: graphics, illustrations. During the stage children develop a creative attitude to the project, get the skill of using various artistic means.

Stage 6. "Evaluation of the project results":

- teacher takes part in the discussion, but does not introduce significant criticism into this discussion, enabling students to make their own decisions;
- teacher helps students correctly approach the project assessment, identify the main mistakes and develop ways to finish the project, as well as correct mistakes.

Students learn to analyze the results of their own work and determine the causes of mistakes, in order to subsequently eliminate them.

Drawbacks of the project method

Despite its effectiveness, the project method in the learning practice of teaching geography at school has a number of drawbacks, to be more exact, "fragile" moments:

1. The project method endangers re-evaluating the achieved results and underestimating the process. This fact is explained by the fact that the assessment is based on the results given in the presentation. In order for the assessment to be of maximum objectivity, the teacher should carefully consider the formation and further analysis of the project portfolio. A well-designed portfolio reflects the progress of the project; it can be analyzed after the project is finished.

2. Also, the problem of the project may be its transformation into a simple abstract. So, the teacher should remember that it's not enough to research scientific works on the problem and state their content, the project should reflect the student's opinion on the topic of the project.

3. The organization of the project system in the school is not always accompanied by the necessary substantive thematic unity and system. Often this phenomenon occurs in schools, in the teams of which are many creative teachers.

4. But the most important point is the full implementation of educational tasks in the process of project activities. The traditional educational system is characterized by the consideration of educational issues only from the intellectual side, while the emotional side is considered secondary. But at the same time, students' moral principles should be formed. The philosophy of active education that uses the project activity, the main moral principles are responsible for the decisions taken, responsiveness, and understanding of one's duty. In this regard, it is necessary to pay attention to educational issues during project activities as part of the implementation of innovations.

Advantages of the project method

The method of projects in geography classes at school allows the student to be creative, improve cognitive skills, while the main task of the teacher is the competent direction of the students, stimulation of their own mentality and activity, not limited by the opinion of the teacher.

Besides, project teaching develops such competencies as inventiveness; ability to solve problems; decision-making skills; ability to communicate effectively with others (Đorđević et al., 2020).

The advantage of the project method is that each student, even with less knowledge or who is not able to apply them in practice, has the opportunity to develop these abilities, as well as improve creativity and independence. Project work allows us to exclude the formal nature of students studying geography, activates their interaction to achieve practical learning outcomes.

The selection of design topics is determined by the external situation. When teaching geography, the project method can be applied within the program material on any topic, which is explained by the selection of topics taking into account practical significance for students. Therefore, the main task becomes the formulation of the problem introduced to the students, which they will solve in the process of project work.

The project method allows you to effectively improve the thinking process through the transformation of standard geography lessons into a kind of discussion club where students can freely debate, solve important and interesting problems. It is necessary to pay attention to the fact that these tasks should be selected in entire accordance with the peculiarities of the culture of the country, the level of students' capabilities and the degree of their interest. That is, the effectiveness of the project method depends on the pedagogical talent in a timely, competent and full-fledged way to put this technology into practice.

Using Informational Technologies in Geography Classes

The state strategies and programs both of Kazakhstan and Kyrgyzstan contain such strategic directions of the development of the educational systems as digital technologies. So, we need to consider the experience of using of innovative informational technologies in a teaching process.

First of all, we should mention the experience of teaching using geospatial technologies. These technologies are hardware and software used to collect and analyze geographical data and include geographical information systems (GIS), Global Positioning Systems (GPS) and remote sensing (Coleman, 2018).

During the research of the use of geospatial technologies in secondary geography education in Australian secondary schools (students aged 13-18 years) Coleman (2018) concluded that despite their inclusion in the curriculum the level of GST adoption by teachers remains low.

The development of Google's mapping platforms (Google Maps, Google Earth, Google MyMaps) as free downloadable or web-based software now allows anyone with an internet-capable device to engage with geospatial information. This software, coupled with the popularity of smartphones and other portable devices (such as laptops, tablets and iPads), has led to unprecedented levels of access to geospatial information amongst non-geographers. (Coleman, 2018)

Huang (2018) reports on results of using GIS software in an elementary school in a remote area of southern Taiwan. The students were all had basic computer skills.

Students learned to use Google Earth and Google Map software easily. However, students found the software complicated. So, Google Maps and Google Earth are better than GIS software for students at elementary school.

The main outcomes of this research included the following:

- a positive attitude towards geography and spatial technologies in students;
- spatial technologies were considered useful tools for planning walking;
- for exploring their hometown Google Maps and Google Earth were fun to use;
- students gained new information about their local community and had become more familiar with features of their hometown (Huang, 2018).

Multimedia technologies can be successfully used in geography classes. According to Ramadhan et al. (2018) learning media is a supporting tool in the process of teaching and learning.

First students perceive the multimedia technology in the classroom at the level of the game. Only gradually these technologies involve them in serious creative work, in which the personality of the student develops (Zhusupova, 2018).

Ramadhan et al. (2018) researched the use of Adobe Flash for geography e-learning in Indonesian school. For the purposes of choosing technologies for Kazakhstan and Kyrgyzstan it is

important that e-learning based Adobe Flash can be accessed by many computers with limited access of internet speed (Ramadhan et al., 2018).

E-learning geography using Adobe Flash was effective to enhance students' cognitive learning outcomes (Ramadhan et al., 2018).

A design of the research conducted in Indonesia included three groups:

- the group that used interactive multimedia learning technology (ICT media),
- the group that used three-dimensional media (3D),
- the group that used environmental media (Prasetya, 2018).

As the result significant differences between groups using environmental media, 3D media and ICT media on interest and learning outcomes were found.

The highest interest and learning outcomes are in groups using environmental media, followed by 3 D media and ICT media. There is a close relationship between interest in media usage and learning outcomes. The greater the interest in media use, the greater the learning outcomes achieved by students (Prasetya, 2018, p.561).

For purposes of our study it is also important to review the results of using computer teaching systems.

Intelligent Tutor System created in Brazil is a computational system that incorporates artificial intelligence techniques to act as tutor of a student in geography. This system allows to learn with the help of mobile devices and assists the teacher (Moro et al., 2018).

In the research of Yerzhanova and Maketova (2018) a service LearningApps.org was used in the discipline "Social and economic geography of the World". It is a multimedia tool which supports audio, video, graphics, interactive system of control, and also provides an opportunity of organizing interaction. The results of the research showed the increase of quality of knowledge for 13–15 % at different stages of lessons (Yerzhanova & Maketova, 2018).

Researching the use of the Google Classroom for teaching geography Bondarenko et al. (2018) concluded that Google Classroom as an educational interactive tool that allows creating an informatively rich educational environment integrating the text editor, cloud storage, email and other applications can support real-time interaction of real-time learning subjects, formation of professional geographic competencies. But among the disadvantages the need for extra-curriculum pedagogical support, which requires additional time consuming from the teacher, was pointed out.

Also, we should mention the positive results of using a popular non-educational mobile game, "Pokémon Go" for the design of educational activities in Biology, Geography and Mathematics for secondary level students (14–15 years old). The research showed that mobile technologies can enhance learning and students' attitude (Deslis et al., 2019).

Choosing the Innovative Technology for Geography Classes

Sleptsova (2019) insists that despite the breadth of scientific and pedagogical research, the results achieved in the practical activities of educational institutions, the development of the hardware of computer equipment and specialized software, it was not possible to significantly increase the efficiency of the educational process in educational institutions at various levels. These results are connected with the fact that the abundance and accessibility of information provided to students by computer systems and databases through, in particular, the global Internet is in no way connected with its individual educational goal.

However, if a teacher establishes the framework of using informational technologies, literally teaches students to learn to use the modern technologies, the outcome can be really better, as it can be seen from the mentioned above researches.

Besides both Kazakhstan and Kyrgyzstan will gain with developing such innovative technologies as e-learning, online tutor systems and learning applications because sometimes only through Internet can be effectively delivered really vast knowledge to some remote settlements in this country. We have to notice that in Kazakhstan rural population makes 42.6% and in Kyrgyzstan–66.1% (Allworth & Sinor, n.d.; Hambly et al., 2020). Thereby the use of digital innovative technologies in the teaching process in Kazakhstan and Kyrgyzstan is vital.

Innovation doesn't have to become the end purpose. Even if a school has a sufficient funding for buying all kinds of gadgets, applications, virtual reality glasses and 3D printers, a teacher should understand clearly what it is all for. For example, digital innovative technologies can be used for the purposes of inclusion and make quality education accessible to all children, without exception. Modern technologies allow children to be creative. To make education accessible and effective, you need to open three doors: a teacher, curriculum and technology in the hands of students. And these three components are equally important and help each other (Kiselyova, 2019).

Also, choosing the innovative technology for using in school classes we have to take into account the costs. How much is it to organize discussion or to visit the local river? How much is it to use Google Maps during the geography lesson or to buy virtual reality viewers and the router? Is it possible for a school to pay for safe storage of the equipment and software updates?

As we remember from the Indonesian report mentioned above, the most effective medium utilized in the learning of geography was learning geography in the real environment; students learn the subject directly, thus the more real learning (Prasetya, 2018).

Subramani & Iyappan (2018) distinguish face to face learning (synchronous) and hybrid learning the traditional method of teaching and learning (asynchronous). In addition to the synchronous teaching hybrid teaching includes e - learning.

We agree with the opinion of Miroshnikova (2019) that the school should move on to a model of mass personalization. This model can be examined along with the hybrid learning by Subramani & Iyappan (2018), because it combines innovative pedagogical methods and educational technologies. Mass

personalization includes learning to learn, in-depth knowledge on creativity and analysis, and project activities (Miroshnikova, 2019).

Testing the hybrid teaching model Subramani & Iyappan (2018) obtained improvement in students' soft skills, critical thinking and problem solving; increase in compute skill and technical skills of students; better accomplishing of course teaching objective. As the effectiveness of in-class activity increases, it encourages out-of-class learning (Subramani & Iyappan, 2018).

In our opinion the most appropriate choice of the innovative technologies for the school education can be done using such an asynchronous model of teaching. But it requires some more professional competencies from teachers than just pedagogic knowledge.

Teacher as the Main Support for Innovations

As we mentioned above the next step in innovation process is to build support for innovations. One of the key stakeholder of this step is a teacher who both responsible for the time and qualification recourses and directly benefits from the innovation achieving better teaching results. The teacher is required to selecting teaching methods and techniques that meet all modern requirements and help implement a productive educational process.

A modern teacher creates an atmosphere and learning conditions that stimulate students' interests, meets their needs in developing their potential, develops a strategy so that students can learn effectively and meet the goals to be achieved. Simultaneously, such a teacher acts as a facilitator who helps students to be creative in understanding the materials (Rahmawati et al., 2018).

At the same time, despite the urgency of improving the educational system, the introduction of innovations is often resisted both by practical teachers and by the administrative apparatus. Prigozhin (1989) called these trends as “anti-innovation barriers”, and Slastenin referred them as a “psychological barrier” (Slastenin & Podymova, 1997).

The reason for the formation of such confrontations must be considered psychological unpreparedness for the perception of everything new. Practitioners are trying to “pass” through the prism of their own worldview new trends and shift them to their experience. The main criterion in this case will be the absence of the need to destroy the already built pedagogical system.

Formed and developed pedagogical habits impede the introduction of pedagogical innovations, initiating the emergence of “innovative resistance.” Zagvyazinsky and Strokova (2014) drew attention to the opposition to innovation, which is characteristic of all levels of the pedagogical system.

So, starting from the highest levels of the structure, where typical anti-innovative judgments (“it’s already there”, “what’s the reason to re-invent a bicycle?”, “This is not a solution to the problem”, etc.), and at the level of specific teachers: “it’s difficult to implement in our school”, “this will not suit my students” (Zagvyazinsky and Strokova, 2014).

The stage of using innovation, which, in our opinion, is now taking place in Kazakhstan and Kyrgyzstan, no longer demonstrates open resistance of the participants in the process. Meanwhile, there is a latent or involuntary opposition. So Slastenin and Podymova (1997) wrote about the problem-creating methods of “piecewise implementation”, “perpetual experiment”, and “reporting and parallel implementation”.

This fact should not be ignored, but on the contrary, it is necessary to pay maximum attention to it, to cope with the fears and contradictions of local educators, to bring the introduction of innovative technologies to the final level. That is why the introduction of innovation should, in the first place, be accompanied by a large-scale and effective clarification to all the problematic issues, both from the technical and psychological part.

We tend to agree with Polyakov (2007), who proposed to perceive the process of resistance to innovation as a natural phenomenon. Polyakov (2007) presented the illusory opinion that the development of new technologies in pedagogy can be completely painless. This is especially true of our significant territorial state. In our opinion, the introduction of something new in most cases is a turning point: stereotypes, established preferences and developments.

But, considering this situation, we are by no means calling for inaction. On the contrary, the elimination and minimization of innovative resistance should be the most important task for the heads of educational institutions of Kazakhstan and Kyrgyzstan.

The basis of such work can be the algorithm proposed by Zagvyazinsky and Strokova (2014): a teacher’s positive perception of innovation; understanding of the essence and proper result of innovation; a positive emotional response to innovation; acceptance of innovations and the formation of preferences; the formation of a teacher’s value orientations in relation to innovation; the creation of his own system of innovative values; full assimilation and adoption of innovations.

Note that the above-mentioned algorithm describes an ideal situation that is unlikely to happen in real life. But, despite the emerging resistance, the consistent implementation of this mechanism forms the basis for the full adoption by teachers of innovative technologies and their further integration into practice.

Thus, working with innovative resistance is administered by a teacher of the educational institution and should be based on identifying the true causes of opposition and resolving them through the use of personal innovative reserves.

Besides resistance to innovation there is the more complicated challenge for innovators in education. Teachers in Kazakhstan and Kyrgyzstan are underpaid and grossly overworked (Ozisik, 2015; Lee, 2016). The mass of teachers is not ready for the transition from traditional teaching methods to the use of information technology in the educational process. Computers are so far mainly used as an aid to learning (Berdaliev & Atakanova, 2018). According to Hong et al., among Chinese geography teachers only 27.71% could use multimedia and other electronic resources. (Sishchuk, Gerasimova, & Goncharova, 2018) These issues can need the attention of the government to support the strategic plans for continuing education of teachers on new informational technologies.

Teaching the geography with new technologies creates new requirements for modern teachers, basic of which is being able to work with innovative technologies: multimedia, interactive boards and computer (Yerzhanova & Maketova, 2018).

Sure, a technology can be used in different ways. For example, Coleman (2018) reports about two strategies: to use geospatial technologies in creative ways that enable students to develop higher-order thinking skills and deep learning of geography concepts or to use these technologies merely for demonstration or engagement purposes.

Although all the teachers in the study of Degirmenci (2018) agreed to the necessity of using GIS in geography lessons, they did not use this technology sufficiently. There were several reasons of inefficient use of this technology: infrastructure of GIS laboratories, softwares, hardwares and other necessary tools, lesson hours and teaching programs, teachers' skill of using this technology (Degirmenci, 2018).

There can be other non-technological obstacles for teachers: "there are no geography classrooms, there is not enough equipment and equipment to be used in geography courses in classrooms, classes are crowded and physical conditions are bad" (Kaya, 2018).

These data are from the research in schools of Turkey, but the situation can be the same in some schools of Kazakhstan and Kyrgyzstan. Even for German teachers the first obstacle for innovation is school equipment. A shortage of technological tools and digital media in some schools considered inhibiting innovation (Krohmer & Budke, 2018).

We can conclude that the most of these problems in teaching and learning environment cannot be solved on the school level. But a teacher is still the main power in implementing innovative technologies into the educational process. Even without any modern equipment for geography lessons is it possible to use non-digital innovative technologies like projects, discussions or problem-solving methods for effective teaching. The point is to use any innovative technology as a good supplement to the teaching process.

Krohmer and Budke (2018) in their study of the understanding of innovation by geography teachers in relation to their activities in the classroom came to the important conclusion that the changes in lessons can consist of new combinations of known elements and do not have to be absolutely new. There has to be an opportunity to repeat such changes in new routines. The role of innovations in geography classes is to break routines (Krohmer & Budke, 2018).

IV. Conclusions

The requirements of modern society to the quality of education are reflected in state education development programs and strategies in Kazakhstan and Kyrgyzstan. The introduction of innovative technologies in teaching should take into account the economic, social and strategic features of the regions. There is no need to implement all technologies at once, but there is a need to attentively choose appropriate technologies.

For the conditions of Kazakhstan and Kyrgyzstan with the purpose of implementation of state directions, taking into account local and international experience in teaching geography, the combination of the innovative technologies should be most acceptable. Along with the ideas of personalization and hybrid learning, design method, competency-based approach, problematic learning, interactive methods, project methods combined with e-learning technologies as the basic digital technologies should be used in order to break routines in the teaching-learning process and to achieve better results in geography classes.

An important part of the effective process of introducing innovations in the education system should be the work with teachers as key persons in the overall effectiveness of education.

In order to efficiently implement an innovative approach to learning, the teacher must not possess the methodology, but the skills of organizing and using innovative technologies. Moreover, in view of the possibility of the emergence of innovative resistance, the task of revealing the importance and subsequent popularization of innovation in the teaching staff lies on the shoulders of the head of the educational institution.

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