



KAPITEL 7 / CHAPTER 7⁷

FORMATION OF DIGITAL COMPETENCE DURING GEOGRAPHY LEARNING AT SCHOOL

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Introduction

The use of digital technologies in all spheres of social life has especially intensified in recent years, due to the spread of the Covid-19 pandemic. These changes did not escape the sphere of education, which had to quickly adapt to the new realities of distance learning. In this regard, many digital platforms and resources for learning in secondary schools and universities have appeared. Among them, digital online whiteboards, resources for creating infographics and maps, electronic maps and interactive atlases, statistical databases, mobile applications, etc. have gained the most popularity for studying geography. It is important for a modern secondary school teacher to choose the best digital applications for their effective introduction into the educational process.

7.1. Application of SMART technologies and tools in the school geography course






The long period of the Covid-19 pandemic in 2020-2022, as well as the beginning of a full-scale war in Ukraine in February 2022, necessitated the widespread use of digital platforms and tools during the implementation of the educational process in general secondary education institutions, including during geography lessons.

One of the first and urgent problems that arose in this context was the choice of a platform for teaching and communication between the teacher and students. The modern market of digital products offers a wide selection of such platforms. Let's consider the main ones, as well as highlight the advantages and disadvantages of each of them for the educational process (Table 1).




⁷Authors: Zastavetska L., Zastavetskyi T., Semehen O.



Table 1 - Advantages and disadvantages of the main digital platforms for communication and teaching

| Platform | Advantages | Disadvantages |
|--|---|--|
|  ZOOM | <ul style="list-style-type: none"> • Service for conducting video conferences and online meetings. • The platform has an electronic board for writing with a marker. • It is possible to divide the class into groups to perform tasks using the “rotation by stations” method. | <ul style="list-style-type: none"> • Limited number of participants. • The platform provides only online communication between the teacher and students. • There is no possibility to create tasks and evaluate them. • One of the least secure platforms. |
|  Google Meet | <ul style="list-style-type: none"> • Service for conducting video conferences and online meetings. • The maximum number of video meeting participants depends on the version used, usually from 100 to 500 participants. • There are no time limits for video meetings. • The platform has an electronic board for writing with a marker. | <ul style="list-style-type: none"> • The platform provides only online communication between the teacher and students. • There is no possibility to create tasks and evaluate them. |
|  Bigbluebutton | <ul style="list-style-type: none"> • Easy-to-use video tutorial creation platform. • Students do not need to install the app to join the webinars, the teacher can share their screen in real time. • Participants can collaborate using a number of tools, such as virtual whiteboards and shared notes. | <ul style="list-style-type: none"> • The platform provides only online communication between the teacher and students. • There is no possibility to create tasks and evaluate them. |
|  Cisco WebEx | <ul style="list-style-type: none"> • The platform makes it possible to conduct online lessons with high-quality video and audio. • Provided tasks for survey, evaluation, joint work. • One of the most secure platforms. | <ul style="list-style-type: none"> • The platform is compatible only with new digital products and updated versions of browsers. • Setting up work on this platform requires some time to learn. It is quite difficult for many users. |
|  Microsoft Teams | <ul style="list-style-type: none"> • Up to 300 students can be added to the meeting for free. • Access to permanent chat. • It is possible to transfer files. • It is possible to use the platform in inclusive education (for persons with hearing and visual impairments). • The platform has an electronic board for writing with a marker. | <ul style="list-style-type: none"> • The platform does not support documents with DOC, XLS and PPT extensions. • Quite complex interface. |



| | | |
|---|--|--|
|  Skype | <ul style="list-style-type: none"> • The platform can only be used for conference mode. | <ul style="list-style-type: none"> • The platform is not recommended by the Ministry of Education and Culture of Ukraine for use in the educational process. |
|  Google Classroom | <ul style="list-style-type: none"> • A free web service created by Google for educational institutions. • Provides for the creation of various types of tasks and opportunities for their evaluation – essays, tests, presentations, etc. • There is a mobile application. • You can create training courses. • Ability to accept and evaluate schoolchildren's homework. • You can add educational materials. | <ul style="list-style-type: none"> • Online conferences and meetings are not provided. • There is a limit on the number of students – you can join up to 25 people. • In the free version, there is no possibility to create a journal of student evaluation. |
|  Moodle | <ul style="list-style-type: none"> • An educational platform that will help you create effective online learning in your own environment. • Ability to create courses. • About 20 types of activities. • There is a mobile application. | <ul style="list-style-type: none"> • The platform does not allow live online communication between the teacher and students. |

The choice of a platform for learning and communication during the educational process depends either on the recommendations of the educational institution, or the teacher is given complete freedom to choose digital platforms and tools. Among the digital platforms listed in Table 1, only those that have gained the most popularity in Ukraine are presented.

In total, more than 500 platforms of various content have been developed in the world, which are used for conducting online meetings, lessons, and lectures. Among the presented platforms are those that are used for video conferencing mode and provide high-quality communication during the interaction of the teacher and students – Bigbluebutton, Google Meet, ZOOM. They have both paid and free versions, and can be easily used from a personal computer and from a mobile device. As a rule, such platforms are easy to use and have an intuitive menu. Thanks to these programs, you can hold a lesson, lecture, conference, conversation, etc. However, their significant drawback is that these platforms do not allow you to create tasks and check them.

Instead, the Google Classroom and Moodle platforms were developed from the beginning for educational needs. Accordingly, they are equipped with a whole set of tools for creating courses, various tasks, dictionaries, for uploading educational content, student evaluation journals, etc. However, the disadvantage of these platforms



is that they do not provide the opportunity to meet with students in conference mode. Therefore, teachers, as a rule, use a combination of several platforms – for communication and for creating and checking tasks.

Sometimes teachers like to use Viber, Skype and e-mail to communicate with students. And if in the early days of distance learning during the pandemic, the use of these resources seemed convenient, now the modern variety of available platforms allows the teacher to choose such tools that will allow him to organize his work as quickly and efficiently as possible, combining on one platform the possibilities of online communication during the explanation of the lesson and the creation of tasks, their verification and test control of learning results.

In addition to digital platforms, geography teachers can use other available SMART resources to organize the educational process. For convenience, we will group them into several categories (Fig. 1).

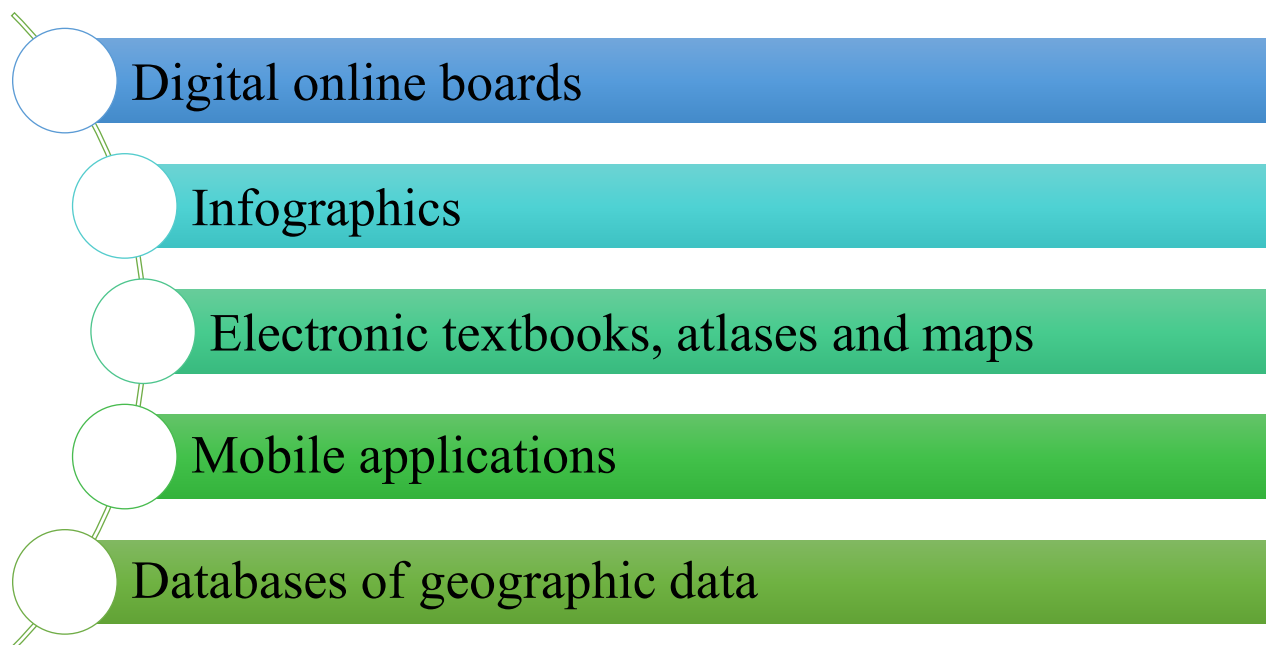


Fig. 1. The most popular SMART resources for studying geography

Since 2020, a global boom in the development of digital online boards has begun. If earlier they were characterized by simple characteristics, now the modern market of educational tools has been conquered by complicated online boards with rich functionality. In total, there are over 1,000 online boards of various developers and content, but the most popular among Ukrainian teachers are: Twiddla, MIRO, Awwapp, Idroo, Whiteboard Fox, Conceptboard, Groupboard, NoteBookCast, Drawchat, Limnu, Classroomscreen, Ziteboard, Padlet, etc.



Online boards can be widely used when teaching a geography course in general secondary education institutions (Fig. 2.).

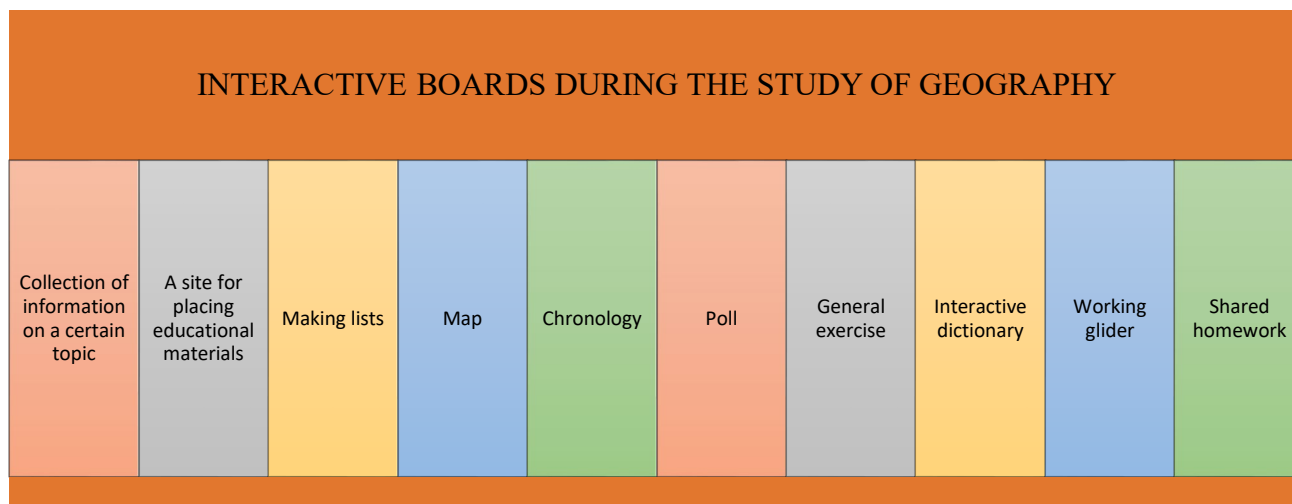


Fig. 2. Using interactive online boards when studying geography

During the study of the population, online boards can be used at all stages of the lesson – during the announcement of a new topic, generalization and systematization of knowledge, updating of previous experience, for posting tasks and their evaluation, etc.

The most popular online board in Ukraine is Padlet. It is easy to learn and easy to use for training. Padlet allows you to place a variety of content on one page: photos, drawings, audio files, videos, notes, links to other Internet sites.

To create a virtual board, you need to register at <http://www.padlet.com> or log in with an existing Facebook or Google+ account.

The “Maps” section may be interesting for a geography teacher. Thanks to this Padlet board tool, you can create tasks to mark certain places on the map, create captions for them, a short description, and upload your own photos.

Information graphics or infographics are graphical visual representations of information, data, or knowledge designed to quickly and clearly display complex information. It can improve the perception of information by using graphic materials to increase the ability of the human visual system to see patterns and trends. The process of creating infographics can be considered as data visualization, creation of information schemes and information presentation models. Among the most popular Internet services that will help create infographics for studying geography at school are: Canva, Infogram, Piktochart, Venngage, Easel.ly, Stat Planet, Visual.ly, Dipity,



Creately, Spritesapp, Exhibit, etc.

One of the best currently available tools for visualizing map data is InstantAtlas. In it, you can create interactive dynamic and narrow-profile reports that combine statistics and cartographic information.

When studying population in an 8th grade school geography course, students can be asked to mark the countries of the world with the highest and lowest population density, the largest cities in the world by population, etc. in the InstantAtlas program.

An interesting resource for creating geographic infographics is Easel.ly, which offers many free templates for creating infographics. All the structural elements of the future infographic can be adjusted and edited to your liking.

This service also has a library of ready-made forms, arrows, pointers and lines for creating flowcharts, easy adjustment of color palettes and fonts. It is also possible to add your own graphics for design.

Infogr.am is a free tool for creating charts, graphs and maps with the ability to upload videos and photos to create interactive infographics.

All the data for the finished infographic is entered into a table that resembles Excel. They can be edited at any time, and the built-in generator will automatically update the finished infographic. After completing all the edits, you can publish the result on the Infogram website, embed the infographic code on your website or blog, and share the link with your friends via social networks.

Modern online atlases and interactive maps are essential help for geography teachers. Among such resources, the electronic “National Atlas of Ukraine” deserves special attention, which contains a comprehensive selection of maps of various topics related to Ukraine. This atlas was created in paper and electronic versions.

The OSVITANET website has been developed for the convenient use of cartographic material in geography lessons at school, which offers a digitized version of atlases for all academic years – from the 6th to the 11th grade in geography (developed by the “Kartography” publishing house) for convenient use of cartographic material in distance learning.

To the attention of users – all tools of this site are conveniently divided into 2 blocks: interactive maps and interactive atlases. What is more, you can find appropriate cartographic content here not only for geography lessons, but also for history and natural science.

The block with interactive geographical maps is presented in sections: maps of the world, maps of continents, maps of parts and regions of the world, maps of Ukraine.



In addition to textbooks on geography, in the last 3 years, electronic online manuals have gained particular popularity, which contain a large amount of basic and additional material on each topic, rich cartographic and graphic material, and video applications.

An example of a successful and effective digital tool is the electronic guide arctgis.com – it is a new generation educational resource that combines the properties of an electronic textbook and an interactive map for studying and improving knowledge of geography. All educational information in the manual is structured into sections by continent. Each continent is studied according to a plan that repeats the content of a school textbook on geography: geographical position of the continent, history of exploration, tectonic structure and minerals, relief of the continent, climate, hydrological objects, natural zones, political map.

The text of each topic has words with colored highlights that contain hyperlinks to additional content: explanatory text for a new definition, a video related to the topic, an article from the “interesting to know” section, etc. The content of the training manual is constantly updated and supplemented with relevant information.

7.2. Digital competence as an important component of school geographic education

The main goal of basic general secondary education is the development and socialization of the student, the formation of his national self-awareness, general culture, worldview orientations, ecological style of thinking and behavior, creative abilities, research skills and life support skills, the ability for self-development and self-education in the conditions of global changes and challenges. The goal is realized through a competence approach to learning and the selection of educational material in accordance with the tasks.

The study subject “Geography” in institutions of general secondary education is designed to form the key competences of a modern citizen and a comprehensively developed personality (Fig. 3).

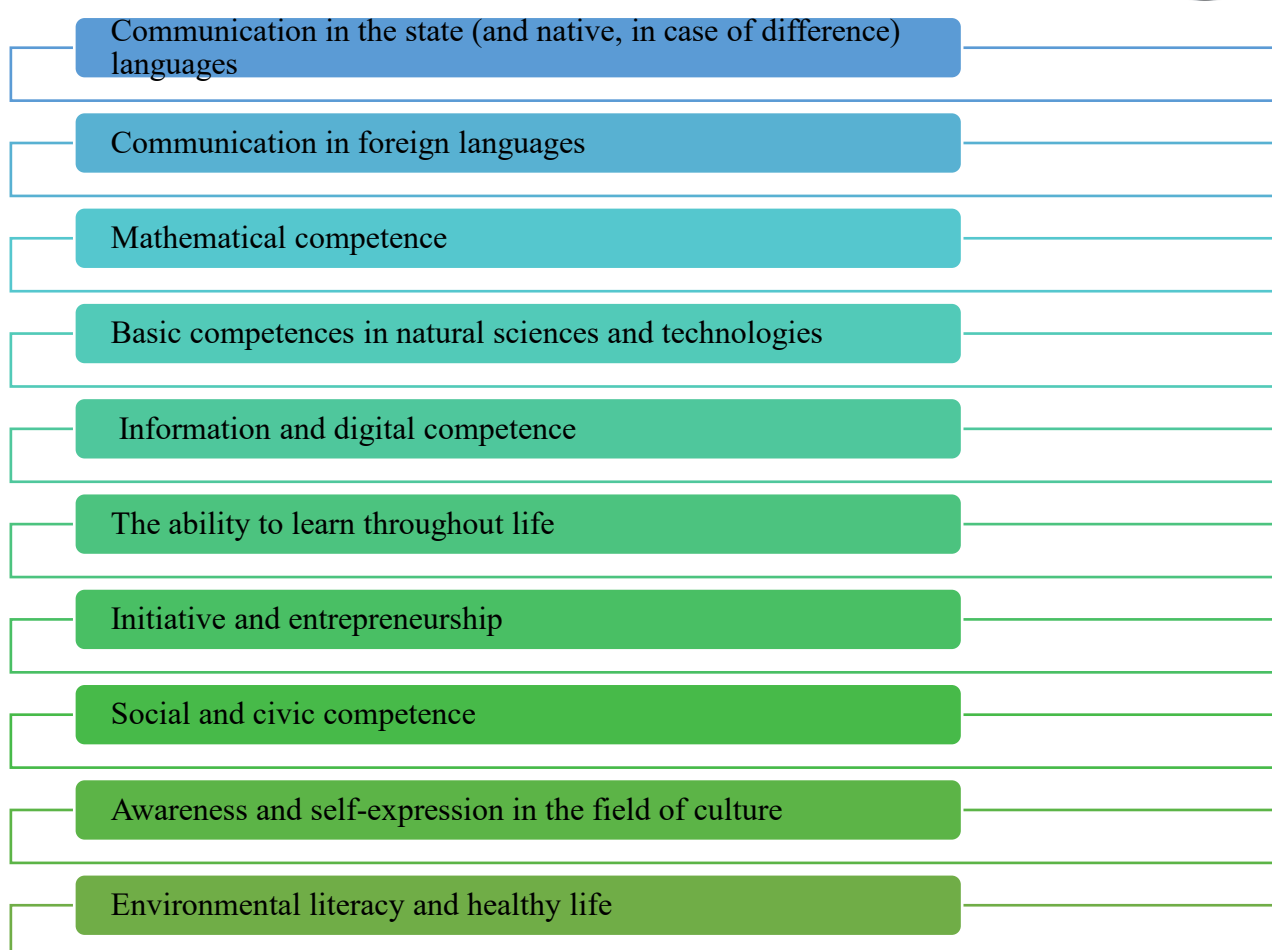


Fig. 3. Basic competences of the school geography course

It is worth noting that the basis of modern Ukrainian school geographic education is the competence approach of the European Framework of Key Competences (from 2006 and with changes from 2018), which allows for the formation of a complete personality and is aimed at the comprehensive development of a person as an individual and the highest value of society, his talents, intellectual, creative and physical abilities, the formation of values and competences necessary for successful self-realization, the education of responsible citizens who are capable of conscious social choice and direction of one's activity for the benefit of other people and society, enrichment on this basis of the intellectual, economic, creative, cultural potential of the Ukrainian people, raising the educational level of citizens in order to ensure the sustainable development of Ukraine and its European choice [3].

Let's consider the characteristics of each of the key competences of the European framework (Fig. 4.).



| | |
|---|---|
| <p>Literacy</p> | <ul style="list-style-type: none"> • The ability to identify, understand, express, create and interpret concepts, feelings, facts and thoughts both orally and in writing using visual, sound/audio and digital materials from different disciplines and in different contexts. It includes having the ability to communicate and effectively establish contacts with other people in an appropriate and creative way. |
| <p>Mathematical competence</p> | <ul style="list-style-type: none"> • Mathematical competence is the ability to develop and apply mathematical thinking and understanding to solve problems in everyday situations. Based on thorough numeracy, the focus is on process and activity as much as knowledge. Mathematical competence covers, to varying degrees, the ability and willingness to use mathematical ways of thinking and presentation (formulas, models, constructs, graphs, diagrams). • Competence in science is the ability and willingness to explain the natural world by applying a body of knowledge and methodology, including observation and experimentation, to identify problems and formulate evidence-based conclusions. • Technology and engineering competences involve the application of relevant knowledge and methodology in response to human desires and needs. Competences in science, technology and engineering encompass the understanding of transformations caused by human activities and the responsibility for them as individual citizens. |
| <p>Digital competence</p> | <ul style="list-style-type: none"> • Presupposes confident, critical and responsible use and interaction with digital technologies for learning, work, participation in public life. It covers information literacy, communication and collaboration skills, media literacy, digital content creation (including programming), security (including digital well-being and cyber security-related competencies), intellectual property related to problem solving and critical thinking. |
| <p>Personal, social competence and ability to learn</p> | <ul style="list-style-type: none"> • Is the ability to think, manage time and information effectively, work with others constructively, take a stand and manage one's own learning and career. This competence includes the ability to cope with uncertainty and complexity, the ability to learn, maintain physical and emotional well-being and health, be able to lead an informed healthy and future-oriented life, empathize and manage conflict in an inclusive and supportive context. |
| <p>Civil competence</p> | <ul style="list-style-type: none"> • Ability to act as a responsible citizen and fully participate in public life based on awareness of social, economic, legal and political concepts and structures, as well as global transformations and sustainable development. |
| <p>Entrepreneurial competence</p> | <ul style="list-style-type: none"> • Ability to respond to opportunities and ideas and turn them into value for others. It is based on creativity, critical thinking and problem solving, emphasizing initiative and persistence, the ability to collaborate to plan and manage projects that have cultural, social or commercial value. |
| <p>Cultural awareness and self-expression</p> | <ul style="list-style-type: none"> • Presupposes an understanding and respect for how ideas and content are creatively expressed and communicated in different cultures and through the means of different branches of art, other cultural forms. It includes participation in understanding, developing and expressing one's own ideas and sense of place or role in society in various forms and contexts. |

Fig. 4. Characteristics of key competences in the European Reference Framework (according to Prof. O.I. Lokshina) [2]

These competences are reflected in three important areas of educational and scientific-cognitive activity: research, thinking, communication (Fig. 5).

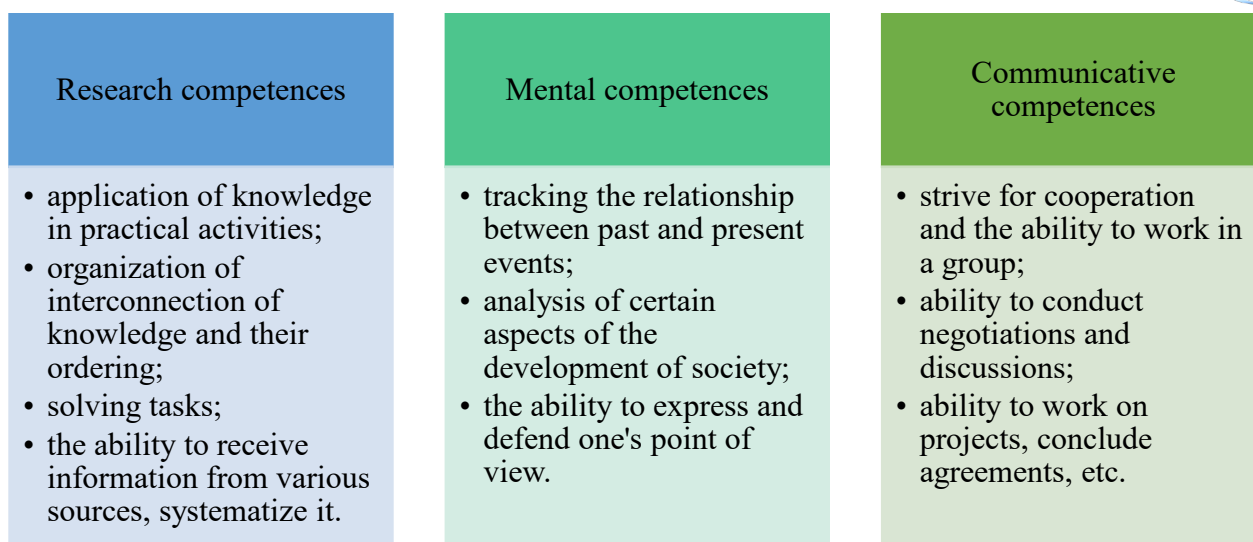


Fig. 5. The main blocks of competences that are implemented in the course of studying geography in institutions of general secondary education

Thus, the key competences of national education, including geographical ones, reflect the main positions of the European framework of key competences for lifelong learning.

In the course of our research, it is worth noting that among the basic competences that are gaining more and more importance in modern society, a special role belongs to two of them: information and digital competence and lifelong learning competence.

Conclusions

The use of digital technologies in all spheres of social life has especially intensified in recent years, due to the spread of the Covid-19 pandemic. These changes did not escape the sphere of education, which had to quickly adapt to the new realities of distance learning. As a result, many digital platforms and resources have emerged for high school and university education. Among them, digital online whiteboards, resources for creating infographics and maps, electronic maps and interactive atlases, statistical databases, mobile applications, etc. have gained the most popularity for studying geography. All these and other resources, mastered by the teacher and integrated into the study of the school course of geographic disciplines, make it possible to implement a competence approach in teaching and learning in secondary school (digital, mathematical, entrepreneurial, civic competence, the ability to learn throughout life, etc.), which is formed by the European Educational Framework of Qualifications, introduced by the Ministry of Education and Culture in Ukrainian education at all levels.