ISSN 3041-1831 (print) Ідентифікатор медіа: R30-05068
ISSN 3041-184X (online) *Media identifier: R30-05068*
Вісник післядипломної освіти: збірник наукових праць. Серія «Педагогічні науки». Вип. 34(63). Категорія «Б»
Bulletin of Postgraduate education: collection of scientific papers. Educational Sciences Series. Issue 34(63). Category «B»
https://doi.org/10.58442/3041-1831-2025-34(63)

https://doi.org/10.58442/3041-1831-2025-34(63)-291-310
UDC 372.801

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APPLICATION OF THE 5E MODEL IN THE TEACHING OF AZERBAIJANI GEOGRAPHY AND ITS COMPARATIVE ANALYSIS BASED ON INTERNATIONAL EXPERIENCE

Abstract. In recent years, the strengthening of constructivist approaches in education, particularly methods aimed at enhancing pupils' active participation and research skills, has increased the focus on the 5E model. Structured around the sequence "Engage–Explore–Explain–Elaborate–Evaluate" the core principle of this model is not to deliver knowledge in a ready form but to enable the pupil to discover and apply it step by step. International studies show that the 5E approach enhances key competencies such as critical thinking, problem solving, knowledge transfer and motivation. In Azerbaijani education, this model was first introduced in the 2023–2024 academic year in grade 6 geography textbooks. What draws attention here is that in grade 6, Azerbaijani geography was structured according to the entire unit based on the 5E model, whereas in grade 7, it is applied to separate topics within the unit. This feature demonstrates the practical adaptation of the 5E model to local needs within the context of the Azerbaijani curriculum. The article presents the theoretical framework of the 5E model and provides a comparative analysis based on the experiences of the United States, Finland, Singapore and Türkiye. At the same time, observations conducted on the new Azerbaijani geography textbooks show that the implementation of the model creates conditions for the practical use of knowledge through deepening tasks aimed at Azerbaijani geography, starting from learning global concepts. Since the teaching of geography has an integrative nature connected with both natural and social sciences, research-oriented and practice-based approaches are particularly important in its instruction. At present, many developed countries apply modern pedagogical technologies in geography lessons that stimulate pupils' active learning. For example, since 2016, Finland's general education curriculum has transitioned to phenomenon-based learning (PhenoBL),

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where pupils study real-world topics from interdisciplinary perspectives. In Singapore, the geography curriculum is based on the methodology called the "Geographical Inquiry Process" which emphasizes the inquiry-based approach as a "signature pedagogy" at all grade levels. Reforms carried out in these countries show that modern geography teaching focuses less on memorizing facts and more on developing pupils' skills in conducting research, working with maps and data, making decisions and solving problems. In the Azerbaijani education system, as a result of recent curriculum reforms, the objectives and tasks of the geography subject have been redefined, emphasizing aspects such as *"viewing the world from a local perspective, forming a global worldview, and fostering the concept of sustainable development".* To achieve these objectives, it is necessary to apply interactive and research-oriented methods in the teaching process. The 5E model provides a learning framework that meets these requirements and takes into account both the local context (e.g., Azerbaijani geography) and the global one. However, the implementation of the 5E model at the school level in Azerbaijan is still a new development and its first large-scale example can be observed in the grade 6 and grade 7 geography textbook sets introduced in the 2023–2024 academic year. Therefore, studying the 5E model in terms of content and methodology, comparing it with international experience and developing strategies for its application in the national context represent a relevant scientific and methodological issue. This research also presents a methodological approach developed by the author and demonstrates that the application of the 5E model at the unit level allows both efficient time management and deeper understanding of the topics. Based on the results, it is emphasized that teacher training, resource provision and consistency in textbook-methodological materials are of particular importance for the broad and systematic implementation of the model.

Keywords: 5E learning model; Azerbaijani geography; international experience; curriculum; research; skills-based learning.

INTRODUCTION / ВСТУП

Statement of the problem / Постановка проблеми. As a result of educational reforms implemented in the 21st century, student-centered and competency-based approaches to teaching have become central to the curricula of many countries. The "State Strategy for Education Development," adopted in 2013, set the goal of modernizing the content and methods of education in our

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country and widely implementing active learning methods that develop students' critical and creative thinking. Curriculum reforms implemented in this direction have stimulated the application of new pedagogical strategies in the teaching of general education subjects, including geography. National geography curricula also indicate that the use of inquiry-based strategies in geography teaching fosters student skills such as problem-posing, information gathering, analysis, and decision-making. This approach assumes that students acquire geographical knowledge and practical skills through tasks related to everyday life and based on real-world content.

The 5E model of learning, a constructivist model widely used in science education internationally, is recognized as an effective methodological framework that meets these requirements. The 5E model was first proposed by Professor Roger Bybee in the United States as part of the Biological Sciences Curriculum Study (BSCS) project (c. 1980s and 1990s) and was widely adopted in 1997. The model includes a sequential learning cycle consisting of five stages:

- *Engage* – capturing students' attention and generating interest in the topic;
- *Explore* – students' discovery of new information through research;
- *Explain* – interpreting newly learned concepts with the participation of the instructor or students;
- *Elaborate* – applying and expanding acquired knowledge in new situations;
- *Evaluate* – assessing learning outcomes and providing feedback [1, p. 1–35].

Research has shown that the use of the 5E model significantly improves students' academic achievement compared to traditional methods, enhances knowledge retention, and fosters positive attitudes toward the classroom. For example, a meta-analysis of 14 studies conducted between 2008 and 2014 on the effectiveness of the 5E model, which was widely implemented in Türkiye following the 2005 curriculum reform, found that the 5E model resulted in a significant increase in students' academic achievement (ES = 1.13), a significant increase in learning retention (ES = 1.42), and a positive average increase in attitudes toward the classroom (ES = 0.55).

These studies also emphasize that the 5E model is based on scientific findings and that its application develops students' higher-order thinking skills (analysis, logical inference, etc.). At the same time, it should be noted that the successful application of the 5E model depends on a number of conditions. In some cases, the 5E model may prove no more effective than traditional methods,

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primarily due to factors such as low teacher training, insufficient lesson time, and limited access to digital resources. In other words, while the 5E model potentially facilitates interactive, inquiry-based learning, its true effectiveness depends directly on the proper planning and implementation of the learning process [2, p. 1–214], [3].

Analysis of (major) recent research and publications / Аналіз (основних) останніх досліджень і публікацій. This article presents an overview of the scientific literature and research conducted on the 5E model of education over the past ten years (2013–2023).

The review examines and summarizes the results of meta-analyses, experimental studies, systematic reviews, and theoretical sources on this topic (textbooks, teaching aids, and official curricula). Specifically, it analyzes the structure and content of newly published geography textbooks for grades 6 and 7 in Azerbaijan and identifies ways to implement elements of the 5E model in educational materials. The 5E learning model is based on constructivist learning theory.

According to this theory, knowledge acquisition occurs when learners make connections between existing knowledge and new information and actively "discover" new knowledge. Each stage of the 5E model encompasses important components of this constructivist learning cycle. As noted by the model's founder, R.W. Bybee, and his colleagues, the 5E framework, developed from the 1962 Atkin-Karplus model and other previous learning models, was created in the late 1980s and early 1990s, and organizes the process of scientific knowledge formation in a sequential manner [1, p. 1–35].

Numerous studies conducted in recent decades have proven the effectiveness of the 5E model in various ways. For example, a study conducted in Australia by Boddy et al. [4], showed that students' higher-order thinking skills improved after a learning unit based on the 5E model.

Turkish researchers F. Ağül-Yalçın, and O. Avinch-Akpınar [5, p. 1–15] noted that assignments on topics prepared in accordance with the 5E model move students from a passive listener's position to a more exploratory and active one, increasing their motivation for the learning process. Another study [6] states that instruction using this model develops students' logical thinking and reasoning skills. Furthermore, systematic literature reviews conducted in recent years also confirm the overall positive effect of the 5E model.

For example, a large systematic review conducted in the United States and published in 2024 presented significant empirical evidence on the effectiveness of the 5E model [7].

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These reviews demonstrate that the 5E model not only improves students' scientific knowledge but also fosters their interest in the lesson and an active attitude toward the subject [8, p. 1–350].

Overall, an analysis of the scientific literature on the 5E model suggests that its proper application yields the following positive results in the teaching of many subjects, including geography.

AIM AND TASKS / МЕТА ТА ЗАВДАННЯ

The ***purpose*** of this article is to explore the scientific and methodological foundations of applying the 5E model to geography teaching in Azerbaijan, analyze the advantages and potential challenges of this model, and conduct a comparative analysis with the best practices of countries such as the USA, Finland, Singapore, and Türkiye in geography teaching.

To achieve this goal, the article defines the following ***objectives***:

- Analyze the theoretical foundations of the 5E teaching model and the results obtained in international studies;
- Explore the application of the 5E model in the general education curriculum and textbooks on the geography of Azerbaijan;
- Present a specialized methodology developed in accordance with the 5E model, as well as develop and demonstrate a sample lesson sequence for one section of the "Geography of Azerbaijan" course for grades 6–7;
- Conduct a comparative analysis of the Azerbaijani experience in the context of international pedagogical experience (USA, Finland, Singapore, Türkiye) and provide recommendations for further development.

THEORETICAL FRAMEWORK / ТЕОРЕТИЧНІ ОСНОВИ

The place of the 5E model in international practice (using the example of the USA, Finland, Singapore, Türkiye).

USA: In the United States, where the 5E model originated and developed, it has become a widely used standard methodology for teaching science. Specifically, the Next Generation Science Standards (NGSS), adopted in 2013, promote constructivist and phenomenological approaches, and teachers are encouraged to use learning cycles such as the 5E model when implementing these standards.

Methodological tools developed by the Biological Sciences Curriculum Study (BSCS) claim that the 5E model develops scientific thinking and engineering skills, which are also emphasized in the NGSS. For example, educational resources from institutions such as NASA and the National Geographic Society have

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developed numerous lesson plans structured around the 5E model for geography and earth science. Originally developed for science instruction, the 5E model is now being applied to some humanities subjects in the United States.

The model creates an active learning environment by engaging students in subject matter, conducting research, and applying knowledge. Thus, the US experience has formed a substantial research base that supports the effectiveness of the 5E model as an educational framework with empirical evidence. In particular, the BSCS report by Bybee et al. systematically analyzed the origins, theoretical foundations, and application results of the model, demonstrating its significant role in improving student achievement and developing scientific thinking [1, p. 1–35].

Finland: Finland, known as one of the world's leading countries for educational quality, has systematically incorporated active learning methods similar to the 5E model into its curriculum in recent years. Following the 2016 curriculum reform, Finnish schools have been implementing "phenomenon-based learning," which integrates subjects. With this approach, students select complex, real-life problems and events as topics—phenomena—and explore them by integrating various subjects.

Phenomenon-based learning is fundamentally inquiry-based, and therefore aligns with the philosophy of the 5E model. For example, in an interdisciplinary weekly project organized around the phenomenon of "time" in one Finnish school, students made clocks, studied calendars from different eras, and created a time plan for a future city. In this process, students are first motivated by the topic (engagement), then conduct research (exploration), present their findings (explanation), deepen their learning by working on various projects (elaboration), and finally, demonstrate and evaluate the results (evaluation). As can be seen, although the Finnish model is not formally called 5E, it has a step-by-step, inquiry-based structure. As a result, Finnish students demonstrate advanced problem-solving skills and creative thinking [9, p. 1–3].

Finland's experience also shows that models like 5E can be applied not only to individual lessons but also to larger projects—weekly projects, interdisciplinary modules—in which case collaboration between teachers from different subjects plays a crucial role. The Finnish example demonstrates that inquiry-based, step-by-step learning makes the process of understanding the material more meaningful and prepares students to solve real-life problems.

Singapore: Singapore, with one of the most effective education systems in East Asia, utilizes an inquiry-based learning approach to geography instruction. Singapore's Ministry of Education's geography lesson plans emphasize that "inquiry in teaching is a distinctive feature of pedagogy," and this is implemented

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at all levels of learning through the process of geographical inquiry. The process of geographical inquiry consists of four stages: "engagement," "data collection," "analysis and reasoning," and "reflection."

These stages are equivalent to the 5E model—for example, "interest" corresponds to the "engage" stage, "data collection" to the "investigate" stage, "analysis" to the "explain/clarify" stage, and "reflection" to the "evaluate" stage. Singaporean geography textbooks and teaching aids provide specific examples of this inquiry process. For example, in the "Weather and Climate" topic, students are asked the question, "Why is annual temperature change in Singapore small?" Students first discuss what they know, then conduct a brief investigation to collect climate data, then analyze and explain the results, and finally prepare a presentation and present it to the class.

For each stage of this sequence, the teacher provides questions, resources, and assessment criteria. Singapore's experience demonstrates that an inquiry-based approach similar to the 5E model improves student achievement in geography. Furthermore, the Singaporean geography curriculum places significant emphasis on fieldwork—schools implement geographic research projects, which extends the "Exploration" phase of the 5E model beyond the classroom walls and into the real world. Overall, Singapore's example demonstrates that an inquiry-based approach can be successfully applied to subjects such as geography and that it is strategically supported at the national curriculum level [10, p. 1–40].

Türkiye: Like Azerbaijan, Türkiye's education system, as a country in transition, underwent a shift from traditional to constructivist methods in the 2000s. Following a decision made in 2004, the curricula for grades 1-5, including the "Social Studies – History and Geography with Elements" curriculum, were updated to reflect constructivism and began to be implemented in the 2005–2006 school year. In this context, the 5E model officially became the recommended methodology in the new curricula.

Turkish teachers began to widely use the 5E model, particularly in primary and secondary science subjects (science and technology), and this approach was later widely adopted by geography teachers. When the geography curriculum for grades 9–12 was updated in Türkiye in 2005, it emphasized project work, research, and active methods, and encouraged teachers to connect geography subjects to students' daily lives and environments (MEB, 2005).

Research conducted in subsequent years examined Turkish geography teachers' attitudes toward the 5E model. For example, in a 2017 survey, although most geography teachers believed that the 5E model improved the quality of their teaching, some stated that they were unable to fully implement the model in every

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lesson due to time constraints. However, a small-scale experiment conducted in Turkish high school geography classes in 2018 found that a lesson based on the 5E model significantly improved student achievement in the topic of population geography. The Turkish experience is particularly interesting for Azerbaijan because the transition to constructivism in the curricula of both countries occurred at the same time, and they share common cultural roots. The results obtained in Türkiye demonstrate that if teachers are methodologically well prepared to implement the 5E model and if lesson resources are sufficient, it is possible to contribute to the development of both academic and practical skills in geography lessons.

Thus, international experience provides numerous examples of the successful application of the 5E model in geography teaching. The "American Model" demonstrates how the 5E model can be refined as a system; the "Finnish Model" paves the way for interdisciplinary integration; the "Singapore Model" demonstrates how inquiry-based learning has become a priority in the national curriculum; and the "Turkish Model" demonstrates the challenges and opportunities that arise during a similar transition process.

The conclusion of this comparative review is that the 5E model can be adapted across cultures and systems while maintaining its general pedagogical principles. While each country adds specific innovations to the model to suit its needs and circumstances (e.g., interdisciplinary application in Finland, curriculum-wide application in Azerbaijan, etc.), the model's core—a student-centered, inquiry-based approach—remains unchanged.

Table 1

Application of the 5E model by country and results for Azerbaijan

Country	Features of application	Lessons to be learned by Azerbaijan
1	2	3
USA	The country where the 5E model was first implemented	Creation of resource and methodological platforms for the 5Es at the national level
	The curriculum structure is aligned with the NGSS (2013)	Development of an open bank of 5E lessons and methods for methodological support for teachers

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Continuation of the table 1

1	2	3
USA	The methodological foundations and extensive resource base were developed by BSCS	Special attention to the 5E model in official educational documents
	Organizations such as NASA and National Geographic have lesson plans based on the 5E model	Special attention to the 5E model in official educational documents
Finland	An interdisciplinary, phenomenon-based learning model	Application of the 5E model in the format of interdisciplinary projects
	Students conduct research on real-world problems	Organizing geography lessons as integrated modules with history, biology, and computer science
	A high degree of faculty autonomy and team-based planning	Development of project-based learning
Singapore	Research-based teaching of geography is recognized by state policy	Organizing continuous field research in geography lessons
	The "Geographical Research Process" has a structure parallel to the 5E program	Reinforcing skills in working with meteorological and cartographic databases
	Fieldwork, observation, and working with real data are central	Systematizing presentation, discussion, and analytical reporting skills
Türkiye	The constructivist curriculum and the 5E model have been widely adopted since 2005	Developing 5E training courses and certification modules for geography teachers
	Extensive teacher training programs have been developed	Expanding teaching and learning materials and creating example lesson plans

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Continuation of the table 1

1	2	3
Türkiye	Difficulties with time management and resource constraints have arisen during implementation in geography lessons	Establishing mechanisms for monitoring and supporting the implementation of 5E

Since the early 2020s, Azerbaijan has been working to improve curricula and develop next-generation textbooks for general education institutions. New sets of geography textbooks have been developed, beginning with the 6th grade, and will be available in schools beginning in the 2023–2024 academic year. According to methodological recommendations developed by the Institute of Education of the Ministry of Science and Education, these textbooks are structured according to the 5E model, which is widely used internationally. Each section of the textbook covers one or more topics, and each section begins with examples and quizzes drawn from real-life situations, nature, or technology.

Table 2 presents an example of the unit structure in the new geography textbooks using the 5E model. It summarizes the stages and corresponding activities for the "Weather" unit for 7th grade.

Table 2

Sample section on "Weather Conditions" in a 7th grade geography textbook, corresponding to model 5E

Stages 5 E	Application in the textbook
1	2
Engage	The section begins with illustrations and questions to focus students' attention on the topic. For example: Describe the phenomenon depicted in the illustration. What consequences might this type of weather cause? (The illustration depicts trees bending under the force of a strong wind.) These questions arouse students' curiosity: "Why does the wind affect this?" and appeal to their existing knowledge
Explore	Students are offered small experiments and observational tasks. For example, they can conduct a "Humidity and Temperature" experiment with a thermometer and water vapor in the classroom, or observe the movement of a flag to determine wind direction in the schoolyard.

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Continuation of the table 2

1	2
Explore	In the textbook, as part of the "How Do Clouds Form?" subsection, students prepare a simple "cloud model" using cotton wool and water (recommended by the teacher in the methodology section). Students work in groups and discuss their observations
Explain	The teacher summarizes the students' research and introduces them to theoretical concepts. Elements of weather conditions—temperature, precipitation, pressure, and wind—are explained sequentially in the textbook. For example, in the topic "How Does Air Temperature Change?", graphs of thermal inversion and daily and annual temperature variations are presented, and the teacher explains them. Errors are corrected by answering students' questions (for example, by explaining the phenomenon of "warm air rise"). At this stage, the main text and illustrations from the textbook are used
Elaborate	In the "Summary Tasks" section of the textbook, students apply their new knowledge to various situations. For example, students analyze and compare temperature and precipitation data for different regions (Baku, Nagorno-Shirvan, Lankaran, etc.) on a map of Azerbaijan. In the "City of Winds" task, they read a text and answer questions such as: why is it windy in Baku, what is the difference between Khazri and Gilavar, and so on. Students can also complete a short project, such as "Make a device to measure air humidity at home." At this stage, the teacher provides additional examples and expands the scope of the concepts
Evaluate	In the "Evaluate" section of the textbook, mastery of the topic is assessed using questions. For example, there are control questions: "What is drizzle and how does it form?" and an open-ended question: "Why is it colder in mountainous regions?" Students can also independently assess their knowledge using criteria (recommended by the teacher in the methodological guidelines). At this stage, the teacher analyzes the students' answers, identifies any gaps, and provides feedback

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As can be seen from the table, all stages of the 5E model are consistently reflected in the new textbook and adapted to the subject content. It is particularly noteworthy that the "Deepening" stage of the 5E model prioritizes the teaching of topics related to the geography of Azerbaijan. The special methodological model we developed aims to systematize this principle: the optimal distribution of the 5E model stages in the study of the geography of Azerbaijan.

According to this model, the 5E sequence for each section of the main topic in geography courses for grades 6 and 7 should be planned as a unified educational unit. Traditionally, the 5E model is applied over a single lesson—45 minutes—or several blocks of lessons; our approach utilizes a "5E scale by sections." This is due to the fact that the structure and distribution of hours in national textbooks presuppose the implementation of several topics within a single section, which together form a series of concepts.

This model demonstrates that by applying the 5E model at the unit level within the Azerbaijani curriculum, it is possible to fully master subject content while simultaneously developing research skills. The advantage of this approach is that sufficient time is allocated to each 5E stage, allowing students to explore both global and local examples without rushing.

If the 5E model were applied separately to each lesson, there might sometimes not be enough time for in-depth study or assessment; however, when applied at the unit level, time can be allocated more effectively. On the other hand, since the teacher must plan the entire unit as a single scenario, responsibility increases, requiring high methodological skills. Therefore, to implement the model proposed by the author, it is important to engage teachers in professional development and provide them with sample unit plans.

Overall, the new textbooks and teaching methods for geography in Azerbaijan can be seen as a creative adaptation of the 5E model to the national context. The main innovation here is the application of the model to entire units, rather than individual lessons, and the systematic integration of local geographic material into the model. Initial impressions indicate that students appreciate the new approach to teaching: lessons have become more dynamic, assignments are more meaningful, and geography is transformed from a "subject to be memorized" to a "subject to be discovered."

RESEARCH METHODS / МЕТОДИ ДОСЛІДЖЕННЯ

The following methods were used in this article:

1. Theoretical analysis – studying and systematizing scientific sources related to the 5E teaching model (monographs, articles, teaching aids, official curricula, etc.).

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2. Meta-analysis and literature review – summarizing the results of international studies (2008–2024) on the impact of the 5E model on students' academic performance, motivation, and thinking development.

3. Content analysis of teaching materials – analyzing the structure and content of new Azerbaijani geography textbooks for grades 6–7, identifying elements of the 5E model in them.

4. Comparative analysis (comparative method) – comparing the application of the 5E model and research approaches in teaching geography in Azerbaijan, the USA, Finland, Singapore, and Türkiye.

5. Modeling method – developing and presenting the author's methodological model for teaching geography in Azerbaijan based on 5E principles.

These methods allowed the author to comprehensively study the theoretical foundations, practical application and international experience of using the 5E model, as well as to offer recommendations for its adaptation to the national education system of Azerbaijan.

RESEARCH RESULTS / РЕЗУЛЬТАТИ ДОСЛІДЖЕННЯ

The results of this study demonstrate that the application of the 5E learning model to teaching geography in Azerbaijan is both theoretically and methodologically sound and practically effective. Based on the comparative analysis conducted in this article, the following key findings emerge:

The 5E model is aligned with a constructivist teaching philosophy and places the student at the center of the learning process. International research (Anıl & Batdı [3], Ruiz-Martin & Bybee, [11], and others) shows that this model improves student achievement, engagement, and interest in the lesson. This model, particularly well-tested in science teaching, is equally suitable for subjects such as geography, as its teaching also incorporates processes such as inquiry, observation, and analysis.

The new geography curriculum and textbooks in Azerbaijan are based on the principles of the 5E model. An analysis of the structure of textbooks for grades 6 and 7 revealed that lesson sections begin with the "Involvement-Exploration" phases, the "Explanation" phase provides theoretical material, the "Development" phase includes examples from local geography and integrative tasks, and the "Evaluation" phase conducts summative assessment. This also demonstrates that curriculum reforms are being implemented in line with modern requirements. In other words, the Azerbaijani education system integrates modern global trends (phenomenal learning, inquiry-based learning, etc.).

ISSN 3041-1831 (print) Ідентифікатор медіа: R30-05068
ISSN 3041-184X (online) *Media identifier: R30-05068*
Вісник післядипломної освіти: збірник наукових праць. Серія «Педагогічні науки». Вип. 34(63). Категорія «Б»
Bulletin of Postgraduate education: collection of scientific papers. Educational Sciences Series. Issue 34(63). Category «B»
https://doi.org/10.58442/3041-1831-2025-34(63)

The comparative analysis revealed several unique aspects of the Azerbaijani model. In particular, the use of the 5E model within an entire module is new to our country. This allows for the learning period to be extended beyond a 45-minute lesson.

It was found that while in the US and other Western countries, the 5E model is typically taught within one or more lesson hours, in Azerbaijani practice, a module consisting of several lessons covers the same period of the model. This difference is due to the structure of the geography curriculum and can be viewed as a purposeful integration of the model.

The application of the 5E model promotes skill-based learning in students, rather than knowledge-based learning. As demonstrated by the sample teaching scenarios developed as part of the study (for example, in the "Climate" section), students gradually master both global geographic patterns and local specifics.

This approach develops analytical thinking—they first learn a universal rule and then apply it to their own country. As a result, students not only memorize but also apply what they understand. This means developing 21st-century skills—critical thinking, problem solving, and application.

CONCLUSIONS / ВИСНОВКИ

A review of international experience shows that the Azerbaijani model is on the right track, but several points should be addressed during implementation. A lesson learned from the examples of Finland and Singapore is that interdisciplinary collaboration and providing a real-world context make learning more engaging and profound. In this regard, geography teachers are encouraged, where possible, to organize integrative lesson projects with teachers of other subjects (e.g., biology, chemistry, history)—for example, the topic "The Environment and Human Activity" could be taught as part of a joint 5E biology-geography project. Furthermore, the Turkish experience has shown that teachers may experience difficulties adapting to the new model in the early stages.

Therefore, in Azerbaijan, teaching the 5E model should also be prominently featured in teacher training programs. To ensure that all geography teachers fully embrace this approach, methodological seminars, video presentations of example lessons, and experience sharing should be organized.

Prospects for further research in this direction / Перспективи подальших досліджень у цьому напрямі. In conclusion, it should be noted that the introduction of the 5E learning model into geography instruction in Azerbaijan is an important step toward modernizing education in our country.

ISSN 3041-1831 (print) Ідентифікатор медіа: R30-05068
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This model allows students to study geography not just as numbers on maps, but as a living, dynamic, and interconnected science. Compared to international experience, we still have much to learn and apply—for example, by increasing the number of interdisciplinary projects in geography lessons and making greater use of digital technologies (GIS, interactive maps).

However, the steps already taken deserve praise: the fact that our textbooks reflect a modern approach, and our teachers are beginning to master new methods, creates a solid foundation for future success. In conclusion, we recommend that the Ministry of Education (Ministry of Science and Education) implement additional methodological support projects to improve the effectiveness of the 5E model.

For example, we could organize "5E lesson competitions" where teachers would compete for the best structured lesson plans using the 5E model that are both motivating and educational. Furthermore, future geography teachers at universities should be familiar with the theory and practice of the 5E model—this topic should be included in pedagogy courses.

As we determined in our research, the success of the model largely depends on the training of the teachers implementing it. Therefore, the better we prepare our teachers, the more interesting, profound, and memorable our geography lessons will be.

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Text of the article was accepted by Editorial Team 25.10.25

ISSN 3041-1831 (print) Ідентифікатор медіа: R30-05068
ISSN 3041-184X (online) *Media identifier: R30-05068*
Вісник післядипломної освіти: збірник наукових праць. Серія «Педагогічні науки». Вип. 34(63). Категорія «Б»
Bulletin of Postgraduate education: collection of scientific papers. Educational Sciences Series. Issue 34(63). Category «B»
https://doi.org/10.58442/3041-1831-2025-34(63)

ЗАСТОСУВАННЯ МОДЕЛІ 5E У ВИКЛАДАННІ ГЕОГРАФІЇ АЗЕРБАЙДЖАНУ ТА ЇЇ ПОРІВНЯЛЬНИЙ АНАЛІЗ НА ОСНОВІ МІЖНАРОДНОГО ДОСВІДУ

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Анотація. В останні роки посилення конструктивістських підходів в освіті, зокрема методів, спрямованих на підвищення активної участі та дослідницьких навичок учнів, призвело до посилення уваги щодо моделі 5E яка структурована навколо послідовності «Залучати – Досліджувати – Пояснювати – Розробляти – Оцінювати», основний принцип цієї моделі полягає не у тому, щоб надавати знання в готовій формі, а у тому, щоб дати учню можливість відкривати та застосовувати їх крок за кроком. Міжнародні дослідження показують, що підхід 5E розвиває ключові компетенції, такі як критичне мислення, вирішення проблем, передача знань та мотивація. В освіті Азербайджану цю модель уперше було запроваджено у 2023–2024 навчальному році у підручниках з географії для 6-го класу. Тут звертається увага на те, що у 6-му класі географія Азербайджану була структурована відповідно до усього розділу на основі моделі 5E, тоді як у 7-му класі вона застосовується до окремих тем у межах розділу. Ця особливість демонструє практичну адаптацію моделі 5E до місцевих потреб у контексті навчальної програми Азербайджану. У статті представлено теоретичну основу моделі 5E та наведено порівняльний аналіз, заснований на досвіді Сполучених Штатів, Фінляндії, Сінгапуру та Туреччини. Водночас спостереження, проведені за новими азербайджанськими підручниками з географії, показують, що впровадження моделі створює умови для практичного використання знань шляхом поглиблення завдань, спрямованих на азербайджанську географію, починаючи з вивчення глобальних понять. Оскільки викладання географії має інтегративний характер, пов'язаний як з природничими, так і з суспільними науками, особливо важливими у його викладанні є дослідницькі та практичні підходи. Наразі багато розвинених країн застосовують сучасні педагогічні технології на уроках географії, які стимулюють активне навчання учнів. Наприклад, з 2016 року навчальна програма загальної освіти

ISSN 3041-1831 (print) Ідентифікатор медіа: R30-05068
ISSN 3041-184X (online) *Media identifier: R30-05068*
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Bulletin of Postgraduate education: collection of scientific papers. Educational Sciences Series. Issue 34(63). Category «B»
https://doi.org/10.58442/3041-1831-2025-34(63)

Фінляндії перейшла на феноменологічне навчання (PhenoBL), де учні вивчають реальні теми з міждисциплінарного погляду. У Сінгапурі навчальна програма з географії базується на методології під назвою «Географічний дослідницький процес», яка підкреслює дослідницький підхід як «фірмову педагогіку» на усіх рівнях навчання. Реформи, проведені у цих країнах, показують, що сучасне викладання географії менше зосереджене на запам'ятовуванні фактів і більше на розвитку навичок учнів у проведенні досліджень, роботі з картами та даними, прийнятті рішень та вирішенні проблем. В системі освіти Азербайджану, у результаті нещодавніх реформ навчальних програм, цілі та завдання предмета географія були переосмислені, з акцентом на таких аспектах, як *«погляд на світ з локальної точки зору, формування глобального світогляду та сприяння концепції сталого розвитку».* Для досягнення цих цілей необхідно застосовувати інтерактивні та дослідницькі методи в освітньому процесі. Модель 5E забезпечує навчальну основу, яка відповідає цим вимогам та враховує як місцевий контекст (наприклад, географія Азербайджану), так і глобальний. Однак впровадження моделі 5E на рівні школи в Азербайджані все ще є новою розробкою, і її перший масштабний приклад можна спостерігати у комплектах підручників з географії для 6 та 7 класів, запроваджених у 2023–2024 навчальному році. Тому вивчення моделі 5E з точки зору змісту та методології, порівняння її з міжнародним досвідом та розробка стратегій її застосування у національному контексті є актуальним науково-методологічним питанням. Це дослідження також представляє методологічний підхід, розроблений автором, і демонструє, що застосування моделі 5E на рівні підрозділів дозволяє як ефективно керувати часом, так і глибше розуміти теми. На основі результатів наголошується, що підготовка вчителів, забезпечення ресурсами, узгодженість підручників та методичних матеріалів мають особливе значення для широкого та систематичного впровадження моделі.

Ключові слова: модель навчання 5E; географія Азербайджану; міжнародний досвід; навчальна програма; дослідження; навчання на основі навичок.

TRANSLATED AND TRANSLITERATED / ПЕРЕКЛАД, ТРАНСЛІТЕРАЦІЯ

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Retrieved October 25, 2025 отримано
Reviewed November 05, 2025 рецензовано
Published November 26, 2025 опубліковано