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**PROSPECTS AND FEATURES OF IMPLEMENTATION OF PROJECT-BASED  
LEARNING IN THE CONTEXT OF "CHESS" AS A SCHOOL SUBJECT IN PRIMARY  
SCHOOL \*\*\***

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**Abstract**

*In this article, special attention is paid to project-based learning (PBL), a complex of successful learning methods that ensure the diversity and effectiveness of the learning environment. It focuses on forming and developing learners' inquiry activity, critical and creative thinking, and ability to navigate a changing society. Examining the essential components of project-based learning, we can see a visible connection to the content of chess education. The paper aims to identify the features of PBL in chess education and its application possibilities. The research employed the following methods: document analysis, questionnaire survey, in-depth interview, and focus group method.*

*The article answers the following questions: What perceptions and ideas do the teachers of the "Chess" subject have regarding project-based learning? What conditions ensure the formation of the culture of project-research activity in educational chess? What are the difficulties of PBL in educational chess? What potential does the Chess subject have for the feasibility of project-based learning?*

*At this moment, with its potential, the chess subject in PBL can provide a smoother transition from primary school to secondary school and promote motivation in the educational process because project-based works motivate teachers and learners by their nature and content.*

**Keywords:** *project-based learning (PBL), "Chess" as a school subject, primary school, competency-based approach, critical and creative thinking.*

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## INTRODUCTION

Today, the focus of public attention is on competency-based learning, which is the educational process that develops standardized knowledge, skills, and values and forms attitudes, in which learning begins with the learner's knowledge, opinions, and experience and, based on them, allows them to search together, find new ideas and experience, it encourages learners to participate in discussions and cooperate. The latest State Standard of General Education (2021) is based on the competency-based approach. It defines eight key competencies and sets out the expected learning outcomes. Competencies are formed and manifested with the help of different educational activities: interactive methods, research activities, and debates. Pasi Salberg developed the idea of an interactive task, which makes the involvement of learners in the task's performance possible and organized (Smith B., MacGregor J., 1992, p. 68).

In this context, special attention is paid to project-based learning, which is a complex of successful learning methods for ensuring the diversity and effectiveness of the learning environment. Moreover, general education focuses on forming and developing learners' inquiry activity, critical and creative thinking, and ability to navigate a changing society. On the other hand, project-research activities help bridge the gap between different academic subjects and find ways to expand the connections between subjects and learners' interests. Project works help the learner to be motivated, develop their knowledge, interests, attitudes, and values, get involved, bear responsibility, and unite; they contribute to forming and strengthening self-confidence and belief in one's abilities. PBL allows learners to define the goals of the learning process with the teacher.

Within the project-research activities, the teacher's role is to create an educational environment in which the interests and abilities of each learner are emphasized, in which learners test their knowledge and skills, study, develop, and achieve self-knowledge. Moreover, PBL can significantly contribute to helping learners achieve their current goals, develop future goals, and set life goals.

The PBL method was created in the second half of the 19<sup>th</sup> century. While applying this method, learners acquire theoretical knowledge, practical skills, and abilities. Project learning can become one of the primary tools of competence-based education, leading to the expected learning outcomes with clearly defined and direct steps. The latter's manifestations are visible and tangible at the end of the project.

Swiss psychologist Jean Piaget, famous for his theory of cognitive development, in his work

on constructivism, emphasizing the active role of learners in the construction of world perception, discussed and analyzed several educational approaches, including the PBL approach. John Dewey contributed to the theoretical formulation of the project method in the first quarter of the 20th century. He used the project method in pragmatic pedagogy to organize children's purposeful activities, considering their individual preferences, interests, and abilities. American educator and psychologist W. H. Kilpatrick was the first to provide a comprehensive description and theoretical rationale of the "project method" (1918): the project method assumed a system of learning in which learners acquire knowledge and master skills in a planned and continuous manner, during the solution of increasingly complex practical tasks.

According to Y.S. Polat's definition, "the project method is based on the development of the learner's cognitive skills, the ability to build one's knowledge independently, the ability to navigate in the information space, and the development of creative and investigative thinking."

In contrast to traditional classroom lessons, the project-based approach pursues an ambitious goal. Based on that goal, learners conduct studies within the framework of cases of social importance for them, contributing to the development of specific abilities and skills.

The success of PBL depends on the principles coordinating the activity, which include:

- orientation towards real life,
- orientation towards problem determination,
- orientation to the result-product,
- process-based approach,
- social trend (Sharipov F.V., 2011, p. 375).

It is evident from the above that the project method makes possible the tight connection between the organization and the implementation of training and the analysis of social environment and reality problems. In this context, project-based education seeks to overcome the separation of school and life with methodological guidance.

However, generalizing the works and views of various researchers on the discussed issue, the issue of ensuring the effective organization of project-research activities at different levels of education (as well as in chess education) has yet to receive adequate coverage. At the same time, the conclusions of several researchers show that the critical problem for introducing PBL is the teachers' superficial knowledge of the project method's theoretical foundation and the need for competence while organizing project activities.

## METHODS AND METHODOLOGY

The work aims to identify the features of PBL in chess education and the possibilities of applying it.

The research carried out within the framework of this paper assumed to get the answers to the following questions:

1. What perceptions and ideas do the teachers of the "Chess" subject have regarding the organization and implementation of project learning?
2. What conditions and factors ensure the formation of the culture of project-research activity in educational chess?
3. What are the difficulties of PBL in educational chess?
4. What potential does the Chess subject have for the feasibility of project-based learning?

The research employed the following methods: document analysis, questionnaire survey, in-depth interview, and focus group method. We used a **purposive sampling** method to select the teachers for the survey. This method allows us to select participants who meet the defined criteria. In total, a questionnaire survey was conducted among 122 teachers who met the following criteria:

- ✓ STEM teachers,
- ✓ Participants in PBL training.

The primary data were collected through 15 in-depth interviews with chess teachers and four focus-group discussions with chess teachers and others (8 participants each). The **selection of teachers for the focus group** discussion was made according to the following criteria:

- teacher's work experience,
- teacher qualification,
- gender of the teacher,
- age of the teacher,
- participation in training.

The study's main findings and data were obtained using qualitative methodology. The interviews were conducted in private by the article's authors themselves in a friendly and confidential atmosphere. These interviews were recorded and later transcribed for detailed accuracy in analysis.

All the respondents were selected based on a set of sampling criteria described in the paper: the preliminary list of teachers provided by the Chess Academy of the Republic of Armenia. Since

this list is an official registry of teachers, this would mean our sample is relevant and representative.

While we recognize the importance of quantitative data in this phase of our research, they serve a secondary and supporting role. The authors collected the quantitative data to complement the qualitative insights.

Indeed, the next stage of our project will focus on investigating the effect of PBL among primary school students and educators who work with them. This study further explores the practical effects and possible advantages of PBL in this context, contributing to ongoing relevance and innovation in this area.

Note that the sample size may be small, which could reflect the strength of the conclusions. If there are fewer respondents, the results will not display the total variation of the population and can, therefore, not generalize to a larger or different group.

Again, implementing PBL in chess education will look very different from setting to setting. The instructor's experience, the available resources, and even specific activities used to deliver PBL may make a difference. Once again, this could provide variability that might make replicating results from these studies challenging in other contexts.

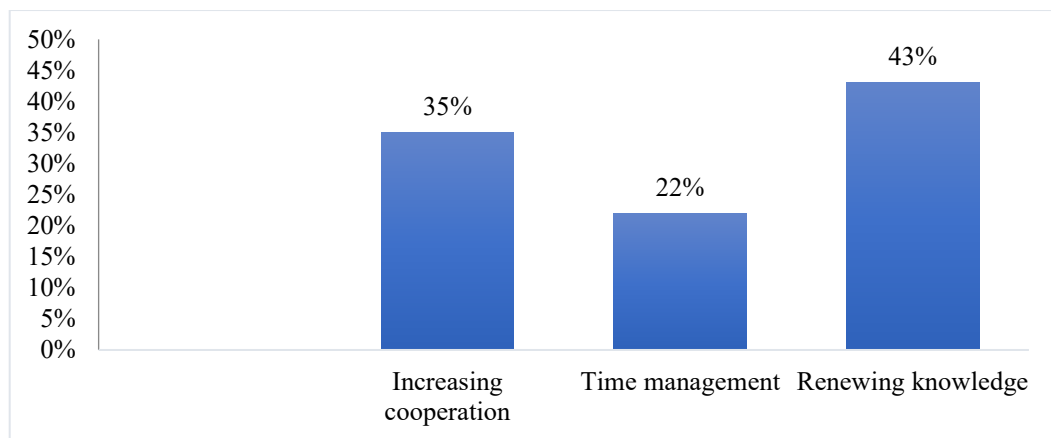
Studies conducted within one nation may not generalize to another due to cultural differences in educational practices, attitudes to chess, and other out-of-school activities. For instance, the same experiment conducted in a country that perceives chess as a viral and well-supported activity is less comparable than if the same experiment were conducted in a country where the prominence of chess is less relevant.

This may also be the case because, in many instances, the sample included highly experienced teachers who would be hard to generalize into other environments without such experienced teachers leading such a process. In addition, the ability or lack thereof of the instructor to effectively facilitate can make or break PBL alone.

Finally, it should be remembered that such differences in funding, class size, and material readiness may, in fact, make a difference in problem-based learning.

## RESULTS

The analysis of the teachers' answers in the survey shows that most teachers imagine that spending a considerable amount of time on self-training and updating knowledge is necessary to implement project-research activities (see diagram 1).



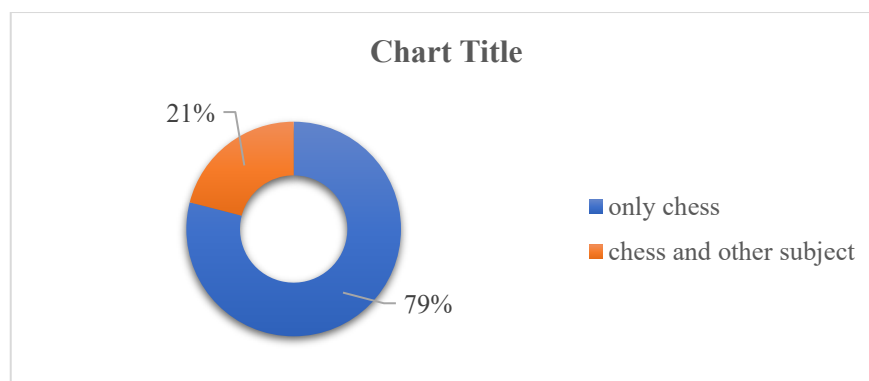
**Diagram 1: Perception of Prerequisites for ensuring project-based learning.**

Taking into account the fact that in the case of other subjects, the component of PBL is to be included in higher grades: in particular, according to the "State Standard of Public Education point 9.46 (4)," every learner in grades 7-12 must implement at least one educational project in the subject or subjects of his/her choice per year, some of the interviewed teachers were more concerned about the possibility of its implementation in the framework of the subject of chess in primary school.

The overwhelming majority of the teachers of the subject "Chess," even though they shared the point of view of the teachers teaching other subjects regarding the formulation of social problems, the topic, time-consuming, self-training, and the difficulties related to the modernization of knowledge, nevertheless, they mentioned a vital facet in their field that contributes to project-based learning. That is the high level of cooperation. The high level of collaboration enables the implementation of projects in the context of chess education. Teacher collaboration and professional development are connected. Good teacher collaboration and continuous professional development are critical to the PBL's successful application. Effective PBL integration in the classroom requires teacher collaboration and ongoing professional development. To better address the requirements of their learners and improve their teaching practices, educators can better adopt PBL strategies by investing in professional development and creating a collaborative environment. A more dynamic, encouraging learning environment is produced among teachers of "Chess." It guarantees the efficient application of heuristic learning and situated learning theory concepts (Guskey T.R., 2002, pp. 381-391).

The high level of cooperation among teachers of "Chess" is because the teachers teaching the subject of chess" in R.A. are involved in the discussions, meetings, and research works carried out within the framework of the Armenian State Pedagogical University (ASPU), the Chess Scientific Research Institute, Chess Academy, and the efforts of those responsible for coordinating the work of teachers in different regions of Armenia. Teachers can develop social connections and social capital by having these opportunities to work with each other. This critical characteristic that stands out in the chess teaching experience fully corresponds to the ideas of social constructivism, which is the basis of project-based education. According to L.S. Vygotsky's theory on social constructivism, the learning process has a social nature (Vygotsky L.S. 1978). Moreover, it is only possible to perceive it in the social context. In this regard, during the implementation of project works, layers of knowledge are built in the conditions of teacher-teacher, learner-teacher, and learner-learner social interaction.

On the other hand, "Chess" has significant potential for implementing interdisciplinary projects, as almost 21% of the teachers teaching "Chess" also teach another subject (see diagram 2). Therefore, being well-informed, skilled, and knowledgeable about the possibilities of the other subjects they teach, the interdisciplinary matrix, and expected outcomes, they better understand the process of implementing interdisciplinary projects within them. Integrating chess with other subjects shows how modern PBL methods may enhance learning. Learners' educational experience is improved when they use their knowledge in many circumstances by integrating multiple disciplines into chess projects.



**Diagram 2: The teachers teaching chess at the Primary school.**

This interdisciplinary approach enables the "Chess" subject to comply with the principles of situated learning theory developed by Jean Lave and Etienne Wenger, which is necessary for project learning. According to the situated learning theory (Lave & Wenger, 1991), learning happens

most effectively in situations that are authentic and relevant to the learner. This theory emphasizes the importance of participating in communities of practice and engaging in real-world activities. This idea is implemented in the PBL framework, where learners work on assignments that resemble real-world problems. PBL effortlessly integrates with Situated Learning Theory by involving learners in projects with practical applications in chess education. It fosters an environment where learners gain deeper understanding via relevant, hands-on experiences (Thomas, 2000).

Inquiry-based learning is another essential component of PBL that applies to chess teaching. The learners participate in projects by investigating chess strategy, evaluating game positions, and resolving challenging issues. This method supports the development of critical and creative thinking abilities, which are essential to PBL (Bransford, Brown, & Cocking, 2000). Inquiry-based learning in chess teaching creates a setting where learners are motivated to go further into strategic thinking and problem-solving, guiding the learning process through inquiry and investigation. PBL involves building knowledge based on the principles of algo-heuristic methodology. It implies a practical problem-solving method that does not guarantee an exact solution but is sufficient to solve the problem. It makes it possible to solve problems in cases where a clear solution is not found. In this regard, the algo-heuristic method is also applicable in Chess, which is based on the intellectual search for strategies for solving chess tasks. Chess provides a real-world learning experience that engages learners in a game that mirrors real-life complexities and helps develop skills in building algorithms and making heuristics to solve situations.

The next feature of the PBL implemented in the context of the "Chess" subject is also related to the activities of the Chess Research Institute. Suppose most teachers teaching other subjects see clarifying the project's conceptual idea (research topic) as the main difficulty of project work. In that case, they have an insufficient level of research skills, and they considered themselves helpless in this matter, pointing out that the primary sources of information about the requirements and criteria for the assessment of project-research activities are their subject standard of general education, qualification courses, consultations held by the administration. In contrast, teachers teaching Chess are full of hope that they will get enough support to organize research work. Each of the 1273 chess teachers in R.A. has an opportunity to contact the researchers of the Chess Research Institute for individual advice and assistance in the field of research.

The circumstance mentioned above has had its effect, as most teachers teaching chess value integration of the project-based teaching method as an effective means of forming and developing



the learner's abilities. Moreover, even though most teachers carry out project work partially, there are still successful cases of implementation of mini-projects within the framework of the subject of chess, which allows us to claim that even in lower grades, it is possible to implement project-based learning. The data shows that those successful projects were implemented by teachers with high scores in the training course organized within the framework of the Chess subject. Those projects include "The Chessboard Project," The Chess Piece Passport Project, and "The Movable Board Project", which have effectively contributed to building relevant capacities and ensuring primary school outcomes.

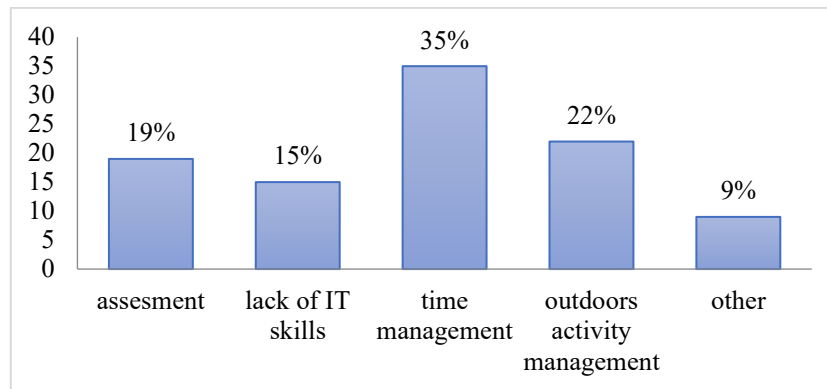
The teachers participating in the survey, who have used elements of research-project work or a complete model during their educational activities, state that it is difficult to define the main concepts and formulate the social component. On the other hand, some teachers believe that when carrying out project work, it is necessary to be guided by the learner's psycho-pedagogical features, knowledge of the subject, potential, and cognitive interests, which the teacher often finds difficult to identify. Particular difficulties arise in connection with the evaluation of project work. According to the teachers, evaluating projects requires much work. Teachers need help setting appropriate deadlines for formative assessments and find the process demanding. These problems show how the evaluation process can be streamlined by having more precise assessment criteria and timetables. The teachers used the following criteria to make a holistic assessment rubric to evaluate the effectiveness of PBL(PBL) strategies in chess education,

*Outcomes of Primary School Education:* Teachers focused on developing specific skills such as strategic thinking, problem-solving, and decision-making, as well as learners' ability to work collaboratively, work well with a team, and communicate.

*Educational Goals:* In this regard, they assessed improvements in learners' overall academic performance, particularly in mathematics, technology, and the Armenian language.

*Outcomes of Specific Chess Topics:* Teachers assessed learners' understanding and mastery of specific chess concepts and strategies according to these criteria. Application of their chess knowledge in real-game scenarios and presentations

Obtaining authorization and guaranteeing safety for outdoor activities introduce additional complexity, indicating the necessity for solid safety procedures and administrative assistance for project-based learning.



**Diagram 3: Difficulties Related to PBL in Primary School.**

Another area for improvement mentioned by the teachers is related to the need for more knowledge in the field of IT. Knowledge of information technology is an essential prerequisite for effectively implementing project works. It should be noted that as a result of reforms in the field of general education, "digital literacy and computer science" are also taught in the 2nd-4th grades of elementary school. However, young children in primary school still need more knowledge or technological skills, which complicates the organization of PBL and limits the choice of topics.

Teachers need help ensuring learner autonomy in this age group. Matching the project work to the defined curriculum is impossible or partially possible. However, according to the project learning approach, the learner's autonomy should be preserved in selecting and specifying the topic.

## DISCUSSION

The issue discussed in the framework of this work was studied and analyzed considering the main components of the educational process, which are the expected result of the study, subject content, age characteristics of the learner, accessibility, comfort of the environment, and the time factor. The educational subject "Chess," by its very nature, contributes to the development of the learner's thinking processes, internal planning, decision-making in complex situations, self-analysis abilities, and social-emotional intelligence, which is supported by three critical approaches during the teaching of the subject:

- learning of concepts and principles, which will make it possible to know the content of the subject,
- active learning, which will enable learners to discover and learn the content of the subject independently, immediately apply the knowledge, valuing the acquisition of knowledge as a key to

success,

- project-based learning.

In general, the approaches underlying PBL emphasize the inclusion of learners in complex processes of discovering the world and solving real problems. Examining the essential components of project-based learning, we can see a visible connection to the content of chess education. The content of chess education is also based on the development of critical and creative thinking, accurate situational combinations, the ability to search for alternative ways, and the need to analyze one's moves and decisions and evaluate them. These are the main characteristics of project-based learning. The chess game and project work create a favourable environment for testing new behaviour, overcoming the gap between real life and theory, and applying one's experience and skills. The urgency of studying and developing the culture of project activities among chess teachers and learners becomes evident from the discussion above.

In general, let us note that the difficulties arising during the organization and implementation of project-based and research activities are:

- Lack of experience in implementing Project-based learning,
- The uncertainty related to the distribution of the number of hours, rubrics for evaluating work results, organizational issues,
- The problem of ensuring learners' autonomy,
- Difficulties resulting from the low level of technological skills,
- Definition of the social problem underlying the projects. The awareness of social problems among learners is almost absent, even in high grades.

Considering these problems, the mini-projects implemented within the framework of the Chess subject can contribute to getting to know the elements of project learning, facilitating the organization work, understanding the social aspects, and acquiring the background knowledge of project work. It shows that PBL concepts could be applied practically in chess education through mini-projects. Through these initiatives, learners get targeted, doable learning opportunities closely related to real-world situations. It increases learner engagement and illustrates that Mini-projects help learners acquire pertinent knowledge and skills while highlighting the tenets of situated learning theory. Mini-projects help learners become more concrete and relevant by bridging the gap between theoretical ideas and real-world applications. With its potential, the chess subject in PBL can provide a smoother transition from primary school to secondary school and promote motivation

in the educational process because project-based works motivate teachers and learners by their nature and content.

The urgency of forming and developing the culture of project activities among chess teachers and learners becomes evident from the above. In general, the issue of substantiating the specifics and conditions of the modernization, formation, and development of the project-research culture in the educational process is comprehensively presented in the works of foreign researchers.

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