

THE FORMATION OF PRIMARY SCHOOL STUDENTS' COLLABORATIVE SKILLS THROUGH ONLINE CHESS

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ABSTRACT

One of the key goals of the 21st-century education is the development of learners' universal competences, which enable them to perform effectively, achieve self-realization, and solve problems collaboratively. Among these competencies are collaborative skills, which are a fundamental prerequisite not only for the social development of primary school students but also for their success in the learning process. According to UNESCO (2015), collaborative skills are included in the group of "4Cs" competences (Critical thinking, Creativity, Communication, Collaboration), which are essential for learners' social self-realization. As an effective means of developing primary school students' collaborative skills, the Li-chess online platform has been chosen for our research. From this perspective, the goal of the article is to promote the development of students' collaborative skills through online chess. The research methodology involves the analysis of professional literature, systematic observation, the use of the Li-chess platform for organizing online chess activities, and the evaluation of students' collaborative skills using a rating scale designed on the basis of Zaitseva's structural components of collaborative competence (cognitive, emotional-motivational, and communicative-activity components). It is also important to note that existing researches on chess have primarily focused on the development of cognitive processes, whereas the purposeful development of primary school students' collaborative skills through online chess remains underexplored. Given the increasing role of digital learning environments, it is necessary to investigate online chess as a context for communication, joint decision-making, and mutual support among students. Accordingly, the present research seeks to fill this gap by examining online chess as a potentially effective tool for fostering collaborative skills. Hence, the scientific novelty of the study lies in examining online chess as a pedagogical tool for the development of primary school students' collaborative skills in a digital learning environment and in applying a component-based observational assessment model. The obtained results suggest a positive tendency regarding the development of students' collaborative skills through chess activities. In particular, online

chess may provide opportunities for joint discussions, proposing solutions to problems, making decisions, and justifying moves within a collaborative learning process.

Keywords: *primary school students, collaborative skills, components of collaboration, online chess, the Li-chess platform.*

INTRODUCTION

Collaboration implies the ability to work in a group, listen to others, respect expressed opinions, and engage in discussions, where the responsibility of each group member and the commitment to achieving a common goal are emphasized. Collaborative skills are essential in any situation that requires working with others toward a shared objective. Well-developed collaborative skills enable individuals to work harmoniously together, implement projects, and create outcomes that would be difficult to achieve individually. In essence, collaboration is crucial for success in every field, as it allows individuals to set common goals, share ideas, and engage in open discussions, creating opportunities to learn from one another and jointly propose effective solutions to emerging problems. Therefore, the development of collaborative skills becomes particularly important starting from primary school, as attending school changes a student's social position, status, and role within a group. In many cases, students' academic success is also influenced by their level of collaborative skills. It is in primary school that learners' essential qualities are formed, such as responsibility in relationships, skills for organizing one's own behavior, and an understanding of the importance of cooperation, communication, and interaction in various forms of activity. These factors provide the foundation for the development of collaborative skills among primary school students.

LITERATURE REVIEW

A number of researchers have discussed the concept of "collaborative competence" identifying several key components within it, such as communication, active listening, and the exchange of ideas (Rosen, et al., 2018).

According to G. N. Klimanova, collaboration ensures interaction with the surrounding environment, as a result of which the interests of group members are satisfied and they develop as individuals (Klimanova, 2010). Essentially, collaboration is a process of joint development carried out through shared activities and the organization of collective discussions around common goals.

Tsukerman notes that during collaboration all participants influence one another and actively contribute to the achievement of both individual and shared goals (Tsukerman & Elizarova, 1993).

Collaborative competence also implies responsibility for group work, time management, and actions directed toward a common goal. It is also emphasized that knowledge, skills, and attitudes (KSA) play a crucial role, as collaboration requires not only technical abilities but also social readiness and appropriate attitudes (Goldsmith, et al., 2023). Trust among team members is also essential in the process of collaboration (Bennett & Gadlin, 2012).

Collaborative competence is most effectively developed within the cooperative learning model (Johnson, 1999), which highlights the following key elements of collaboration:

1. positive interdependence among group members,
2. individual responsibility,
3. interaction,
4. interpersonal and group skills,
5. willingness to cooperate within a group.

The development of the above-mentioned elements in primary school contributes to the formation of students' collaborative culture. Therefore, the development of collaborative competence is closely related to the child's social perception and the development of behavioral self-regulation. During collaboration, a primary school student learns to recognize others' emotions, relate them to their own perceptions, and understand that it is important not only to express their own opinion but also to accept others' viewpoints.

It is emphasized that well-developed collaborative skills contribute to increased motivation, self-confidence, and social engagement, enabling students to learn from one another as co-constructors of solutions to given problems rather than as competitors (Slavin, 2015; Gillies, 2007).

Researches show (Gillies, 2016; Mercer & Howe, 2012) that the development of collaborative skills in primary school:

- improves students' academic achievement,
- promotes the development of critical and creative thinking,
- contributes to the formation of social responsibility,
- creates a positive emotional climate.

It becomes evident that collaboration among primary school students involves interaction between peers of the same age who are united around a shared activity and connected through specific relationships characterized by mutual understanding, harmony, and mutual support aimed at achieving a common goal (Lyatifova & Sinebryukhova, 2021).

In the development of collaborative competence among junior schoolchildren, particular importance is attached to communication, the formation of effective relationships through interaction, empathy, the implementation of constructive dialogue, understanding the positions of group members, and engaging in reflection. This is manifested in the analysis of own actions as well as the interests, desires, and attitudes of peers toward themselves (Subbotina, 2023).

Thus, the development of collaborative competence is viewed not only as a methodological objective of teaching but also as a prerequisite for an individual's social and civic maturity.

The process of forming and developing collaborative competence has its own internal structure, reflecting both its content-related and functional aspects. M. Yu. Zaitseva conceptualizes the structure of collaborative competence as a combination of three interrelated components: cognitive, emotional-

motivational, and communicative-activity. These components not only represent different levels of the collaboration process but also ensure the unity of the child's individual and social development.

The cognitive component involves the ability to engage in effective collaboration in various social situations, as well as the conscious replacement of ineffective behavioral patterns with purposeful and productive actions. The children learn to comprehend and analyze the outcomes of their interactions with peers, to understand the impact of their own actions on the overall effectiveness of group work, and to anticipate the possible results of partner relationships. This component characterizes the child's perception, conscious processes, and thinking operations during collaboration.

The emotional-motivational component reflects the learner's internal motivation to collaborate. It includes both a positive emotional attitude toward joint activity and the perception of own "I" and peer as equal participants in interaction. This component is based on emotionality, mutual respect, trust, and empathy, which foster effective communication and team cohesion. It characterizes the child's internal attitudes, interests, and value orientations toward collaboration.

The communicative-activity component represents the external manifestations of collaboration. It is based on the ability to organize and carry out joint actions aimed at achieving a defined goal. This component includes not only verbal communication but also nonverbal means of expression: facial expressions, gestures, pantomime, and movements, which facilitate mutual understanding and interaction. It reflects the child's practical behavior and communicative skills during collaboration (Zaitseva, 2013).

The structural components of communicative competence can also be observed in the teaching process of "Chess" as a subject, where the use of approaches, methods, and techniques that foster the effective manifestation of these components becomes essential.

Research indicates that chess, in general, contributes to students' cognitive, emotional, and also linguistic development; children who play chess demonstrate more developed verbal skills and communicative abilities, as chess promotes the exchange of ideas and the development of discussions (Nippold, 2009).

At the same time, it is noted that beyond cognitive skills, chess also promotes the development of communication among children, including respectful interaction, turn-taking, fair play, and the expression of empathy (Chess in Education, 2021).

METHODOLOGY AND DISCUSSION

In order to foster the development of students' communicative competence during the teaching of "Chess" subject, the Li-chess educational platform was utilized. The experiment involved a total of 8 primary school students (Grades 2, 3, and 4), as this represents the entire population of primary-level students in the school: three students in Grade 2, four students in Grade 3, and one student in Grade 4. In order to support the development of the latter student's collaborative skills, direct individual interaction

was organized by the teacher, while in certain cases, learning activities were implemented jointly with students from all three grade levels.

The aim of the experiment was to examine the impact of the Li-chess platform on the development of students' collaborative competence formation process.

The following objectives were derived:

1. to develop assessment indicators based on the structural components of collaborative competence,
2. to implement the Li-chess platform during chess lessons,
3. to record changes in students' collaborative behavior throughout the study,
4. to analyze the obtained pre-test and post-test results, presenting the data in the form of tables and diagrams.

In order to assess the level of development of junior schoolchildren's collaborative competence, the structural model of collaborative competence proposed by M. Yu. Zaitseva was adopted as the theoretical framework for the research (collaborative competence comprises three interrelated components: cognitive, emotional-motivational, and communicative-activity). Based on these components, a set of specific behavioral indicators was developed in order to observe students' participation in collaborative situations and to evaluate the competences they demonstrated (the indicators are presented in the table below). Each indicator was assessed using a three-point rating scale that reflected the degree of manifestation and stability of the observed behavior: 3 points were assigned when the indicator was demonstrated fully, independently, and consistently; 2 points when it was manifested partially or inconsistently; and 1 point when it appeared minimally, rarely, or only with external support. The choice of a three-point scale was determined by the age characteristics of junior schoolchildren and the observational nature of the assessment. In contrast to more differentiated scales, the three-level scale (low-medium-high) allows for clearer interpretation of behavioral indicators, reduces evaluator subjectivity, and facilitates more consistent assessment of collaborative behavior in natural classroom conditions. A total of 12 indicators were evaluated, with a possible score ranging from 12 to 36 points. On the basis of the cumulative score, three levels of collaborative competence were identified: low level (12 points), medium level (13-24 points), and high level (25-36 points).

Since this research had an exploratory character and was conducted with a relatively limited sample, quantitative indices of inter-rater agreement were not calculated. Nevertheless, detailed scoring descriptors were prepared for each level of manifestation, which contributed to greater consistency and transparency in the assessment process.

The research was conducted during the first semester of the 2025–2026 academic year and lasted for 12 weeks including 24 online chess sessions implemented through the Li-Chess platform.

The instructional tasks were designed to promote collaborative interaction and included several types of activities organized through the Li-Chess platform. First, the students solved chess puzzles in pairs using tactical tasks available in the Li-Chess Puzzles section. The tasks required identifying the best

move in a given position. Before submitting an answer, students discussed possible moves, compared alternatives, and agreed on a common solution. Second, the students participated in the joint analysis of chess positions. A position was displayed to the students. They were encouraged to listen to their classmates, ask questions, express agreement or disagreement politely, and reach a decision regarding the most appropriate move. Third, students engaged in the discussion of possible moves before making a decision. During these discussions, they shared opinions, justified their choices, considered alternative ideas, and responded to the suggestions of their peers. Fourth, team-based mini-tournaments were organized through the Li-Chess platform. Students prepared strategies together, discussed key moments during the games, and reflected collectively on successful and unsuccessful decisions. Finally, the students completed reflection tasks in which they explained and justified their moves. They answered short prompts such as: “Why did we choose this move?”, “What did my partner suggest?”, and “Did we change our decision after discussion?” These questions encouraged students to become aware of both their own thinking and the collaborative process.

During the use of the Li-Chess platform, the students gradually became more active in collaborative interaction. They discussed possible moves, shared opinions, attempted to justify their choices, considered alternative ideas, and accepted the viewpoints of others. Their communication became increasingly organized and purposeful. In the initial stage, discussions occasionally led to disagreements; however, in the later stages, mutual respect, patience, and willingness to cooperate became more evident. Students’ statements such as “I think this move is safer”, “If we move the king here, it will protect the rook”, “Your suggestion is better” indicate that they were not only reasoning about the logic of the game but also recognizing the importance of cooperation. Awareness of collaboration was further reflected in expressions such as “We succeeded” and “Our move was good”. Some students also demonstrated analytical reflection, for example, by stating: “If we had not made this move, the rook would have remained unprotected”.

Thus, the Li-Chess platform was used not merely as a tool for chess practice, but as a digital learning environment that created opportunities for students to discuss moves, express and justify opinions, listen to others, negotiate options, and make decisions. Through these activities, the platform promoted the development of communication, mutual understanding, shared responsibility, and collaborative decision-making skills. It should also be noted that prior to the implementation of the Li-chess platform in lessons, students worked individually and separately, while the discussion of chess tasks was often limited to a question-and-answer format. Under these conditions, collaboration among students did not develop, and it was difficult to foster skills of mutual assistance and team-based thinking.

During the whole term systematic observations were conducted after each session, while the assessment of collaborative skills was carried out at the beginning and at the end of the research. The evaluation was performed by chess teacher.

Below, in Table 1, the initial (I) (pre-test) and final (F) (post-test) data, obtained from the indicators, organized according to the structural components of communicative competence are presented:

Table 1.

Structural components of communicative competence and pre-test/post-test data

Structural Components	Indicators	Grade 2						Grade 3								Grade 4	
		1		2		3		1		2		3		4		1	
		I	F	I	F	I	F	I	F	I	F	I	F	I	F	I	F
Cognitive	estimates collaboration and the roles of peers	1	2	1	2	2	3	2	3	1	2	1	3	1	2	2	3
	analyzes the situation and acts effectively	1	2	1	2	2	3	1	3	1	3	1	2	1	2	1	2
	listens and understands the ideas expressed by peers	1	2	1	2	1	2	2	3	1	2	2	3	1	2	2	3
	participates in discussions by offering opinions	1	2	1	2	2	3	2	2	1	3	1	2	1	2	2	3
Emotional-Motivational	demonstrates a positive attitude toward peers	1	2	2	3	3	3	2	2	1	2	2	3	1	2	2	2
	respects peers' opinions	1	2	1	2	3	3	2	3	1	2	2	3	1	2	2	3
	justifies own viewpoint without offending others	1	2	1	2	2	3	2	3	1	2	2	3	1	2	2	3
	supports group members	1	2	2	3	2	3	2	2	1	2	2	3	1	2	2	2
Communicative-Activity	actively participates in group activities	1	2	1	2	1	3	2	3	1	2	2	2	1	2	1	2
	expresses own opinion	1	2	2	3	2	3	2	3	1	2	2	3	1	2	2	3
	coordinates own actions with others	1	2	2	3	2	3	2	3	1	2	1	3	1	2	1	2
	demonstrates responsibility while making decisions	1	2	1	2	2	3	1	2	1	2	2	3	1	2	2	3

Based on the comparison of the structural components it became obvious that the most noticeable changes occurred in the communicative-activity component. Indicators such as actively participates in group activities, expresses own opinion, and coordinates own actions with others demonstrated improvement in almost all students. The average score of this component among second-grade students increased from 17 to 30 points, among third-grade students from 22 to 38 points, and in the case of the

fourth-grade student from 6 to 10 points. This may be explained by the fact that these skills were practiced repeatedly during each online chess lesson and were directly required for successful completion of the tasks.

The emotional-motivational component also showed positive dynamics, particularly in relation to respect for peers' opinions and justification of own viewpoint without offending others. The relatively strong progress in these indicators may be connected with the interactive and game-based nature of the activities, which created a more engaging and emotionally supportive learning environment. The averaged data demonstrated a positive increase in this component: the average score rose from 20 to 30 points among second-grade students, from 20 to 38 points among third-grade students, and from 8 to 10 points in the case of the fourth-grade student.

Changes in the cognitive component were positive but less consistent. Skills related to analyzing situations and understanding peers' ideas improved in most cases; however, not all students made the same progress. This may indicate that cognitive aspects of collaboration require a longer period of systematic practice than communicative behaviors. Overall, the average score of cognitive component among second-grade students increased from 15 to 27 points, among third-grade students from 20 to 39 points, and in the case of the fourth-grade student from 7 to 11 points.

Taking all the data into account, we can say that in Grade 2, one student demonstrated a low initial level of collaborative competence (12 points), while the other two students were at a medium level (16 and 24 points). After the intervention, the final results indicated that one student reached a medium level (24 points), whereas the other two students achieved a high level (28 and 32 points).

Among the four Grade 3 students, two initially demonstrated a low level of collaborative competence (12 points), while the other two were at a medium level (22 and 20 points). According to the final data, three students reached a high level (32, 26, and 33 points), while one student remained at a medium level (24 points). In Grade 4, the student initially demonstrated a medium level of collaborative competence (21 points), whereas in the final assessment this improved to a high level (31 points).

The average results are presented below (Table 2 and Figure 1):

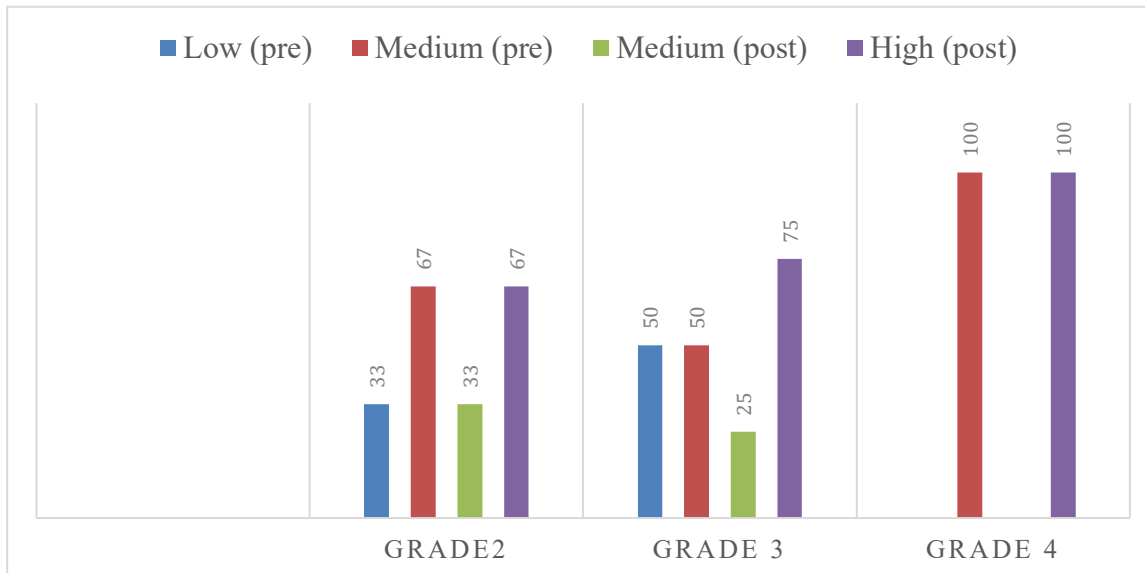
Table 2.

Pre-test and post-test data on the level of development of collaborative competence

Levels	Grade 2				Grade 3				Grade 4			
	Pre		Post		Pre		Post		Pre		Post	
	n	%	n	%	n	%	n	%	n	%	n	%
Low	1	33	-	-	2	50	-	-				
Medium	2	67	1	33	2	50	1	25	1	100		
High	-	-	2	67	-		3	75			1	100

Figure 1.

Initial and Final Level of Development of Collaborative Competence



The results of the research indicate a positive dynamic in the development of primary school students' collaborative competence after the implementation of the Li-Chess platform. At the same time, the findings should be interpreted with caution. The study involved only eight students from one school, which limits the possibility of broad generalization. Consequently, the results should be considered preliminary and may serve as a basis for further research with larger samples, longer interventions, and comparative experimental designs.

The obtained findings are consistent with the ideas of D. W. Johnson and R. T. Johnson's (1999) social interdependence theory, according to which effective collaboration develops when learners work toward a common goal, interact directly, and assume shared responsibility for the outcome. During the research, students completed chess-related tasks that required discussion of moves, agreement on decisions, and coordination of actions with peers. Such forms of interaction created conditions for positive interdependence and mutual involvement, which may explain the observed improvement in collaborative behaviors. The results also correspond to R. E. Slavin's (2015) conception of cooperative learning, which emphasizes that group goals combined with individual participation increase learners' engagement and responsibility. In the online chess activities, each student's contribution was visible during discussions and decision making, which likely encouraged more active participation and accountability within the group. In addition, the findings are in line with R. M. Gillies' (2007) research on cooperative interaction, which highlights the role of constructive dialogue, explanation, and peer support in the development of both academic and social skills. The growth observed in students' participation in discussions, expression of opinions, and coordination of actions with others may be interpreted as evidence of increasingly productive peer interaction. The findings may also be interpreted

in the context of G. N. Klimanova's (2010) technology of collaboration, which emphasizes the purposeful organization of joint activity, distribution of functions, mutual support, and coordinated interaction among learners. The online chess tasks used during the research required students to discuss possible moves, justify their choices, and coordinate decisions with peers, which corresponds to the key principles of collaborative technology.

Thus, the influence of the Li-Chess platform can be interpreted through several psychological and pedagogical mechanisms. First, the platform provides immediate feedback, which supports motivation and self-regulation. Second, the digital environment increases the visibility of actions, allowing students to observe both their own and their peers' decisions, thereby promoting mutual monitoring and shared responsibility. Third, discussing chess positions promotes verbalization of thinking, as students need to explain, justify, and reconsider their ideas in response to peer feedback. Finally, the game-oriented format may reduce anxiety and fear of making mistakes, creating conditions for more confident social participation.

CONCLUSION

By studying the process of developing collaborative skills among elementary school students through online chess, and based on the data obtained from the research, we can state that:

- The formation of collaborative skills is one of the significant priorities of contemporary pedagogical education. Collaboration should be understood as a multidimensional construct that includes not only communicative and organizational aspects, such as interaction and role distribution, but also cognitive, emotional-motivational, and social components, including trust, shared goal orientation, joint decision-making, and responsibility for collective outcomes.
- The findings of the research suggest that "Chess" subject, implemented through the Li-chess platform, may create favorable conditions for the development of elementary school students' collaborative skills. Positive tendencies were observed in students' participation in joint discussions, their ability to express and justify ideas, listen to peers, consider alternative viewpoints, and coordinate actions during shared activities. The use of online chess also appeared to support respectful interaction, mutual support, and elements of self-regulation within group work.
- At the same time, the results of the research should be interpreted as preliminary due to the limited number of participants. The exploratory nature of the research does not allow for broad generalization. However, the identified tendencies indicate the potential pedagogical value of online chess for fostering collaborative interaction. Further research involving larger and more diverse samples, as well as students from different educational contexts, is necessary to obtain a more comprehensive and reliable understanding of the effectiveness of this approach.

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