

Pedagogical Mechanisms and A Model for Developing the Leadership Qualities of Primary School Students Based On 4c Competencies

Khodiyeva Gulkhayo Khasan qizi

Doctoral Candidate, National Research Institute of Pedagogical Sciences of Uzbekistan named after T.N. Kori Niyazi, Uzbekistan

Received: 30 April 2026; **Accepted:** 26 May 2026; **Published:** 22 June 2026

Abstract: This article elucidates the theoretical and practical foundations of the pedagogical mechanisms and a pedagogical model for developing leadership qualities in primary school students based on 4C competencies. The study scientifically analyzes the role of creativity, critical thinking, communication, and collaboration competencies in fostering leadership qualities in students, such as initiative, responsibility, independent decision-making, and effective team management. Pedagogical mechanisms that serve to develop leadership qualities through the effective use of the potential of mathematics and educational sciences are substantiated, and the methodological aspects of their practical implementation are revealed. Additionally, a pedagogical model aimed at ensuring a cohesive link between 4K competencies and leadership qualities has been refined, and its effectiveness has been proven based on the results of experimental testing. The obtained results serve to expand the pedagogical opportunities for developing students' leadership potential in the primary education process.

Keywords: 4K competencies, leadership qualities, primary education, creativity, critical thinking, communication, collaboration, pedagogical mechanism, pedagogical model.

Introduction: In the global education system, a competency-based approach aimed at ensuring the comprehensive development of the individual and the realization of their intellectual, social, and personal potential is becoming increasingly prevalent. The socio-economic changes occurring in modern society, the sharp increase in information flow, and the new demands of the labor market require learners to possess not only subject-specific knowledge but also creative thinking [24; 27].

At present, the development of leadership qualities among primary school students is regarded as one of the pressing issues in contemporary pedagogy. Leadership qualities are closely associated with students' initiative, sense of responsibility, ability to make independent decisions, justify their opinions, and participate effectively in collaborative activities. In particular, the purposeful development of these

qualities during the primary school years serves as an important factor in ensuring students' future academic achievement and social engagement [24; 25].

An analysis of pedagogical research indicates that, although considerable scholarly attention has been devoted to the development of leadership qualities, the pedagogical mechanisms and methodological support for fostering these qualities through 4K competencies among primary school students have not been sufficiently explored. In particular, there is a need to develop an integrated pedagogical model for cultivating leadership qualities through the enhancement of creativity, critical thinking, communication, and collaboration by utilizing the educational potential of Mathematics and Tarbiya (Moral Education) subjects [3; 4; 5].

LITERATURE REVIEW AND METHODOLOGY

The development of creativity, critical thinking, communication, and collaboration skills is considered one of the priority directions of contemporary pedagogy. Studies conducted by Uzbek scholars, including X.I. Ibraimov, R.X. Djuraev, R.G. Safarova, B.S. Abdullaeva, B.R. Adizov, M.T. Jumaniyozova, O.P. Aslanova, and others, have examined the theoretical and methodological foundations of the competency-based approach as well as the pedagogical conditions for developing students' creativity, critical thinking, communication, and collaboration skills. These studies substantiate the role of 4K competencies in students' intellectual and social development. Research conducted by Uzbek scholars interprets 4K competencies as an important factor in promoting students' active participation in teamwork, effective collaboration, problem-solving abilities, and initiative. Furthermore, these studies highlight the potential of 4K competencies for fostering students' leadership qualities [6–18].

The works of scholars from the CIS countries, including A. Derkach, A. Rean, N.V. Kuzmina, I.A. Zimnyaya, L.S. Vygotsky, A.N. Leontiev, D.B. Elkonin, and N. Istomina, have analyzed leadership in relation to social activity, initiative, independent thinking, and communicative culture. According to their scientific views, leadership qualities are developed through activity and are enhanced by the pedagogical environment and purposeful educational influence. In particular, group activities, collaboration, and problem-solving situations are recognized as significant factors contributing to the development of leadership qualities among students [19–23].

International scholars such as K. Robinson, H. Gardner, J. Guilford, E. Torrance, R. Sternberg, J. Dewey, B. Bloom, and P. Freire have characterized creativity, critical thinking, effective communication, and collaboration as essential components of twenty-first-century skills. In their view, the development of these competencies enables students to make independent decisions, generate innovative ideas, defend their viewpoints with evidence, and work effectively within a team [26; 27].

Studies on leadership have paid particular attention to the scientific views of B. Bass, J. Burns, and P. Northouse. These scholars interpret leadership as a complex socio-pedagogical phenomenon associated

with influencing others, directing individuals toward common goals, organizing collective activities, and creating a collaborative environment [24; 25].

The review of the literature indicates that creativity, critical thinking, communication, and collaboration competencies constitute the fundamental basis of leadership qualities. However, existing studies have not sufficiently addressed the development of leadership qualities among primary school students specifically through the framework of 4K competencies. Therefore, the present study developed a pedagogical model and mechanisms aimed at fostering leadership qualities among primary school students based on 4K competencies and substantiated their effectiveness through experimental research.

DISCUSSION

A distinctive feature of the pedagogical model developed during the study is that leadership qualities were not considered as a separate educational outcome but rather as an integrative quality emerging from the harmonious development of creativity, critical thinking, communication, and collaboration competencies. The target, content, process, and outcome components of the model functioned in close interrelation, making it possible to develop leadership qualities through fostering creativity and critical thinking in Mathematics lessons, as well as communication and collaboration skills in the subject of Tarbiya (Moral Education). Unlike previous pedagogical models, this approach is significant because it integrates 4K competencies and leadership qualities within a unified conceptual framework [3; 5].

The analysis of the findings demonstrated that the development of creativity and critical thinking competencies contributed to the formation of students' initiative, independent decision-making abilities, and innovative approaches to problem situations. In particular, the use of problem-based situations, open-ended tasks, mathematical modelling, and group activities in Mathematics lessons promoted students' strategic thinking and encouraged the manifestation of leadership initiatives. Likewise, the application of communication- and collaboration-oriented methods in Tarbiya lessons enhanced students' communication culture, teamwork skills, task distribution abilities, and participation in collective

decision-making processes. As a result, the cognitive, communicative, and social dimensions of leadership were developed in a comprehensive manner [24; 26].

A total of 1,182 primary school students participated in the experimental study. Of these, 595 students

constituted the experimental group, while 587 students formed the control group. The experimental group was taught using an integrative pedagogical methodology developed on the basis of the 4K model, whereas the control group continued learning through traditional instructional approaches (Table 1).

Table 1

Distribution of Students Participating in the Study

General Secondary Educational Institution	Total Number of Students	Control Group (CG)	Experimental Group (EG)
Andijan Region	385	193	192
Syrdarya Region	379	187	192
Tashkent City	418	207	211
Total	1182	587	595

The results of the mathematical and statistical analysis revealed a significant improvement in the experimental group students' creativity, critical thinking, effective communication, and collaborative skills. In turn, this

confirms the positive impact of these developments on the formation of leadership qualities, including initiative, responsibility, independent decision-making, and the ability to organize and lead a team (Table 2).

Table 2

Comparative Results of the Experimental and Control Groups Before and After the Experiment

Groups	Number of Respondents	High		Average		Low	
		Before	After	Before	After	Before	After
Experimental Group	595	119 (20%)	256 (43%)	214 (36%)	243 (41%)	262 (44%)	96 (16%)
Control Group	587	147 (25%)	154 (26%)	164 (28%)	237 (40%)	276 (47%)	196 (33%)

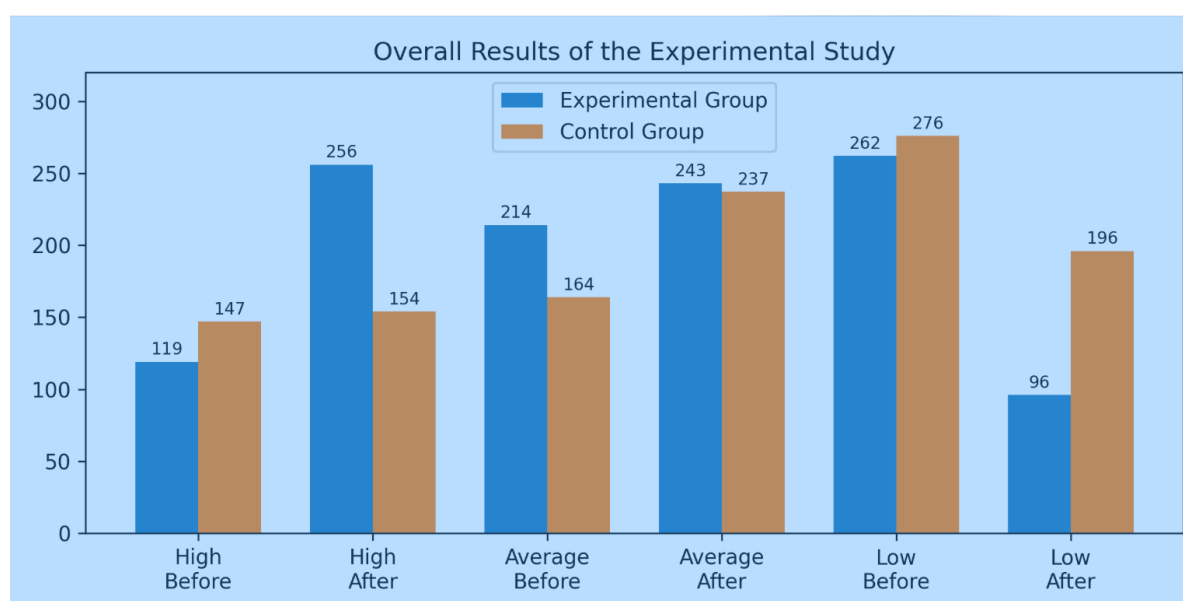


Figure 1. Comparative diagram of the overall results of the experimental and control groups

Based on the data presented above, the effectiveness of developing students' leadership qualities through the 4C model was determined.

At the initial stage of the statistical analysis, the average achievement levels of the experimental and control groups were calculated and compared. The results of the calculations are presented as follows:

$$X_m = 0.43 \times 3 + 0.41 \times 2 + 0.16 \times 1 = 1.29 + 0.82 + 0.16 = 2.27$$

In percentage terms:

$$X_m (\%) = (2.27 / 3) \times 100\% = 75.6\%$$

$$Y_m = 0.26 \times 3 + 0.40 \times 2 + 0.33 \times 1 = 0.78 + 0.80 + 0.33 = 1.91$$

In percentage terms:

$$Y_m (\%) = (1.91 / 3) \times 100\% = 63.7\%$$

Thus, the average achievement level of the experimental group was 11.9% higher than that of the control group ($75.6\% - 63.7\% = 11.9\%$). Moreover, the ratio of the two indicators ($75.6\% / 63.7\%$) demonstrates that the effectiveness of the experimental methodology was 1.18 times higher.

The statistical analysis revealed a significant difference between the results of the experimental and control groups. The reliability of this difference was confirmed using Student's t-test. The non-overlapping confidence intervals obtained during the calculations proved the effectiveness of the methodology applied for developing 4C competencies. Positive dynamics were observed in the experimental group with regard to creative thinking, critical analysis, communication culture, and collaborative skills. According to the data presented in the tables and figures, the overall quality indicator of the experimental group increased by 11.9%, which confirms the effectiveness of the implemented research design.

The results of the pedagogical experiment confirmed the practical effectiveness of the developed model and methodology. At the end of the study, the level of leadership development among students in the experimental group was significantly higher than that of the control group, while the overall effectiveness indicator increased by 11.9%. These findings demonstrate that pedagogical activities organized on the basis of the 4C competencies serve as an important factor in developing students' initiative, responsibility,

independent thinking, and collaboration culture.

CONCLUSION

1. The findings demonstrated that the 4C competencies (creativity, critical thinking, communication, and collaboration) are important pedagogical factors in developing leadership qualities among primary school students. These competencies contribute to the enhancement of students' initiative, responsibility, independent decision-making, and active participation in teamwork.
2. It was determined that problem-based situations, open-ended tasks, mathematical modeling, and collaborative learning activities aimed at developing creativity and critical thinking in mathematics lessons effectively foster students' strategic thinking, problem-solving abilities, and leadership initiatives.
3. Discussions, debates, role-playing activities, and project-based tasks designed to develop communication and collaboration competencies in Moral Education lessons proved to be effective pedagogical tools for improving students' communication culture, teamwork skills, and ability to guide a group toward common goals.
4. The pedagogical model developed within the study, based on the 4C competencies, integrated goal-oriented, content-based, procedural, and outcome-oriented components into a holistic mechanism for leadership development. The preparatory, practical, and reflective stages of the model ensured the systematic development of students' leadership potential.
5. The results of the pedagogical experiment confirmed the effectiveness of the proposed methodology and model. The 11.9% higher performance of the experimental group compared to the control group indicates that educational activities organized on the basis of the 4C competencies yield substantial outcomes in the development of students' leadership qualities.
6. The implementation of the pedagogical recommendations and the proposed model in general secondary schools will contribute to the personal, social, and intellectual development of primary school students and expand opportunities

for fostering modern leadership competencies.

REFERENCES

1. O'zbekiston Respublikasining "Ta'lim to'g'risida"gi Qonuni [Law of the Republic of Uzbekistan "On education"]. Tashkent, 2020.
2. Mirziyoyev Sh.M. Yangi O'zbekiston strategiyasi [New Uzbekistan strategy]. Tashkent: O'zbekiston, 2021. 464 p.
3. Xodiyeva G.H. Zamonaviy boshlang'ich ta'limda 4K modeli kompetensiyalarini rivojlantirishga integrativ yondashuvning mohiyati [The essence of an integrative approach to developing 4C model competencies in modern primary education]. Ijtimoiy-gumanitar fanlarning dolzarb muammolari, 2024, No. 2, pp. 327–333.
4. Xodiyeva G.H. Boshlang'ich ta'limda 4K modelidan foydalanishning pedagogik xususiyatlari [Pedagogical features of using the 4C model in primary education]. Ta'limda istiqbolli izlanishlar, 2024, No. 6, pp. 196–199.
5. Xodiyeva G.H. "4K" modeli asosida boshlang'ich sinf o'quvchilarining liderlik sifatlarini tarbiyalashning mexanizmlari [Mechanisms for developing leadership qualities of primary school students based on the 4C model]. Proceedings of the Republican scientific-practical conference. Tashkent, 2026, pp. 84–87.
6. Ibraimov X. Teoreticheskie osnovy professionalnogo samovospitaniya budushchikh uchiteley nachalnykh klassov [Theoretical foundations of professional self-education of future primary school teachers]. Doctor of Pedagogical Sciences Dissertation. Tashkent, 2006. 307 p.
7. Abdullayeva B.S. Boshlang'ich matematika kursi nazariyasi [Theory of the primary mathematics course]. Tashkent: Tafakkur Bo'stoni, 2020. 320 p.
8. Musurmonova A.N., Jumaniyozova M.T., Isaqulova N.J., Jumayev A.B. Umumiy pedagogika [General pedagogy]. Tashkent, 2018.
9. Qosimov F.M. Boshlang'ich sinf matematika darslarida ijodiy topshiriqlar tizimi [A system of creative tasks in primary school mathematics lessons]. Candidate of Sciences Dissertation. Tashkent, 2007. 202 p.
10. Tolipova O.I. Oliy ta'lim tashkilotlari talabalarining kreativligini rivojlantirishning pedagogik imkoniyatlari [Pedagogical opportunities for developing creativity among higher education students]. PhD Dissertation. Tashkent, 2023. 148 p.
11. Qulboyeva D.A. Boshlang'ich sinf o'quvchilarining kreativlik qobiliyatini rivojlantirish [Development of creative abilities among primary school students]. PhD Dissertation. Tashkent, 2023. 152 p.
12. Ehsanova F.T. Boshlang'ich sinf o'quvchilarida kreativlikni rivojlantirishning pedagogik mexanizmini takomillashtirish [Improving the pedagogical mechanism for developing creativity among primary school students]. PhD Dissertation. Tashkent, 2020. 140 p.
13. Xodjiyeva F.O. O'quvchilarda tanqidiy fikrlashni shakllantirishning didaktik asoslari [Didactic foundations for developing critical thinking among students]. PhD Dissertation. Tashkent, 2009. 194 p.
14. Aslanova O.P. Boshlang'ich sinf o'quvchilarida tafakkur tezligini shakllantirishning pedagogik shart-sharoitlari [Pedagogical conditions for developing thinking speed among primary school students]. PhD Dissertation. Tashkent, 2020. 164 p.
15. Umurova U.L. Boshlang'ich sinf o'quvchilarida o'z faoliyatini baholash va tashxislash ko'nikmalarini shakllantirishning pedagogik asoslari [Pedagogical foundations for developing self-assessment and diagnostic skills among primary school students]. Dissertation. Tashkent, 2009. 136 p.
16. Derkach A.A. Psikhologiya razvitiya professionala [Psychology of professional development]. Moscow: RAGS, 2000. 124 p.
17. Rean A.A. Psikhologiya lichnosti [Personality psychology]. Saint Petersburg: Piter, 2018. 288 p.
18. Zimnyaya I.A. Klyuchevye kompetensii kak rezultat obrazovaniya [Key competencies as an educational outcome]. Moscow, 2004. 42 p.
19. Vygotsky L.S. Mind in society: The development of higher psychological processes. Cambridge, MA: Harvard University Press, 2018. 159 p.
20. Leontiev A.N. Activity, consciousness and personality. Eastford, CT: Martino Fine Books, 2019. 238 p.
21. Derkach A.A. Psikhologiya razvitiya professionala

[Psychology of professional development].
Moscow: RAGS, 2000. 124 p.

- 22.** Rean A.A. Psikhologiya lichnosti [Personality psychology]. Saint Petersburg: Piter, 2018. 288 p.
- 23.** Zimnyaya I.A. Klyuchevye kompetensii kak rezultat obrazovaniya [Key competencies as an educational outcome]. Moscow, 2004. 42 p.
- 24.** Northouse P.G. Leadership: Theory and practice. 9th ed. Thousand Oaks, CA: Sage Publications, 2021. 600 p.
- 25.** Burns J.M. Leadership. New York: Harper & Row, 1978. 530 p.
- 26.** Facione P.A. Critical thinking: What it is and why it counts. California Academic Press, 2023.
- 27.** OECD. Future of education and skills 2030: Conceptual learning framework. Paris: OECD Publishing, 2023.
- 28.** UNESCO. Global education monitoring report 2024: Leadership in education. Paris: UNESCO Publishing, 2024.