

THE IMPACT OF ARTIFICIAL INTELLIGENCE–BASED PERSONALIZED LEARNING ON LEARNING MOTIVATION AND COGNITIVE ENGAGEMENT AMONG PRIMARY SCHOOL PUPILS

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Abstract: This article examines the introduction of artificial intelligence (AI) technologies into primary education and their influence on pupils’ learning motivation and cognitive engagement from theoretical and practical perspectives. The limitations of traditional classroom instruction are compared with the potential advantages of AI-based adaptive learning environments. During the study, pupils’ intrinsic motivation, sustained attention, and information-processing speed were assessed in experimental and control groups. The reported findings suggest that AI technologies may strengthen pupils’ desire to learn, reduce their fear of making mistakes, and support the development of logical thinking.

Keywords: artificial intelligence, personalized learning, primary education, learning motivation, cognitive engagement, adaptive learning platform

INTRODUCTION

Developments in contemporary education increasingly call for approaches that take account of each pupil’s individual abilities, psychological characteristics, and pace of learning. Traditional classroom instruction, which is often organized around average performance levels, may lead to boredom among pupils who learn quickly and to reduced cognitive engagement and motivation among those who need more time to master the material.

Primary school is a particularly important stage of children’s intellectual and personal development. During this period, sustained attention develops, and thinking gradually moves from predominantly visual and image-based forms toward more logical and conceptual forms. In recent years, the integration of AI technologies into education has created opportunities to adapt learning activities to pupils’ cognitive abilities. Research literature describes how AI algorithms can analyze pupils’ errors and achievements in real time and provide tasks suited to their current developmental needs. Nevertheless, the mechanisms through which AI-based personalized learning environments affect primary school pupils’ motivation and cognitive engagement have not yet been comprehensively explored. The aim of this study is to examine the pedagogical and psychological potential of AI-based adaptive platforms for promoting intrinsic motivation and cognitive engagement among primary school pupils.

METHODS

The study employed a combination of theoretical and empirical approaches, including classroom observation, comparative analysis, psychological tests, and questionnaires. Experimental and control groups were established to assess primary school pupils’ levels of learning motivation and cognitive engagement. In the experimental group, instruction was organized using AI-based adaptive learning platforms, whereas conventional teaching methods were used in the control group.

RESULTS

The reported findings of the experimental study indicated a positive association between AI-based personalized learning and pupils’ learning-related outcomes. Differences between the experimental and control groups were described in the following areas:

Changes in learning motivation. Whereas pupils’ engagement in conventional classes was largely associated with external incentives, increased intrinsic motivation and a stronger desire to learn were reported in the group using AI technologies.

Indicators of cognitive engagement. Sustained attention and information-processing speed were reported to be 32% higher in the experimental group than in the control group. The source text also reports that pupils did not exhibit excessive cognitive strain as adaptive software gradually increased task difficulty.

Attitudes toward mistakes. In conventional instruction, pupils may experience anxiety about making errors. In the AI-supported environment described in the study, errors were treated as a natural part of learning, and the system provided immediate, understandable explanations and opportunities to try again. Such an approach may support the development of logical thinking.

DISCUSSION

1. Theoretical Foundations of Personalized Learning and AI Technologies in Primary Education

The concept of personalized learning has long been discussed in pedagogy and psychology. It emphasizes the relationship between tasks that children can complete independently and those they can accomplish with appropriate support, including technological assistance. In conventional classrooms with more than thirty pupils per teacher, responding fully to every child’s individual learning needs may be difficult. AI algorithms can help address this challenge by providing digital environments that adapt to each pupil’s pace of learning. Adaptive AI platforms can assess a child’s current knowledge and present tasks at an appropriate level of difficulty. Such adaptation may reduce unnecessary cognitive strain and help sustain interest in learning.

2. The Role of Digital Tools in Fostering Learning Motivation

Learning motivation among primary school pupils often has a strong emotional component and may be influenced by external incentives. However, reliance on external rewards alone may become less effective over time. Studies discussed in the source text suggest that AI-supported learning environments may also encourage intrinsic motivation. Game-based elements, interactive visualizations, and immediate feedback or rewards for small achievements can provide positive emotional reinforcement. Consequently, pupils may become more engaged in learning for the enjoyment and satisfaction of the process itself rather than solely because of external demands.

3. Pedagogical Conditions and Safety Considerations

The findings discussed in this article suggest that AI should be viewed not as a replacement for primary school teachers but as a supplementary tool for improving instruction. Adaptive tasks generated by AI algorithms may help maintain pupils’ attention and present learning material in engaging formats. At the same time, the use of AI technologies must take account of age-appropriate health and safety requirements, limits on screen time, and the teacher’s continuing educational and emotional role. Excessive reliance on digital environments may otherwise adversely affect opportunities to develop face-to-face communication and social skills.

CONCLUSION

By adapting educational activities to each child’s learning pace and abilities, AI technologies may foster intrinsic motivation, create a learning environment in which mistakes are less intimidating, and support the development of logical thinking. A gradual, evidence-informed introduction of this approach into primary education may contribute to improved educational quality and provide a foundation for pupils’ future development.

References

1. Mavlonova, R., Vohidova, N., & Rahmonqulova, N. (2019). *Pedagogika [Pedagogy]. O'qituvchi*. Tashkent.
2. Muslimov, N. A., Usmonboyeva, M. H., Sayidahmedov, N. S., & To'rayev, A. B. (2015). *Pedagogik texnologiyalar loyihasi [Design of pedagogical technologies]. Fan va texnologiya*. Tashkent.
3. To'raqulov, H. X. (2020). *Ta'limda axborot texnologiyalari [Information technologies in education]. Tafakkur*. Tashkent.
4. Luckin, R., Holmes, W., Griffiths, M., & Forcier, L. B. (2016). *Intelligence unleashed: An argument for AI in education*. Pearson.
5. Baker, R. S., & Inventado, P. S. (2014). *Educational data mining and learning analytics*. Springer.
6. Russell, S., & Norvig, P. (2020). *Artificial intelligence: A modern approach (4th ed.)*. Pearson.
13. Azamov, U. Y. (2025). TA'LIM JARAYONIDA IJTIMOIIY INTELLEKTNI RIVOJLANTIRISHNING INNOVATSION TEXNOLOGIYALARI. *Inter education & global study*, 3(11 (1)), 56-65.
14. Turg'unboyeva, A., Badritdinova, M., G'aniyeva, N., & Qayumov, B. (2021, May). Description of the methods of diagnosing the cognitive style of pupils in the educational process. In *E-Conference Globe* (pp. 306-308).
15. Baxtiyor Q. The correlation relationship of the development of creativity in adolescents with achievement.
16. Safarboyeva, S. B. Q. (2026). O 'SMIRLARDA UCHRAYDIGAN PSIXOLOGIK MUAMMOLAR. *Mahalliy va xalqaro konferensiyalar platformasi*, (5), 109-111.
17. Qayumov, B. Z. O. G. L., & Yo'qubxo'jayeva, M. A. Q. (2025). O 'quvchilarda kreativlik rivojlanishida shaxs individual xususiyatlarni roli. *Science and Education*, 6(12), 627-632.
18. Abdullayev, D. Y. O., & Abdurahimova, R. S. K. (2026, June). THE ROLE OF PEOPLE'S PEDAGOGY IN PRESERVING NATIONAL VALUES IN THE CONDITIONS OF GLOBALISATION. In *Altum International Conference Platform* (No. 5, pp. 186-193).
19. Abdullayev, D. Y. O. G. L., & Majidova, Z. Q. Q. (2026). Oliy ta'lim muassasalarida pedagogika fanlarini o 'qitishda zamonaviy pedagogik texnologiyalarni rivojlantirish metodikasi. *Science and Education*, 7(5), 241-247.
20. Abdullayev, D. Y. O. G. L., & Odiljonova, Z. S. Q. (2026). Inklyuziv ta'limga muhtoj bolalarni kasbga yo'naltirishning pedagogik imkoniyatlari. *Science and Education*, 7(5), 371-375.
21. Roziqova, M. O. (2024). Millatlararo oilalarning psixologik xususiyatlari va tipologiyasi. *SCIENCE and SOCIETY*, (1-2), 99-101.
22. Roziqova, M. O., & Burgitova, M. G. TALABALARDA PROKRASTINATSIYA-ISHNI KECHIKTIRISHNING PSIXOLOGIK SABABLARINI O'RGANISH.
22. Roziqova, M. O. Q., & Abdurazzoqova, M. S. Q. (2026). Aqli zaif bolalar bilan korreksion-pedagogik ish tizimidagi didaktik o 'yinlar. *Science and Education*, 7(3), 497-500.
23. Rustamova, G. X. Q. (2025). Noto 'liq oilaning jamiyatdagi o 'rni va psixologik ta'siri. *Science and Education*, 6(4), 265-269.