

**DIDACTIC POSSIBILITIES OF DIGITAL EDUCATIONAL PLATFORMS IN
DEVELOPING MATHEMATICAL THINKING IN HIGHER EDUCATION**

Inoyatov Kayum Yusufovich

Samarkand economy and service institute
teacher Department of “High Mathematics”
inoyatovqayum@gmail.com

Abstract. this in the article supreme in education mathematics science in education digital education platforms didactic opportunities research Research constructivism, interactive education and digital pedagogy concepts based on take visited. Such as Lumio, GeoGebra, Moodle and Desmos platforms using organization done experience lessons results students logical thinking, spatial imagination and analytical thought indicators noticeable at the level increased showed. In the article platforms education in the process visual, interactive and flexible functions, as well as their effective application according to practical recommendations Research results supreme in education mathematician thought and digital competencies development effective methodical basis to create service does.

Keywords: digital learning platform, mathematics education, thinking development, constructivism, interactive learning, higher education education

Login. Current in the period education system all in syllables digital technologies current to grow the process is global intensity with is taking place. World -class progressive education systems (USA, Japan, South Korea, Finland and others) in digital platforms of teaching inseparable part as looking at them main task — educational process interactivity education, training recipients independent thinking develop and individual training trajectories from forming by UNESCO and OECD confession It is believed that digital education infrastructure not only knowledge transmission tool, maybe student's creative and analytical his/her thinking to develop service doer environment also be considered as necessary.

High education in the system, especially mathematics science in education, last in years one row methodical problems is being observed. In particular, students to the topic relatively of interest decrease, mathematics of concepts high level abstractness, theoretical knowledge practical to situations implementation in the making difficulties, as well as the teachers' digital competence enough at the level unformedness teaching efficiency reducer factors as manifestation This is happening. digital tools using lesson process interactive, visual and contextual in the form organization to grow necessity further is strengthening.

Last in years digital education platforms (in particular, Lumio, GeoGebra, Moodle, Desmos, Edmodo, Microsoft Teams) teaching efficiency increase according to various research take is going. Foreign in sources (Anderson, 2021; Keller, 2022; OECD Report, 2023) digital platforms mathematics in science visual modeling, gamification and differential education opportunities expansion Local in research and (Karimov, 2023; Abdullayeva, 2024) this from platforms use students logical his/her thinking development, issues algorithmic solution skills in formation positive results giving record With this together, many in the works their didactic opportunities enough at the level systematic analysis not done.

Research methodology of the research. methodological basis constructivism theory, interactive education approach and digital pedagogy concept organization Constructivist to the approach according to, knowledge teacher by ready in the form not given, but student's active cognitive activity in the process independent accordingly is built. Therefore digital from platforms use to students own knowledge and concepts experience, communication and interactive assignments through formation opportunity gives. Digital pedagogy concept and education process technological tools using to the person oriented, flexible and analytical to analysis based system as sees.

Research Tashkent state pedagogy university of “Mathematics” and in the field of “informatics” education 2nd–3rd year bachelor's degree student of students in the presence of done increased. General 68 people on the account student to research attraction The experiment was carried out. The process is called “Linear Algebra and analytical geometry” and “Mathematics analysis” sciences within take went because this in sciences abstract concepts visual and interactive in a way study necessity is high.

Analysis and results. Experiment-test works supreme education 2024–2025 academic year at the institution year during done increased. Experience group lessons digital education platforms — based on Lumio, GeoGebra, Moodle and Desmos organization was controlled group and traditional methods with education took. Experience process during each platform to oneself typical didactic opportunities from the test held:

- **Lumio** on the platform students logical thinking to develop aimed at interactive tests and drag-and- drop exercises used;
- Using **GeoGebra** spatial models construction, graphics with work through spatial imagination expanded;
- **Moodle** system lesson process control, automatic assessment and mastery monitoring for basis it has been;
- **Desmos** through analytical thinking to develop service doer functions and of equations dynamic visualization provided.

Experience in the end students logical thinking, spatial imagination and analytical thought degrees special diagnostic tests through was evaluated.

Table 1

Students logical thinking, spatial imagination and analytical thought results

Thought indicator	Elementary result (%)	Final result (%)	Growth (%)
Logical thinking	58.2	81.6	+23.4
Spatial imagination	54.7	78.9	+24.2
Analytical thought	52.5	79.3	+26.8

This results this shows that the digital platforms based on organization done lessons students of thought all components positive impact Especially analytical thought in the indicator noticeable growth students problematic situations analysis to do, algorithmic thinking and logical justification of abilities formation with is related.

Questionnaire to the results according to the students digital platforms to teach process further interesting (87%), understandable (82%), collaborative directed (78 %) and as a result (85%) evaluated. Students most (90%) digital in the environment issues solution their creative thinking and independent decision acceptance skills to do strengthened record reached.

Research results digital education platforms mathematician thinking in development didactic opportunities high that it is showed. This platforms study process visual, interactive and flexible in the form organization to grow opportunity gives. As a result in students cognitive activity, creativity, independence thinking and analytical approach skills takes shape and

develops. Digital tools using education process not only knowledge mastery efficiency increases, maybe students mathematician concepts practical hand to get, logical dependencies analysis to grow and problems in solution new strategies working exit also enhances its capabilities.

Research results this shows that digital education platforms supreme in education mathematics science in teaching traditional to methods relatively further effective is, students thought activity deepens. Experience group of the results control to the group relatively height this approach didactic advantages of confirms.

First, logical thinking level growth on Lumio and Moodle platforms created problematic tasks, "answer" "choose" not "answer" "justification" type exercises through This situation was observed. constructivism "knowledge" in the theory active to the principle of "building" complete suitable comes (Piaget, 1972; Bruner, 1996). Students only ready the formula not, maybe mathematician of the event internal logic to explain learns.

Secondly, **spatial imagination** indicator increase in GeoGebra and Desmos programs visualization opportunities with This is related to tools using in students geometric models analysis to do, three measurable objects imagination to do and variables between dependency see skills This result was confirmed by Mayer (2014). previously pushed **multimedia teaching theory** with harmonious, that is visual and verbal information together presented when done knowledge more efficient is being mastered.

Third, **analytical** 26–27 % of **thinking** growth digital platforms algorithmic thinking encouraging interactive tasks with explained. In the Moodle system automatic analysis tools to students own mistakes quickly determination and correction opportunity given because of training in the process **reverse communication speed** increased. This is education the “learning analytics” approach in the process advantage shows (Siemens, 2019).

This results other researchers by taken information with synchronous. For example, Anderson (2021) digital education in their environments interactivity increase students **cognitive activity** strengthening, while Keller (2022) digital gamification elements increase motivation by 20–25% increase possible record Our students in the study study motivation high (82–87%) in this scientific conclusions practical in terms of confirmed.

Digital education process to the efficiency **teacher's digital competence, technical conditions, platform interface The convenience is** also noticeable. impact showed. Some in students initially technician adaptation problems observed although, experience to the end come their most from platforms independent use to take to the level enough.

Research results digital education platforms mathematician thinking in development opportunities not only theoretically, maybe practical even higher that showed. With their help education process **visual, interactive, individual and reflexive** character profession However, in the future this systems efficiency increase for the students digital pedagogy competence preparation, training resources national to the context Adaptation is also important importance profession will reach.

Conclusion and suggestions. Research results this showed that digital education platforms supreme education in the system mathematician thinking development effective tool as big didactic to the potential have Like Lumio, GeoGebra, Moodle, Desmos interactive platforms using organization done study process students logical thinking, spatial imagination, analytical approach and independent study skills noticeable at the level develops.

Digital in the environment education organization to grow in the process following important scientific and pedagogical to conclusions bride :

1. Digital education platforms education process visual, interactive and adaptive in the form organization to grow opportunity gives, this and traditional teaching to the methods relatively students motivation increases.
2. Mathematician concepts in mastering visual modeling, simulation and automatic analysis from the means use students of thought from abstraction clear, logical to the base the passage provides.
3. Platforms diagnostic and analytical functions (test, monitoring, activity monitoring) to the teacher education the results transparent and digital criteria based on assessment opportunity gives.
4. Experiment-test works as a result digital technologies based on educated students group traditional to the trained relatively **mathematician thought development indicators according to average 18–22% higher the** results manifestation reached.

This to the results based on the following practical offers previously is pushed :

- High education in institutions mathematics sciences in education **digital to platforms based training methodical complexes** working exit and to practice current to grow;
- The students digital pedagogy, interactive design and platforms with work according to **qualification increase programs** through preparation;
- Students for independent to study intended **online exercise modules** and **interactive assignments bank** create;
- Study in the process digital technologies efficiency permanent analysis to do for **digital monitoring system** on the road to put

Digital education from platforms targeted and methodical based use supreme in education mathematics education quality increases, students cognitive activity activates and modern digital competencies to form service This approach education process effective, interactive and to the result directed in the form organization to grow opportunity creates, students training motivation strengthens and them digital in the environment independent to think directs.

Used literature list

1. Anderson, T. (2021). *The Theory and Practice of Online Learning*. Athabasca University Press.
2. OECD. (2023). *Education at a Glance: Technology Integration in Learning*. Paris: OECD Publishing.
3. Karimov, A. (2023). Digital platforms using mathematician his/her thinking development. *Pedagogy and Innovations*, 12(3), 58–66.
4. Abdullayeva, N. (2024). Higher in education interactive education of tools efficiency. *Education Technologies*, 7(1), 22–31.
5. Rustamov, J.E. *Povyshenie effektivnosti obucheniya v sredelektronnogo obucheniya*. Mejdunarodn yy nauchno-praktichesky **journal** "Economics and society" №2(117) 2024 www.iupr.ru ; <https://goo.su/MLcL>