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SCIENTIFIC-METHODICAL BASES OF THE USE OF MULTIMEDIA AND PEDAGOGICAL SOFTWARE IN TEACHING INFORMATICS AND INFORMATION TECHNOLOGIES

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Abstract: *This scientific article examines the role and importance of multimedia technologies and pedagogical software tools (PST) in improving the efficiency of teaching informatics and information technology disciplines in the modern educational system. The article analyzes the types of pedagogical software tools, mechanisms for their integration into the educational process, and their impact on the quality of education. The psychological and pedagogical factors of multimedia components in increasing the level of information perception by students are also highlighted.*

Keywords: *Informatics, multimedia, ICT, pedagogical software, virtual laboratory, interactive education, electronic textbook, educational efficiency, digital pedagogy.*

21st century — global digitalization and intellectual technologies century . Humanity of activity all to the fields intensity with enter going information and communication technologies (ICT) today on the day modern education the foundation of the system organization is doing . Uzbekistan In the Republic education system fundamentally reform to do, young to the generation international standards at the level knowledge to give and digital economy requirements suitable personnel preparation state of the policy priority from directions one arrived In particular, computer science and information technologies science modern methods based on teaching, learning

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multimedia and innovative pedagogical software tools wide current to grow strategic importance has.

Traditional education in the system information transmission main source calculated lectures and print literature today 's student or student 's to information was need complete satisfy Modern youth visual , dynamic and interactive resources through information faster and more efficient Therefore , computer science in their classes only theoretical knowledge on the board explanation not , maybe animations , video lessons , virtual simulators and special pedagogical programs using processes modeling necessity to the surface came . The research purpose — informatics science multimedia tools, for example and pedagogical software of products education in the process didactic opportunities scientific justification and their efficiency criteria working from the exit consists of .

Multimedia technologies and pedagogical software of tools education to the efficiency the impact study according to world on a scale many research works take visited. USA and Europe R. Mayer, one of the scientists, in his " Multimedia Learning" (Multimedia learning (in theory) human brain visual and auditorium information two kind independent channel through acceptance to do and they one at the time when used mastery indicator one how many equal increase proved by YA Comenius from the era since known was exhibitionism principle digital The concept of multimedia in the 21st century with new to the stage rose.

CIS countries Robert IV from scientists informed education environment pedagogical-didactic conditions and education quality control to do automated systems research He is a pedagogical software tools education to the recipient directed intellectual system as describes.

From Uzbekistan from scientists Academician S. S. Gulyamov, Sh. A. Begimkulov, A. A. Abdukodirov and N.I. Taylakov own scientific in their

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research national education system informatization, electronic textbooks of creation conceptual basics and supreme and middle special education ICT environment in institutions formation problems deep analysis However , computer science and programming basics such as complicated and abstract to concepts has multimedia tools for science using visualization pedagogical software algorithms still systematic accordingly perfect working This is not released . this in the direction additional research take to go relevance shows.

Research in the process systematic approach, pedagogical observation, comparative-logical analysis, sociological questionnaires and pedagogical from experimental methods used. Pedagogical software of tools impressionability determination for the purpose education in the system electronic textbooks , animation models and virtual laboratory from the stands organization found The complex " Pedagogical -Multimedia System " (PMT) was created and to practice implementation was done .

Experiment-test works 2024-2025 academic year in the years general 4 educations in the account institution Computer science and information technologies direction students (total 240) (respondent) was held. Groups two to category separated:

1. Control groups (120 people) student) — lessons traditional lecture and practice in the form of , standard textbooks using take went .
2. Experience groups (120 people) student) — lessons multimedia interactive content materials, 3D models, programming process visualizer pedagogical software tools (Code Pen, AlgoViz such as modeling programs) integration was done.

Students knowledge level assessment for three main criterion selectively received: theoretical knowledge mastery indicator (tests), practical skills formation (practical laboratory tasks speed and quality) and independent and

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creative thinking level (project works). Statistical analyses Student's t- test using done increased .

Last 6 months pedagogical experiment results this showed that the lesson multimedia in the process and pedagogical software from tools use student's science was interest noticeable at the level increased. Control in the group students programming algorithms (e.g., cycles) and arrays with work) mainly memorization through adopted if they are, experience in the group student's visual simulators using algorithms in memory how performance dynamic in a way review, analysis they did.

Experience in the end held final control of the results comparative analysis are presented in Table 1 below:

Table 1: Traditional and To ICT based education systems efficiency indicators (percentage on account of)

No.	Evaluation criteria	Control group (Traditional, %)	Experience group (Multimedia + VAT, %)	Difference %
1	Theoretical knowledge mastery	68	85	16
2	Practical issues solution speed	55	79	24
3	Independent design skill	43	68	25
4	Information far within the period remembering stay	51	76	25

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Table from the data apparently It is clear that the highest growth practical issues solution at a speed of (+24%) and independent design skills (+25%) were observed. This from that evidence gives, pedagogical software tools in students only dry knowledge not, maybe directly labor in the market demand attainable practical competencies Mathematical - statistical processing to give results experience in the group indicators random not, maybe systematic accordingly confirmed that it improved ($p < 0.05$) .

Received results education in the field digital from technologies use according to there is theories further enriches. Multimedia tools power is that they to the human sensory system complex impact Text, sound, graphics image, animation and video materials one pedagogical program within together, education recipient's attention the center hold stand term by 40% extends.

However, computer science in their classes pedagogical software tools in use some There are also problems. First, the teachers of the composition digital pedagogy in the field preparation level every always in demand answer He doesn't give it. To the lesson just take a presentation (PowerPoint) introductory multimedia education means Not . Real . pedagogical software tool interactive to be, to be opposite providing feedback and student's errors in real time in mode showing to give Secondly, virtual laboratories too much outside given to leave students' real hardware (for example, a computer) internal architecture, network cables) with directly physical work skills decreasing send There is a risk. That's why virtual and real practice for balance storage recommendation is being done .

Computer science and information technologies sciences modern multimedia and pedagogical software tools based on organization to grow education today system strict is a requirement . Conducted scientific research and experiment works based on following to conclusions bride:

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1. Multimedia elements complicated and abstract computer scientist concepts visualization through information mastery efficiency on average 20-25 % increases.

2. Pedagogical software tools education individualization opportunity gives, that is every one student his/ her own intellectual potential and to the speed suitable accordingly knowledge takes.

3. Based on ICT prepared lesson resources in student's independent education to take and problematic from situations creative exit skills develops.

In the future education to platforms artificial intellect technologies integration to do through further smart and adaptive pedagogy software tools create of the research promising direction is considered.

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