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COMPARING INDIVIDUAL AI-DRIVEN LEARNING WITH TUTORIAL CENTERS AND UNIVERSITIES IN THE 21ST CENTURY

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Abstract: The 21st century has seen a deep change in how mathematics can be learned, with artificial intelligence and modern information technology enabling personal learning paths that question the historical leading role of both private tutorial centers (coaching classes) and formal university education. This paper carefully examines the argument that individual AI-driven mathematics learning has become easier and, in some ways, more effective than studying at such institutions. Using a combined framework (Jumaniyazov, 2025d) and recent studies on teaching reform (Jumaniyazov, 2025a; 2025b; 2025c), this analysis looks at both approaches across several areas: teaching effectiveness, student motivation, thinking development, honesty in assessment, and social and economic access. The paper concludes that while individual AI learning offers unmatched advantages in tailoring to the student, reducing anxiety, and allowing flexible pacing, tutorial centers and universities still have important value in organized guidance, learning with others, and official certification. A combined model - rather than completely replacing one with the other - is the best way forward for mathematics education in developing countries and beyond.

Keywords: Artificial Intelligence, Personalized Learning, Mathematics Education, Tutorial Centers, University Education, Combined Approach, Digital Divide, Math Anxiety.

Introduction: The Current Debate

The digital revolution has fundamentally changed the world of mathematics education. As shown in recent studies, the 20th-century teaching model - based on teacher-centered lectures, learning by repetition, and exams with high stakes—has become increasingly out of step with the realities of the 21st-century learner (Jumaniyazov, 2025a). The spread of smartphones, AI-powered solvers, and learning platforms that adjust to the student has created a situation never seen before: for the first time in history, a motivated person can learn large parts of the mathematics curriculum without ever setting foot in a traditional classroom or a private tutoring center.

This development has produced a thought-provoking argument: learning mathematics on your own with AI and modern IT has become easier than studying at learning centers or universities. At first look, the claim seems strong. AI tutors are available 24/7, give immediate feedback, and have unlimited patience. Adjustable systems set difficulty to the exact level of each learner. Moving pictures and graphs make abstract ideas easy to see. Yet the argument needs careful examination. What does "easier" really mean in this context? Easier in terms of time spent? Emotional comfort? Remembering over the long term? Being able to use skills in different situations? Getting a recognized qualification?

This paper carries out a systematic analysis of both positions, using the combined framework developed in Jumaniyazov (2025d) and the diagnostic analyses of the mathematics education crisis (Jumaniyazov, 2025a; 2025b; 2025c). The goal is not to declare a winner but to make clear the conditions under which each approach works or fails, and to describe a way forward that uses the strengths of both.

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Background: The Development of Mathematics Learning Approaches

The 20th-Century Institutional and Tutorial Model

To understand the current debate, one must recognize what traditional institutional and tutorial models were designed to achieve. As Jumaniyazov (2025a) notes, the 20th-century mathematics classroom - whether in a school, a university lecture hall, or a private coaching center - was built on a "teaching single culture" of lecture, showing, and repetitive practice. This model came from behaviourist learning theories that saw knowledge as something passed from expert to beginner, with learning shown by correct answers to standardized problems.

Tutorial centers (also called coaching or learning centers) became especially popular in developing countries as a supplement to weak school systems. They offered small-group instruction, focused exam preparation, and regular testing. Universities provided the highest level of organized progression, with ordered courses, active researchers as teachers, and formal recognition.

These models offered several built-in advantages. They provided organized progression through a ordered curriculum. They created social responsibility—the presence of other students and authority figures motivated effort. And they produced standardised qualifications that employers and higher education institutions could trust.

However, these models also created system-wide problems. Jumaniyazov (2025a) identifies math anxiety as a direct result of performing in public and exams with high stakes, which is often made worse in competitive tutorial centers. The focus on following procedures over deep understanding created learners who could carry out step-by-step methods without grasping the basic ideas. The "one-size-fits-all" pacing left struggling students behind while advanced students lost interest. And the sense that mathematics was useful weakened as its connection to modern careers became unclear.

The Disruption Caused by Technology

The arrival of digital technologies disrupted this model in three waves. First, calculators automated computation, raising questions about the value of doing arithmetic by hand. Second, the internet made access to information available to everyone, making lectures and textbooks less special. Third, and most significantly, AI-powered systems began offering personalised instruction that equaled - and in some ways surpassed - human teachers.

As Jumaniyazov (2025b) shows, AI-driven adjustable learning platforms represent a qualitative shift rather than just a small improvement. Unlike previous technologies that required user input and understanding, modern AI solvers can take a picture of problems, produce step-by-step solutions, and adjust instruction based on live performance analysis. This ability has created what Jumaniyazov (2025c) calls "complete cognitive replacement" - the full transfer of mathematical thinking from student to machine - while at the same time offering unmatched opportunities for personalised support.

The Case for Individual AI-Driven Learning

Positive Aspects

Personalization at a Large Scale. The strongest argument for individual AI learning is personalization. Traditional learning centers and university lectures cannot deal with the needs of thirty students at different levels of readiness at the same time. AI systems, in contrast, constantly check each learner's understanding and adjust difficulty, pacing, and way of presenting accordingly. Jumaniyazov (2025b) emphasises that this adjustable ability allows every student to work within their area of best development - neither bored by material too easy nor overwhelmed by material too difficult.

A Learning Environment Free of Anxiety. Math anxiety, defined by Ashcraft (2002) as "a feeling of tension and worry that gets in the way of math performance," is made worse by being watched in public and time pressure. In many tutorial centers, students are called to solve problems on the board; in universities, large lecture halls and exams with high stakes increase fear. Individual AI learning removes these triggers. Students can make mistakes privately, ask for explanations again as needed, and move forward at their own speed without being compared to others. Jumaniyazov (2025c) argues that this private, non-judgmental space enables the "helpful struggle" that is essential for deep learning.

Immediate, Specific Feedback. Institutional learning often involves delayed feedback - homework returned days later; tests graded weeks after completion. By then, the thinking context has faded. AI systems give instant feedback, identifying not just that an answer is wrong but exactly where the reasoning went away from correct logic. This immediacy strengthens the learning cycle.

**Flexibility and Ease of Access. Individual AI learning removes geographical and time barriers. A student in a faraway village with internet access can potentially receive instruction better than what was available in mid-20th-century universities or expensive urban tutorial centers. This ability to make learning available to everyone is especially important for developing countries, where Jumaniyazov (2025a) shows serious gaps in education buildings and systems and where high-quality learning centers are often located only in wealthy areas.

Keeping Interest Through Game-Like Features. AI platforms can include game-design elements—badges, progress bars, levelling systems—that use the same psychological mechanisms as social media and entertainment. As Jumaniyazov (2025b) notes, this deals with the "lack of engagement" by making sustained mathematical practice rewarding in itself rather than forced from outside.

Negative Aspects

The Cheating Problem. The same tools that enable personalized learning also enable easy cheating. Jumaniyazov (2025c) shows how AI solvers and photo math applications have become "tools of intellectual avoidance," allowing students to skip thinking effort entirely. When learning is completely self-directed and self-assessed, the temptation to take shortcuts may overcome the motivation to really understand.

No Learning with Others. Mathematics is not just a solitary activity. Discussing with peers, solving problems together, and being exposed to different ways of reasoning are essential for developing mathematical communication skills and flexible thinking. Individual AI learning cannot recreate the helpful challenge of group problem-solving, where explaining your reasoning to others deepens your own understanding. Tutorial centers, even though they are focused on exams, do provide some interaction with peers.

Lack of Organized Responsibility. Freedom from institutional limits is a double-edged sword. Without outside deadlines, watched assessments, and social responsibility, many learners -especially those who are still developing skills for managing their own learning - find it hard to keep up consistent effort. Self-directed learning requires self-control abilities that are themselves developed through organized educational experiences.

Lack of Official Qualifications. Even a perfectly educated person without institutional qualifications faces barriers to getting a job and further education. Universities and even some well-known learning centers provide certificates and degrees that show ability. Individual AI learning, no matter how effective, does not currently produce recognized qualifications.

The Digital Divide Reality. Jumaniyazov (2025b) acknowledges that the digital divide is still large. Access to reliable internet, working devices, and electricity is not universal, especially in developing countries. Individual AI learning may be "easier" only for those who already have technological advantage, possibly making inequalities in education larger rather than smaller.

The Case for Learning Centers and Universities

Positive Aspects

Organized Curriculum and Orderly Progression. Universities and well-regarded learning centers provide carefully ordered curricula designed by subject experts. This structure ensures that basic concepts are established before advanced topics are introduced, preventing the fragmented knowledge that can result from self-directed exploration. For learners without strong previous knowledge in the field, this support is extremely valuable.

Expert Guidance and Mentoring. While AI can answer questions, it cannot yet recreate the intuitive judgment of an experienced mathematics teacher who recognizes not just what a student misunderstands but why - and who can offer several different explanatory approaches tailored to that student's way of thinking. Jumaniyazov (2025d) emphasizes that AI should add to, not replace, the teacher's irreplaceable role in providing understanding and encouraging social learning. A skilled tutor at a learning center can also notice emotional blocks (e.g., shame, frustration) that AI cannot perceive.

Learning with Peers and Working Together. Institutional settings provide natural opportunities for collaborative learning. Students explain concepts to each other, discuss solution strategies, and learn from different approaches. This social dimension of learning is not just motivational but cognitive; explaining your reasoning to others strengthens and reorganizes your own understanding.

Responsibility and Motivation. Outside structure provides motivation that many learners need. Fixed classes, graded assignments, and the social presence of peers create responsibility that keeps effort going through difficult periods. While internal motivation is best, outside structure serves as essential support for its development. Learning centers, especially, do well with this responsibility model.

Official Qualifications. University degrees are still the main currency of professional advancement. Even some learning centers offer certificates that local employers recognise. The qualification function is not just bureaucratic; it represents a trusted signal that a learner has shown specific abilities under watched conditions. Jumaniyazov (2025c) notes that dealing with the cheating crisis requires assessment redesign, but institutional settings currently offer stronger assessment honesty than unwatched individual learning.

Negative Aspects

Math Anxiety Made Worse. As Jumaniyazov (2025a) shows, traditional settings can make math anxiety worse. Solving problems in public on the blackboard (common in many tutorial centers), timed examinations, and being compared to others create psychological barriers that get in the way of learning for many students. The institutional model that helps some learners well actively harms others.

One-Size-Fits-All Pacing. Even with efforts at differentiation, group instruction necessarily moves at a speed determined by the average student. Advanced learners waste time on material they have already mastered; struggling learners fall further behind as the class moves on. This pacing problem is built into the structure rather than fixable through small changes.

Weakened Sense of Usefulness. Jumaniyazov (2025a) identifies a "usefulness gap" in mathematics education. Students are taught procedures without understanding their connection to modern careers or personal interests. The practical justification that worked for 20th-century students - mathematics as gateway to engineering and medicine—has lost power in a more varied digital economy.

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Cost and Barriers to Access. High-quality university education is expensive and geographically concentrated. Private learning centers, while more affordable than universities, still charge fees that exclude low-income families. Students in rural areas or financial hardship may lack access to any effective institution.

Resistance to Using Technology. Many institutions have been slow to adapt teaching practices to technological realities. Some continue to ban smartphones and AI tools rather than teaching their proper use. Jumaniyazov (2025c) argues that restriction-based approaches completely misunderstand the problem and are certain to fail.

Comparing the Two Approaches: When Each Works Best

Neither approach is universally better. How well each one works depends on the learner's characteristics, the specific topic, available resources, and educational goals. The table below pulls together the comparative analysis.

Aspect	Individual AI Learning	Learning Center/ University
Tailoring to the student	Excellent (adjustable algorithms)	Poor to moderate (fixed pacing)
Math anxiety	Low (private, no time pressure)	Can be high (public, timed)
Speed of feedback	Immediate	Delayed (hours to days)
Learning with others	None	Rich (interaction with peers)
Responsibility	Self-directed only	Outside structure
Official qualifications	None	Recognised degrees/certificates
Cost (for each additional student)	Low to moderate	Moderate to high
Ease of access	Depends on technology	Depends on location and income
Cheating risk	High (unwatched)	Lower (watched)
Teacher knowledge	AI-generated	Human expert + mentoring

The best approach, as Jumaniyazov (2025d) argues, is combined - purposefully putting together the strengths of both approaches while reducing their weaknesses. This mixed model might include:

- AI-powered personalised practice for building skills, with learning center sessions for discussing concepts and solving problems together.

- Flipped classrooms where students learn basic content on their own using AI, then apply it in university small groups with expert guidance.
- AI as ongoing checking of learning, with institutional final assessment for qualifications.
- Learning centers including AI tools as part of their teaching, training students to use them honestly and effectively.

Conclusion. Moving Toward a Combined Reality

The question "Is individual AI learning easier than studying at learning centers or universities?" is basically wrongly asked. The right question is: Under what conditions, for which learners, pursuing what goals, is each approach more effective?

For learners with strong self-control, access to technology, and goals that do not need official qualifications, individual AI learning may indeed be easier and more effective. For learners who need outside structure, value learning with others, require recognized qualifications, or lack reliable technology, learning centers and universities are still essential. And for most learners, some combined mix will work better than either pure approach.

Jumaniyazov (2025a; 2025b; 2025c; 2025d) consistently emphasizes that the crisis in mathematics education is not technological but teaching-related. The solution is not to give up institutions for AI, nor to ban technology to protect tradition. The solution is to redesign learning experiences that use each tool for what it does best - AI for tailoring, immediate feedback, and anxiety-free practice; learning centers and universities for learning with others, expert mentoring, and official qualifications.

The 21st century does not require choosing between human teachers and AI tutors. It requires teaching students - and teachers - how to work together with intelligent tools to achieve mathematical understanding that is deeper, more lasting, and more truly empowering than either approach alone could provide.

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