The Lingua Spectrum
Cogito, ergo sum

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The problem of full-mastery technology of educational content in general secondary schools

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Annotation *This article explores the theoretical and methodological foundations for applying hermeneutics to the analysis of media texts in the context of digital communication. Building on the philosophical frameworks of Hans-Georg Gadamer and Paul Ricoeur, hermeneutics is presented as a universal theory of understanding that emphasizes the historicity of interpretation, the mediating role of language, and the openness of texts to multiple meanings. The paper then examines developments in linguistic hermeneutics, which highlight the contextual nature of meaning, the importance of the reader's horizon, and intercultural dimensions of understanding. Particular attention is paid to the integration of hermeneutics and discourse analysis in media studies, where media texts are treated as practices of constructing social meanings and power relations. A separate section discusses digital hermeneutics, focusing on how platforms, algorithms and large-scale computational methods (corpus approaches, distant reading) reshape interpretive regimes. The article concludes that a hermeneutic perspective enables researchers to view media not merely as channels of information transfer, but as interpretive spaces where tradition, technology and individual horizons of understanding intersect, opening new possibilities for comprehensive analysis of news, political and multimodal discourses.*

Keywords *Hermeneutics, media text, discourse analysis, digital hermeneutics, interpretation, media studies, digital humanities*

Проблема технологии полного усвоения учебного содержания в условиях общеобразовательной школы

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Аннотация *В статье рассматривается проблема применения технологий полного усвоения учебного содержания в общеобразовательной школе. На основе концепции школьного обучения Дж. Кэрролла и модели «обучения до мастерства» Б. Блума анализируются теоретические основания подхода, предполагающего достижение высоких результатов большинством учащихся при условии гибкой организации времени, качественного инструктажа и систематической обратной связи. Обобщаются данные эмпирических исследований, показывающие, что элементы мастер-обучения способны повышать успеваемость и снижать неравенство, но их эффективность существенно зависит от предметной области и качества реализации. Выявляются ключевые ограничения массовой школы: перегруженные учебные планы, жесткое расписание, дефицит формирующего оценивания, высокая нагрузка на учителя и неоднородность контингента учащихся. Отдельно анализируется роль цифровых* *технологий, которые с одной стороны создают условия для индивидуализации и мониторинга прогресса, а с другой – усиливают цифровое неравенство и предъявляют новые требования к компетенциям педагогов. Обосновывается необходимость «реалистической» интерпретации технологии полного усвоения, ориентированной на выделение ядра результатов обучения, развитие формирующего оценивания, использование интерактивных методов и целевое повышение квалификации учителей.*

Ключевые слова *Технология полного усвоения, мастер-обучение, общеобразовательная школа, формирующее оценивание, дифференцированное обучение, цифровые технологии, учебные достижения*

Umumta'lim maktablarida o'quv mazmunini to'liq o'zlashtirish texnologiyasi muammosi

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Annotatsiya *Maqolada umumta'lim maktablarida o'quv mazmunini to'liq o'zlashtirish texnologiyasini joriy etish muammolari tahlil qilinadi. J.B. Kerrollning maktabda o'qitish modeli va B. Blumning "mastery learning" konsepsiyasiga tayangan holda, ko'pchilik o'quvchilarda yuqori natijalarga erishish vaqtning moslashuvchan tashkil etilishi, sifatli instruktaj va tizimli fikr-mulohaza bilan bog'liqligi asoslanadi. Ilmiy tadqiqotlar tahlili shuni ko'rsatadiki, to'liq o'zlashtirish elementlari o'quv yutuqlarini oshirishi va tengsizlikni kamaytirishi mumkin, biroq ularning samaradorligi fan sohasi va amaliyot sifati bilan chambarchas bog'liq. Maktab amaliyotida asosiy to'siqlar sifatida o'quv rejalari yuklamasining yuqoriligi, dars jadvalining qattiqligi, formatif baholashning yetarli emasligi, o'qituvchi mehnati yuklamasining ortishi va o'quvchilar kontingentining turlicha tayyorgarligi ko'rsatiladi. Raqamli texnologiyalarning roli ikkiyoqlama baholanadi: ular individual ta'lim trayektoriyalarini, monitoring va interaktiv mashg'ulotlarni qo'llab-quvvatlaydi, lekin raqamli tafovutni kuchaytirishi va pedagoglarning AKT hamda pedagogik kompetensiyalariga bo'lgan talabni oshirishi mumkin. Muallif to'liq o'zlashtirish texnologiyasini amaliy nuqtai nazardan qayta talqin etish zarurligini, bunda o'quv natijalarining yadrosini aniqlash, formatif baholashni kuchaytirish, interaktiv va hamkorlikdagi metodlarni integratsiya qilish hamda o'qituvchilar malakasini maqsadli oshirish ustuvor yo'nalishlar bo'lishi lozimligini ta'kidlaydi.*

Kalit so'zlar *To'liq o'zlashtirish texnologiyasi, mastery learning, umumta'lim maktabi, formatif baholash, differensial ta'lim, raqamli texnologiyalar, o'quv yutuqlari*

In contemporary didactics the notion of *full mastery* of educational content has been institutionalized in various "technologies of full mastery," which promise that virtually all students can reach high levels of achievement if instruction, time, and support are adequately organized. The idea traces back to Carroll's model of school learning and Bloom's "learning for mastery," which posited that achievement is primarily a function of opportunity to learn and quality of instruction, rather than fixed aptitude (Carroll, 1989; Bloom, 1968). In many post-Soviet and Central Asian contexts this logic has been reframed in terms of *pedagogical technologies* – systematic sets of methods, tools and organizational forms designed to guarantee thorough assimilation of content (Khamidova, 2024; Shodiev, 2020).

However, implementation in general secondary schools has been uneven and often disappointing. While research indicates that mastery-oriented approaches can improve learning outcomes and equity, they also expose structural constraints: overloaded curricula, rigid timetables, limited teacher capacity, and growing digital inequalities (Education Endowment Foundation [EEF], n.d.; UNESCO, 2023; Wambugu & Changeiywo, 2008). This article analyses the problem of "full-mastery technology" at the level of general secondary schooling, focusing on its theoretical foundations, empirical effects, implementation barriers, and possible directions for realistic, context-sensitive use.

Carroll's model of school learning conceptualizes achievement as a function of time actually spent in learning relative to the time a student needs under good instruction. If opportunity to learn and instructional quality are optimized, most students can reach high levels of attainment, though at different rates (Carroll, 1989). Bloom's mastery learning operationalized this insight by emphasizing small instructional units, clear criteria for mastery (often 80–90% correctness), formative assessments, corrective feedback, and additional learning time before students' progress (Bloom, 1968; Mastery learning, n.d.).

Within this framework *technology of full mastery* can be understood as a systematic design that aligns:

- clearly specified learning objectives;
- diagnostic and formative assessment;
- a repertoire of differentiated instructional strategies;
- corrective and enrichment activities;
- flexible time and pacing.

In Central Asian pedagogical literature, "full mastery" is often associated with innovative technologies such as differentiated instruction and interactive methods. Khamidova (2024), for example, characterizes levels of differentiated educational technology as "modern modified technology of full mastery," highlighting the goal that all learners achieve robust, not merely minimal, command of content. Shodiev (2020), analysing interactive technologies in primary education, similarly notes that cooperative, problem-based and heuristic methods aim to involve every student actively so that "full mastery of the content and quality of education" becomes attainable.

Thus, "full-mastery technology" is not merely a set of techniques but a design paradigm: instruction is engineered so that incomplete learning is treated as a signal for adjustment, not as an acceptable outcome.

A large body of research from the 1960s onward suggests that mastery learning can raise average achievement and narrow gaps, especially in mathematics and science (Bloom, 1968; EEF, n.d.; Mastery learning, n.d.). Wambugu and Changeiywo (2008), in a quasi-experimental study of Kenyan secondary-school physics, found that students taught through a mastery learning approach significantly outperformed peers taught by traditional methods, with higher post-test means and improved retention. Their work also underscores that mastery designs require careful task analysis, diagnostic testing, and supplementary instruction.

Meta-analyses and evidence syntheses reach similar conclusions. The Education Endowment Foundation's review reports that mastery learning yields, on average, the equivalent of about five additional months of progress over a year, but with large variation across studies (EEF, n.d.). Effects tend to be stronger in primary education and in mathematics, and are consistently positive where a high bar for mastery is enforced, progress is monitored systematically, and additional time and support are provided for students who take longer to reach mastery (EEF, n.d.; Wambugu & Changeiywo, 2008).

At the same time, recent work points to limits and domain-specific effects. A 2024 paper on "the limits of mastery learning" argues that mastery-based models have restricted value in secondary English classrooms, particularly for complex writing tasks that are not easily decomposed into discrete, testable objectives (Zou et al., 2025). This suggests that full-mastery technology may be more tractable in well-structured domains (e.g., algebra, physics) than in open-ended, creative ones.

In short, the empirical record justifies aspirations toward fuller mastery of content, but also warns that results are contingent on subject matter, context, and implementation quality.

Structural and pedagogical problems in general secondary schools

Translating full-mastery technology into ordinary secondary classrooms exposes several systemic tensions. *Time-achievement dilemma and overloaded curricula*. Mastery learning presupposes flexible time: if achievement is held constant (everyone reaches mastery), learning time must vary. Carroll's retrospective notes that increase in achievement under mastery conditions often require substantial additional time-on-task (Carroll, 1989). Yet general secondary schools typically operate with fixed timetables, compressed teaching hours, and curricula that prioritize coverage over consolidation. Teachers are pressed to "finish the program," making it difficult to allocate extra instructional cycles to students who need more time without neglecting the rest of the syllabus.

Assessment and feedback capacity. Full-mastery technology relies on frequent formative assessment, timely feedback, and targeted remediation. However, large class sizes and administrative burdens limit teachers' capacity to design high-quality diagnostic tests, analyse results, and plan corrective activities. Studies of mastery implementations show that while diagnostic testing and feedback improve outcomes, they also increase teacher workload substantially (Carroll, 1989; Wambugu & Changeiywo, 2008). In practice, formative assessment is often reduced to simple quizzes that are graded summatively, eroding the corrective logic of mastery learning.

Teacher professional competence and beliefs. Implementing full-mastery technology requires sophisticated pedagogical content knowledge and, increasingly, technological pedagogical content knowledge (TPACK). Handal and colleagues' survey of 280 secondary mathematics teachers found that although many reported adequate basic technological skills, their capacity to design digital assessments and integrate ICT meaningfully into curriculum goals was limited, and organizational factors inhibited more ambitious uses of technology (Handal et al., 2013). Teachers' beliefs about ability, fairness, and the normal distribution of grades also matter; if they assume that some students are "naturally weak," the premise that most can reach high mastery with appropriate support is undermined (Bloom, 1968; Carroll, 1989).

Diversity of learners and motivational issues. General secondary schools serve heterogeneous student populations with varied prior knowledge, language backgrounds, and motivations. Mastery learning can support lower-achieving students through corrective loops, but it can also lead to widening gaps in pace: some students surge ahead, while others accumulate backlogs of un-mastered units. Bergmann (2022), writing from classroom experience, identifies the management of students who lag behind – while others advance – as the "biggest problem" of mastery-based learning and stresses the need for differentiated objectives ("need to know" versus "nice to know") and flexible remediation strategies. Without such adaptations, attempts at full mastery may collapse into unsustainable differentiation for the teacher and discюз-ouraging delays for struggling students (Bergmann, 2022).

Digital technologies are often promoted as a way to operationalize full mastery: adaptive platforms can individualize pacing, provide instant feedback, and track progress over fine-grained objectives. Literature on e-learning at the secondary level emphasizes that digital tools enable personalized trajectories, interactive content, and ubiquitous access, thereby supporting self-regulated learning and differentiated instruction (Cardona-Acevedo et al., 2025).

Yet recent international reports and reviews show that technology integration introduces its own set of problems. The 2023 UNESCO Global Education Monitoring Report on technology in education concludes that benefits are highly context-dependent and that many systems lack governance, teacher preparation, and infrastructure to deploy digital tools effectively and equitably (UNESCO, 2023). A 2025 review on digital learning highlights persistent digital divides: students from low-income families often lack reliable internet, devices, or suitable spaces for learning, exacerbating existing inequalities (Zou et al., 2025).

Moreover, teacher readiness remains a central bottleneck. Handal et al. (2013) show that even where basic ICT tools are available, teachers frequently use them for low-level drill-and-practice rather than higher-order learning aligned with mastery goals. Cardona-Acevedo et al. (2025) note that e-learning technologies at the secondary level offer powerful opportunities for personalization and motivation, but also raise ethical concerns about data privacy, academic integrity, and the risk that personalization becomes tracking rather than support.

In contexts with limited infrastructure, intermittent electricity, and weak technical support, consistent use of digital mastery platforms may be unrealistic. Under such conditions, "full-mastery technology" must rely more heavily on low-tech formative assessment and classroom-level differentiation, which again amplifies demands on teacher expertise and time.

Given these constraints, the problem is not whether full mastery is desirable – few would argue for systematic underachievement – but how to reinterpret "full-mastery technology" so it remains pedagogically ambitious yet practically feasible. First, research suggests that mastery systems work best when they prioritize *essential* objectives. Bergmann's distinction between "need to know" and "nice to know" aligns with Bloom's emphasis on prerequisite knowledge; in overloaded curricula, identifying a limited set of core outcomes for mastery is crucial (Bergmann, 2022; Bloom, 1968). This makes it possible to guarantee strong foundations while maintaining reasonable time frames. Second, full-mastery technology should be built around rich formative assessment, not only short-answer tests. Carroll's model and subsequent work stress that time-on-task matters most when it is spent on cognitively appropriate activities with timely feedback (Carroll, 1989). In secondary schools this implies combining quick checks for understanding, peer assessment, and performance tasks, with feedback that feeds forward into tailored corrective work rather than merely generating grades. Third, the evidence indicates that effective mastery designs often integrate collaborative learning rather than pure individualization. The EEF summary notes that high-impact mastery interventions frequently included group work and peer tutoring, not just individualized drill (EEF, n.d.; Wambugu & Changeiywo, 2008). Interactive and cooperative methods described by Shodiev (2020) and others – problem-based tasks, heuristic dialogues, project work – can be harnessed within a mastery framework to make corrective activities more engaging and socially supported (Khamidova, 2024; Shodiev, 2020). Fourth, teacher professional development is central. Studies on TPACK show that teachers need integrated training that links content, pedagogy, and technology, rather than isolated ICT workshops (Handal et al., 2013; Cardona-Acevedo et al., 2025). Professional learning communities where teachers jointly design mastery-oriented units, share assessment tools, and analyse student data are more likely to sustain change than top-down mandates. Finally, digital technologies should be treated as *amplifiers* of a sound mastery design, not as its precondition. In low-resource settings, simple tools – exit tickets, item banks, concept maps – can approximate key functions of mastery technology. In better-resourced schools, adaptive systems should be critically evaluated against criteria of equity, transparency, and alignment with curricular goals, as urged by UNESCO and recent digital learning reviews (UNESCO, 2023; Zou et al., 2025).

The concept of "full-mastery technology of educational content" at the level of general secondary schools is both inspiring and problematic. It is rooted in robust theoretical and empirical traditions that challenge deficit views of students and emphasize the malleability of achievement through high-quality, well-paced instruction (Bloom, 1968; Carroll, 1989; EEF, n.d.; Wambugu & Changeiywo, 2008). Yet when imported into real school systems with rigid timetables, overloaded curricula, and uneven technological and human resources, the ideal of full mastery can become an unachievable slogan.

A more realistic interpretation sees full-mastery technology not as a guarantee that every student will master every objective, but as a commitment to designing instruction, assessment, and support so that high levels of learning are the *default expectation* rather than the privilege of a minority. Achieving this requires careful prioritization of outcomes, investment in teacher expertise, thoughtful use of interactive and digital methods, and policies that address structural inequities in time, resources, and opportunity to learn. Under these conditions, the "problem" of full-mastery technology becomes a productive tension – between ambition and feasibility – that can drive continuous improvement in the quality and fairness of secondary education.

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