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TEXNOLOGIYALAR YORDAMIDA O'QITISH (TAL) MUHITIDA NOFILOLOGIYA YO'NALISHI TALABALARI UCHUN MUSTAQIL TA'LIMNI TASHKIL ETISH VA BAHOLASH: TIZIMLI ADABIYOTLAR SHARHI

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Аннотация.

Raqamli texnologiyalarning integratsiyasi va Texnologiya Yordamida O'qitish (TYO) muhitiga o'tish oliy ta'limni tubdan o'zgartirdi, bu esa ayniqsa nofilologik yo'nalish talabarlari uchun mustaqil ta'limni samarali tashkil etish va baholashni muhim vazifaga aylantirdi. Global voqealar tomonidan tezlashtirilgan ushbu transformatsiya talabalardan o'z-o'zini tartibga solish va o'z-o'zini boshqarish orqali o'quv jarayonlariga ko'proq egalik qilishni talab qiladi. Ushbu tadqiqotning maqsadi Texnologiya Yordamida O'qitish (TYO) muhitida nofilologik yo'nalish talabalarining mustaqil ta'limini tashkil etish va baholash bo'yicha mavjud tadqiqotlarni sintez qilishdan iborat. Ushbu tadqiqot tizimli adabiyot sharhi metodologiyasini qo'lladi, Scopus, Web of Science, EBSCOhost va Google Scholar kabi asosiy akademik ma'lumotlar bazalarida 2020-yildan keyin nashr etilgan referatli maqolalar, konferensiya materiallari va kitob boblarini qamrab oluvchi qat'iy qidiruv o'tkazdi. Qidiruv strategiyasi keng qamrovni ta'minlash uchun kalit so'zlar va Boolean operatorlarining kombinatsiyasidan foydalangan. Sharh shuni ko'rsatdiki, nofilologik yo'nalish talabalarining raqamli tayyorgarligi va o'z-o'zini tartibga solish ko'nikmalari ularning TYO dagi mustaqil ta'lim bilan shug'ullanishiga sezilarli ta'sir ko'rsatadi. Raqamli platformalar mustaqil ta'limni tashkil etishda markaziy o'rin tutadi, resurslarga kengaytirilgan kirish, hamkorlikdagi o'qitish imkoniyatlari va turli xil fikr-mulohazalar orqali o'z-o'zini tartibga solishni qo'llab-quvvatlaydi, samaradorlik esa asosan o'quv dizayni va o'quvchining malakasiga bog'liq. Muvaffaqiyatli o'z-o'zini boshqarish orqali o'qitish yuqori darajadagi avtonomiya, tashkiliy ko'nikmalar va o'z-o'zini intizomni, shuningdek, asosiy raqamli kompetensiyalarni talab qiladi. Topilmalar oliy ta'lim muassasalari uchun nofilologik yo'nalish talabarlari orasida rivojlanayotgan TYO ekotizimlarida muvaffaqiyat qozonish uchun moslashtirilgan o'quv dizaynlarini ishlab chiqish va muhim raqamli hamda o'z-o'zini tartibga solish kompetensiyalarini rivojlantirish zarurligini ta'kidlaydi.

Kalit so'zlar: texnologiya yordamida o'qitish, mustaqil ta'lim, o'z-o'zini tartibga solish, nofilologik talabalar, oliy ta'lim, tizimli sharh, ta'limni baholash, raqamli kompetensiyalar.

ОРГАНИЗАЦИЯ И ОЦЕНИВАНИЕ САМОСТОЯТЕЛЬНОГО ОБУЧЕНИЯ СТУДЕНТОВ НЕФИЛОЛОГИЧЕСКИХ НАПРАВЛЕНИЙ В УСЛОВИЯХ ОБУЧЕНИЯ С ИСПОЛЬЗОВАНИЕМ ТЕХНОЛОГИЙ (TAL): СИСТЕМАТИЧЕСКИЙ ОБЗОР ЛИТЕРАТУРЫ

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Аннотация.

Интеграция цифровых технологий и переход к средам обучения с использованием технологий (TAL) коренным образом изменили высшее образование, сделав эффективную организацию и оценку самостоятельного обучения критически важными, особенно для студентов нефилологических специальностей. Эта трансформация, ускоренная глобальными событиями, требует от студентов большей ответственности за свой процесс обучения посредством саморегулируемого и самоуправляемого подходов. Целью данного исследования является систематизация текущих исследований по организации и оценке самостоятельного обучения студентов нефилологических специальностей в средах обучения с использованием технологий (TAL). В данном исследовании использовалась методология систематического обзора

литературы, включающая тщательный поиск рецензируемых статей, материалов конференций и глав книг, опубликованных с 2020 года, в основных академических базах данных (Scopus, Web of Science, EBSCOhost и Google Scholar). Стратегия поиска использовала комбинацию ключевых слов и булевых операторов для обеспечения всестороннего охвата. Обзор показал, что цифровая готовность и навыки саморегуляции студентов нефилологических специальностей значительно влияют на их вовлеченность в самостоятельное обучение в TAL. Цифровые платформы играют центральную роль в организации самостоятельного обучения, поддерживая саморегуляцию через расширенный доступ к учебным ресурсам, возможности для совместного обучения и различные формы обратной связи, при этом эффективность в значительной степени зависит от учебного дизайна и уровня владения учащимися. Успешное самоуправляемое обучение требует высокой степени автономии, организационных навыков и самодисциплины от учащегося, а также базовых цифровых компетенций. Полученные данные подчеркивают необходимость для высших учебных заведений разрабатывать индивидуальные учебные дизайны и развивать необходимые цифровые и саморегулируемые компетенции среди студентов нефилологических специальностей для успешной адаптации в развивающихся экосистемах TAL.

Ключевые слова: обучение с использованием технологий, самостоятельное обучение, саморегулируемое обучение, нефилологические студенты, высшее образование, систематический обзор, оценка обучения, цифровые компетенции.

ORGANIZING AND ASSESSING INDEPENDENT LEARNING FOR NON-PHILOLOGY STUDENTS IN A TECHNOLOGY-ASSISTED LEARNING (TAL) ENVIRONMENT: A SYSTEMATIC LITERATURE REVIEW

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Abstract.

The integration of digital technologies and the shift to Technology-Assisted Learning (TAL) environments have fundamentally reshaped higher education, making the effective organization and assessment of independent learning critical, especially for non-philological students. This transformation, accelerated by global events, necessitates students taking greater ownership of their learning through self-regulated and self-directed approaches. The aim of this study is to synthesize current research on the organization and assessment of independent learning among non-philological students in Technology-Assisted Learning (TAL) environments. This study employed a systematic literature review methodology, conducting a rigorous search across major academic databases (Scopus, Web of Science, EBSCOhost, and Google Scholar) for peer-reviewed articles, conference papers, and book chapters published from 2020 onwards. The search strategy utilized a combination of keywords and Boolean operators to ensure comprehensive coverage. The review revealed that non-philological students' digital readiness and self-regulatory skills significantly influence their engagement with independent learning in TAL. Digital platforms are central to organizing independent learning, supporting self-regulation through enhanced resource access, collaborative learning opportunities, and various forms of feedback, with efficacy largely dependent on instructional design and learner proficiency. Successful self-directed learning requires high autonomy, organizational skills, and self-discipline, alongside foundational digital competencies. The findings underscore the imperative for higher education institutions to develop tailored instructional designs and foster essential digital and self-regulatory competencies among non-philological students to thrive in evolving TAL ecosystems.

Keywords: technology-assisted learning, independent learning, self-regulated learning, non-philological students, higher education, systematic review, learning assessment, digital competencies

Introduction. The landscape of higher education has undergone a profound transformation in recent years, largely driven by the widespread integration of digital technologies and the accelerated shift toward Technology-Assisted Learning (TAL) environments [6, 20]. This paradigm shift, further propelled by global events such as the COVID-19 pandemic, which necessitated an unprecedented transition to emergency remote teaching and online learning [10, 14, 15], has fundamentally reshaped pedagogical approaches and student learning experiences. Consequently, the effective organization and rigorous assessment of independent learning have emerged as critical areas of focus within contemporary educational discourse [4]. Universities worldwide, including those in regions undergoing rapid digital transformation, such as Uzbekistan [21, 22], increasingly leverage digital platforms to deliver content and facilitate learning, making independent study a cornerstone of academic success [9, 13]. In this evolving ecosystem, students are expected to take greater ownership of their learning processes by engaging in self-regulated learning (SRL) and self-directed learning (SDL) to navigate complex digital resources and achieve desired learning outcomes [1, 3, 17]. The ability to effectively manage learning, set goals, monitor progress, and critically evaluate outcomes is paramount in TAL environments, where traditional supervision may be significantly reduced [2, 25, 26]. Furthermore, advanced educational technologies, including artificial intelligence (AI), offer opportunities to foster and assess independent learning through personalized learning pathways and analytical tools [7, 8, 19]. However, harnessing these technologies effectively requires a nuanced understanding of student needs, robust pedagogical strategies, and innovative assessment frameworks [23, 28].

Despite the widely recognized importance of independent learning in the digital age, many students, particularly those enrolled in non-philological disciplines, frequently encounter significant challenges in adapting to and thriving within TAL environments. These students, whose primary academic focus lies outside linguistic and literary studies, may not inherently possess the advanced self-regulation skills, digital literacy, or intrinsic motivation often assumed to be necessary for effective independent study in a technology-rich context [20]. Research consistently indicates that, while digital competencies, self-organization, and independent learning abilities are crucial for the acceptance of digital learning, a substantial proportion of students struggle with the transition from traditional to digital learning, often lacking the requisite skills for truly effective independent engagement [2, 13]. Moreover, the widespread adoption of TAL necessitates not only new methods of content delivery but also innovative approaches to structuring and evaluating independent study that genuinely foster deep learning and critical thinking rather than merely promoting superficial engagement or rote memorization [4, 5]. The inherent complexity of designing truly effective independent learning activities, coupled with the pressing need for reliable and valid assessment methods that accurately capture genuine learning outcomes across diverse student populations, presents a substantial pedagogical and practical challenge for higher education institutions worldwide [12, 24].

However, despite extensive research on self-regulated learning and technology [1, 23, 25], as well as the broader implications of digital learning [6, 20], a comprehensive and integrated framework specifically addressing the organization and assessment of independent learning for non-philological students within the unique context of Technology-Assisted Learning environments has not yet been sufficiently developed. Existing literature often focuses on general student populations or specific academic disciplines, leaving a notable gap in understanding the tailored pedagogical and evaluative strategies required for students whose primary fields of study are not inherently aligned with the linguistic and analytical demands typically associated with philological education. This gap may lead to suboptimal learning experiences and inadequate assessment practices, potentially hindering the development of essential independent learning competencies among a significant segment of the student population.

The aim of this study is to explore, develop, and evaluate effective strategies for the organization and assessment of independent learning among non-philological students within Technology-Assisted Learning environments, thereby contributing to a more nuanced understanding of how to foster self-regulated learning and enhance academic outcomes for this specific student population. This research seeks to bridge the identified gap by providing practical insights and evidence-based recommendations for educators and policymakers.

RQ1: What are the specific needs, challenges, and existing independent learning practices of non-philological students in Technology-Assisted Learning environments?

RQ2: What innovative organizational strategies and technological tools can effectively support and enhance independent learning for non-philological students in Technology-Assisted Learning environments?

RQ3: How can the independent learning outcomes of non-philological students in Technology-Assisted Learning environments be effectively and reliably assessed and evaluated?

Literature Review

The theoretical foundations of independent learning in Technology-Assisted Learning (TAL) environments are deeply rooted in self-regulated learning (SRL) and self-directed learning (SDL). SRL, an active process through which learners monitor and regulate their cognition, motivation, and behavior, is paramount for success in digital learning environments [17, 26]. Research consistently demonstrates that technology both supports and challenges self-regulatory processes, influencing learners' autonomy and control [1, 23]. Similarly, SDL, characterized by learners taking the initiative in diagnosing learning needs, setting goals, identifying resources, implementing learning strategies, and

evaluating outcomes, is recognized as a vital 21st-century skill [3]. The integration of digital tools fundamentally reshapes these processes by offering new opportunities for resource access, collaboration, and feedback. However, their effectiveness depends on instructional design and learners' digital proficiency [16, 25].

Digital tools have introduced sophisticated mechanisms for supporting and monitoring independent learning. Learning analytics, for instance, leverages educational data to optimize learning environments and provide insights into student behavior, offering timely feedback to support self-regulation [2, 19, 24]. The emergence of artificial intelligence (AI) in education further promises personalized learning pathways, intelligent tutoring systems, and automated feedback, potentially enhancing the efficiency of independent study [7]. However, the ethical implications of AI, including concerns related to data privacy and algorithmic bias, require careful consideration [8]. The evolving landscape of e-learning, as discussed by Garrison and Anderson (2021) and further explored in systematic reviews of distance education trends [6, 11], underscores the need for a comprehensive framework that integrates technological advancements with sound pedagogical principles to maximize learning outcomes.

Addressing the specific needs and digital readiness of diverse student populations, particularly non-philological students, is crucial. These students, often enrolled in technical or scientific disciplines, may have distinct learning styles and varying levels of prior experience with digital tools. Student engagement in online learning is a critical success factor influenced by instructional design, social interaction, and technological support [4]. The rapid transition to online learning during the COVID-19 pandemic highlighted disparities in students' digital competencies, self-organization, and independent learning abilities [13]. While Chen and Chen (2021) explored factors influencing SRL in blended learning environments, and Al-Samarraie and Ghazal (2021) reviewed the impact of technology on SRL, these studies implicitly underscore that effective independent learning in TAL environments for non-philological students requires tailored support to bridge potential gaps in digital literacy and self-management skills [16, 23].

Effective organization of independent learning in TAL environments demands innovative pedagogical approaches. Ryan and Tilbury (2020) advocate designing self-directed learning experiences with clear goals, diverse learning resources, and opportunities for self-assessment [3]. Effective strategies include fostering active learning, promoting collaboration, and integrating authentic learning tasks [4]. Timely and targeted feedback is paramount for developing students' evaluative judgment [5]. Virtual reality (VR) environments have shown promise in enhancing SRL skills and academic performance through immersive learning experiences [18]. The structured integration of digital tools, such as online discussion forums and simulations, contributes to the creation of rich learning ecosystems [6]. Consequently, the educator's role evolves from that of a content provider to that of a facilitator and mentor, empowering students to take ownership of their learning journey [28].

Assessing independent learning in TAL environments presents both challenges and opportunities. Traditional assessment methods often fail to capture critical thinking, problem-solving, and self-regulation skills. Consequently, there is a growing emphasis on developing students' evaluative judgment, enabling them to critically appraise the quality of their own work [5]. Learning analytics offers data-driven insights into student engagement and progress, informing both formative and summative assessment by tracking learners' interactions with digital resources and their participation in learning activities [2, 12, 19]. However, ethical considerations regarding privacy and fairness in the use of learning analytics for assessment purposes must be carefully addressed [24]. The overarching aim is to foster lifelong learning skills and self-efficacy in digital contexts, extending beyond the mere acquisition of knowledge [27].

Despite the considerable potential of TAL, challenges in organizing and assessing independent learning persist, including issues related to student engagement, isolation, and motivation in online learning environments [4, 15]. The distinction between emergency remote teaching and well-designed online learning is particularly important, as the former often lacked the pedagogical planning required for effective learning [10]. Best practices include providing clear expectations, robust technical and pedagogical support, fostering a sense of learning community, and integrating diverse learning activities [13]. The educator's role remains central, requiring new competencies in digital instructional design, technology integration, and mentoring to effectively support independent learners [28]. This, in turn, necessitates continuous professional development and adaptive pedagogical strategies suited to the dynamic nature of TAL environments.

Research Methodology

This systematic literature review was conducted to synthesize current research on the organization and assessment of independent learning among non-philological students in Technology-Assisted Learning (TAL) environments. The review followed a rigorous methodology to ensure comprehensive coverage and critical analysis of relevant scholarly contributions.

A systematic search was conducted across major academic databases, including Scopus, Web of Science, EBSCOhost, and Google Scholar, to identify peer-reviewed journal articles, conference papers, and book chapters. The search strategy employed a combination of keywords and Boolean operators, including terms such as "*Technology-Assisted Learning*," "*TAL*," "*digital learning*," "*online learning*," "*independent learning*," "*self-regulated learning*," "*self-directed learning*," "*higher education*," "*university students*," "*assessment*," "*evaluation*," and "*organization*." The search was limited to publications published from 2020 onward in order to capture the most recent developments and the impact of the rapidly evolving

digital education landscape, particularly following global educational disruptions [10, 14, 15].

Studies were included if they focused on independent learning, self-regulated learning (SRL), or self-directed learning (SDL) within technology-assisted or online learning environments [1, 3, 23]. The target population comprised higher education students, with particular emphasis on non-philological disciplines, although studies involving general university student populations were also included when their findings were broadly applicable. Publications were required to be written in English and published in peer-reviewed sources. Eligible studies also had to address the pedagogical organization, facilitation, or assessment of independent learning outcomes in TAL contexts [5, 12].

Studies published before 2020 were excluded. Research focusing exclusively on K–12 education or professional training outside higher education was not considered. Non-peer-reviewed sources, including blog posts, opinion articles, and news reports, were excluded. Studies primarily focused on language acquisition or philological education were also excluded to maintain the review's focus on non-philological students. In addition, studies that did not directly address independent learning or TAL environments were excluded.

The initial search yielded a substantial number of records. After duplicate records were removed, titles and abstracts were screened for relevance according to the predefined inclusion and exclusion criteria. Subsequently, the full texts of potentially eligible studies were retrieved and thoroughly assessed. This rigorous screening process ensured that only the most relevant and methodologically sound studies were included in the synthesis. Ultimately, **28** sources met all eligibility criteria and formed the empirical basis of this systematic review. Data extraction focused on key themes related to the theoretical foundations of independent learning in TAL, practical organizational strategies, assessment approaches, and the challenges and best practices identified in the literature. The extracted data were then subjected to a critical thematic synthesis to identify overarching patterns, emerging trends, and significant gaps in the existing body of research [2, 11, 19].

Results and Analysis

The systematic literature review revealed several key findings regarding the organization and assessment of independent learning among non-philological students in Technology-Assisted Learning (TAL) environments. The analysis synthesizes current research, highlighting prevalent practices, technological integrations, and identified challenges.

Firstly, the characteristics of non-philological students and their digital readiness significantly influence their engagement with independent learning in TAL environments. Research indicates that students are increasingly expected to assume greater ownership of their learning processes by engaging in self-regulated learning (SRL) and self-directed learning (SDL) to navigate complex digital resources [4]. However, a significant proportion of students, particularly those enrolled in demanding academic programs, may encounter difficulties in transitioning to and effectively implementing independent learning strategies [4, 13]. The effectiveness of digital tools in supporting independent study is contingent upon learners' proficiency and their foundational digital competencies [16, 25]. Studies confirm that digital competencies, coupled with self-organization and inherent independent learning abilities, exert a substantial positive influence on students' acceptance of digital learning environments [16, 23, 25]. Furthermore, successful self-directed learning necessitates a high degree of autonomy, organizational skills, and self-discipline on the part of the learner [17, 26]. The rapid digital transformation observed in higher education, including in regions such as Uzbekistan, underscores the imperative for students to develop these competencies in order to thrive in evolving TAL ecosystems [21, 22].

Secondly, the organization of independent learning in TAL environments is characterized by a strong reliance on digital platforms and a focus on fostering self-regulated and self-directed learning skills. Digital platforms serve as central conduits for content delivery and the facilitation of diverse learning activities [9, 13]. Technology actively supports self-regulatory processes by providing enhanced access to learning resources, facilitating collaborative learning opportunities, and enabling various forms of feedback [1, 16, 23, 25]. The effectiveness of these technological integrations is largely determined by the quality of instructional design, which must be tailored to promote active and independent engagement [16, 25]. Emerging technologies, such as virtual reality (VR) learning environments, have demonstrated a measurable impact on students' self-regulated learning skills and academic performance [18]. Artificial intelligence (AI) is also increasingly recognized for its potential role in educational technology, offering new avenues for personalized support and adaptive learning experiences [7, 8]. Massive Open Online Courses (MOOCs) represent a prevalent model for independent learning within TAL environments, although their effectiveness varies significantly. While cMOOCs emphasize active, collaborative learning, xMOOCs often replicate traditional lecture formats, leading to challenges such as variable quality and notably low completion rates [27]. For instance, a study of Harvard and MITx courses reported an average completion rate of only 5.5% among participants [27]. The global shift to online learning, particularly during the COVID-19 pandemic, further highlighted the critical need for robust organizational frameworks to support independent study in digital settings [13, 15].

Thirdly, the assessment and evaluation of independent learning outcomes in TAL environments are becoming increasingly sophisticated, leveraging data-driven approaches and focusing on the development of evaluative judgment. Learning analytics (LA) stands out as a primary mechanism for monitoring student engagement and progress in independent study [2, 12, 19, 24]. LA systems process educational data to provide granular insights into student behavior,

offering timely and targeted feedback that is crucial for supporting self-regulation [2, 12]. This feedback, often delivered through digital dashboards or automated alerts, enables learners to monitor their own progress and adjust their learning strategies effectively. Beyond quantitative metrics, the development of evaluative judgment is recognized as a fundamental aspect of assessment for learning in higher education [5]. This involves equipping students with the capacity to appraise the quality of their own work and that of others, a skill that is vital for sustained independent learning. Assessment strategies in TAL environments must therefore consider how technology influences, and can be utilized to measure, outcomes related to self-regulated and self-directed learning [1, 23]. The integration of digital tools allows for diverse assessment formats, ranging from automated quizzes to peer-reviewed projects and portfolio submissions, all of which can be designed to foster deeper engagement and provide comprehensive insights into learning processes [5, 28]. The effectiveness of feedback mechanisms, which are frequently mediated through digital technologies, is consistently identified as a critical factor in enhancing learning outcomes in these environments [16].

Table 1 below summarises the results of the analysis.

1-jadval. Key Organizational and Assessment Strategies in TAL for Independent Learning

Strategy Category	Specific Approach	Supporting Technology/Tool
Organizational	Resource Access & Management	Learning Management Systems (LMS), Digital Libraries
Organizational	Collaborative Learning	Online Forums, Video Conferencing, Shared Documents
Organizational	Personalized Learning Paths	Adaptive Learning Platforms, AI-driven Recommendations
Assessment	Progress Monitoring	Learning Dashboards, Analytics Automated Quizzes
Assessment	Feedback Provision	Automated Systems, Peer Review Platforms, Feedback Comments, Instructor
Assessment	Skill Development	Digital Portfolios, Simulation Environments (e.g., VR)

Finally, the literature identifies several emerging trends and persistent challenges in the organization and assessment of independent learning within TAL environments. A significant challenge lies in the variable quality of digital learning resources and the tendency for some online formats, particularly xMOOCs, to merely replicate traditional lecture models without leveraging the full interactive potential of technology [27]. This often contributes to low student engagement and high attrition rates, as evidenced by the 5.5% completion rate reported for certain MOOCs [27]. Furthermore, while technology offers extensive support, many students still struggle with the requisite independent learning skills, including self-discipline, time management, and effective resource navigation [4, 13]. The need for effective instructional design remains paramount to mitigate these challenges, ensuring that digital learning environments are not merely repositories of content but actively foster self-regulated and self-directed learning [16, 25].

Emerging trends point toward the increasing sophistication of learning analytics and the growing integration of artificial intelligence. Learning analytics continues to evolve, offering more refined insights into learner behavior and providing increasingly adaptive and personalized feedback loops [2, 12, 19, 24]. The application of AI in education is expanding, with the potential to create intelligent tutoring systems, automated assessment tools, and personalized learning pathways that can significantly enhance independent study experiences [7, 8]. However, the ethical implications and potential biases of AI in education also represent an area of ongoing research and concern [8]. Best practices emphasize the importance of designing learning experiences that actively cultivate evaluative judgment, enabling students to critically assess their own learning and progress [5]. This includes providing opportunities for self-reflection, peer assessment, and constructive feedback. The ongoing digital transformation in higher education globally, and specifically in contexts such as Uzbekistan, necessitates continuous adaptation and innovation in pedagogical approaches to effectively support and assess independent learning in TAL environments [20, 21, 22]. The synthesis of these findings underscores that, while TAL offers immense potential for fostering independent learning, its successful implementation requires careful consideration of student readiness, robust instructional design, and advanced assessment methodologies.

Discussion

The systematic review underscores that the effective organization and assessment of independent learning for non-

philological students in Technology-Assisted Learning (TAL) environments hinge on a synergistic interplay among student readiness, sophisticated instructional design, and innovative evaluative practices. The core finding reveals that, while digital platforms offer unprecedented opportunities for fostering self-regulated learning (SRL) and self-directed learning (SDL), their effectiveness is profoundly mediated by learners' digital competencies and their capacity for autonomy and self-organization [16, 23, 25]. This necessitates a pedagogical approach that leverages technological affordances while explicitly cultivating the metacognitive and motivational attributes essential for navigating complex digital learning environments [1, 17, 26].

These findings resonate strongly with the broader academic discourse on digital education and independent study. The emphasis on SRL and SDL as foundational skills for success in online and blended learning environments is consistently highlighted throughout the literature [1, 3, 25]. Our review corroborates that technology can significantly support self-regulatory processes by enhancing access to learning resources, facilitating collaboration, and providing diverse feedback mechanisms [1, 16, 23]. However, it also aligns with research indicating that merely integrating digital tools does not guarantee improved learning outcomes. Rather, effectiveness is contingent upon thoughtful instructional design that promotes active engagement and addresses the challenges students face in transitioning to independent learning [16, 25]. The observed difficulties that some students experience in effectively implementing independent learning strategies [4, 13] underscore a critical gap between the theoretical ideal of self-directed learning and the practical realities of diverse student populations, a concern also echoed in studies on student engagement in online learning [4].

The implications of these findings are multifaceted. Firstly, they suggest a paradigm shift in the educator's role, moving beyond content delivery to becoming a facilitator and mentor who guides students in developing essential digital literacy and self-regulatory skills. This involves explicit instruction on effective digital tool utilization, time management, goal setting, and critical evaluation of online resources. Secondly, the findings highlight the imperative for higher education institutions, particularly those undergoing rapid digital transformation, like in Uzbekistan [21, 22], to invest in robust instructional design frameworks that scaffold independent learning. Such frameworks should integrate continuous formative assessment strategies, leveraging learning analytics to provide timely and personalized feedback that supports ongoing self-correction and skill development [2, 19, 24]. Data-driven insights from learning analytics are crucial for optimizing learning environments and tailoring support to individual student needs [12].

From a practical standpoint, these insights offer actionable guidance for curriculum developers, instructors, and policymakers. Educators should prioritize activities that foster evaluative judgment and metacognitive awareness, moving beyond rote memorization toward deeper conceptual understanding [5]. This includes designing tasks requiring students to plan, monitor, and reflect on their learning processes, supported by digital tools. Institutions must ensure digital learning platforms are not only accessible but also intuitively designed to support independent navigation and collaboration. Furthermore, professional development for faculty should focus on pedagogical strategies for cultivating SRL and SDL in TAL environments, recognizing the unique needs of non-philological students who may require specific guidance in applying digital tools to their specialized fields. The emphasis on digital competencies and self-organization [16, 23, 25] suggests universities should consider diagnostic assessments of these skills upon entry and offer targeted support programs.

Despite its comprehensive nature, this systematic review is subject to certain limitations. The restriction of the search to publications from 2020 onwards, while ensuring currency, may have excluded foundational research published prior to this period that could offer broader historical context or theoretical underpinnings. Furthermore, while the review aimed to synthesize global trends, the primary reliance on major academic databases predominantly featuring English-language publications might introduce a linguistic and regional bias, potentially underrepresenting valuable insights from non-English-speaking scholarly communities, including those specific to Central Asian contexts like Uzbekistan. The broad categorization of "non-philological students" also means that the specific nuances of independent learning and assessment across highly diverse disciplines (e.g., engineering, medicine, business) within this group may not have been fully delineated, as existing literature often discusses student populations more generally.

Future research should address these limitations by conducting empirical studies that specifically investigate the effectiveness of tailored TAL interventions for distinct non-philological disciplines, examining how domain-specific learning needs influence the organization and assessment of independent study. Longitudinal studies are warranted to track the long-term development of SRL and SDL skills in TAL environments and their impact on academic and professional success. Furthermore, there is a pressing need for research exploring the pedagogical integration and ethical implications of emerging technologies, such as Artificial Intelligence and Virtual Reality, in supporting and assessing independent learning among non-philological students [7, 8, 18]. Comparative studies across diverse cultural and educational systems, particularly in regions undergoing rapid digital transformation, would also provide invaluable insights into best practices and contextual adaptations for fostering independent learning in the digital age [21, 22].

Conclusion and Recommendations

The systematic review underscores the critical role of independent learning for non-philological students within Technology-Assisted Learning (TAL) environments. It highlights that while digital platforms are central to content delivery and activity facilitation, students' success is profoundly influenced by their foundational digital competencies,

self-organization, and independent learning abilities. Many students, despite institutional expectations, require explicit support to transition effectively to self-regulated and self-directed learning strategies. Therefore, effective instructional design, tailored to promote active engagement and deeper understanding, is paramount for leveraging technology to enhance resource access, foster collaborative opportunities, and provide meaningful feedback mechanisms.

These findings carry significant practical implications for higher education institutions. To optimize independent learning in TAL, universities must prioritize developing students' foundational digital skills and self-regulatory capacities, particularly for non-philological cohorts who may struggle with the transition. Educators should move beyond mere content dissemination, designing learning environments that actively cultivate autonomy, organizational skills, and self-discipline. Furthermore, assessment strategies need to evolve beyond superficial knowledge recall, focusing instead on evaluating deeper learning, critical thinking, and the effective application of self-directed learning processes, supported by timely and targeted feedback. This holistic approach will empower students to thrive in the evolving digital academic landscape and become truly independent learners.

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