IRSTI 14.14.07
UDC 37.1174
https://doi.org/10.52081/PPS.2024.v07.i3.042

STICKY LEARNING STRATEGIES AS A PEDAGOGICAL APPROACH TO ENHANCING RESEARCH SKILLS IN ACADEMIC WRITING: AN INTEGRATED ANALYTICAL STUDY

Sadykova S.A.[1], PhD
ssadykova@zhubanov.edu.kz, https://orcid.org/0000-0003-3825-7680
Turlan Zh.S.[1], master of philological sciences
zturlan@zhubanov.edu.kz, https://orcid.org/0000-0002-0872-4826
Sarkulova Zh.K.[2], master of philological sciences
zhanarussen@mail.ru, https://orcid.org/0000-0001-8305-6103

[1] *K.Zhubanov Aktobe Regional University, Aktobe, Kazakhstan*
[2] *L.N.Gumilev Eurasian National University, Astana, Kazakhstan*

Annotation. In today's academic environment, the development of research skills, particularly in academic writing, is essential for student success. Research extends beyond information gathering, encompassing critical thinking and synthesis to generate new insights. Sticky learning strategies, which concentrate on making knowledge durable for long-term retention, present innovative methods for improving students' research skills. These strategies promote deeper engagement with the research process by emphasizing active learning, spaced repetition, interleaved practice, and metacognition. The intervention described herein evaluates the influence of sticky learning strategies on augmenting research skills in academic writing. It integrates various methods into the curriculum to assess their effectiveness in fostering retention, critical thinking, and knowledge application. This contribution offers practical value by adding to existing research on effective teaching strategies and carries the potential to refine instructional practices in higher education. A mixed-methods approach was employed, collecting both quantitative and qualitative data. Pre- and post-tests measured changes in students' research skills, while reflections, interviews, and surveys provided qualitative insights. Descriptive statistics and thematic analysis were used to evaluate student outcomes. Results indicated that sticky learning strategies substantially enhanced research skills, as observed in improved test scores, writing quality, and student engagement. Students reported that active learning and spaced repetition improved their ability to retain and apply knowledge. The findings suggest that incorporating these strategies into academic curricula can lead to sustained improvements in research skills and academic writing. This work provides empirical support for sticky learning strategies and offers practical recommendations for educators seeking to improve student outcomes in research and writing.

Keywords: Sticky learning strategies, research skills, academic writing, active learning, spaced repetition, interleaved practice, metacognition.

Introduction. The development of research skills forms a cornerstone of higher education, especially within academic writing. Students are expected to construct evidence-based arguments and critically analyze scholarly sources. Despite the recognized importance of these skills, many students encounter difficulties in engaging with research processes and translating them into effective academic writing [1]. Addressing these difficulties necessitates not only language mastery but also the cultivation of systematic research competencies.

The contemporary educational environment frequently highlights the need for effective research competencies, yet challenges persist in their cultivation. Traditional "study skills" courses often lack context-specific relevance and practical application. Instead, educators increasingly advocate for models that embed research skills directly within subject-based curricula. Blended learning approaches, such as Web-Quests, have demonstrated that integrating reading and writing research skills into academic content can significantly enhance students' writing abilities [2]. However, a gap remains in research specifically addressing how

sticky learning strategies can be applied to develop research skills within academic writing contexts.

One approach for enhancing research skills involves applying sticky learning strategies. These strategies aim to promote long-term retention and deeper understanding of knowledge, a requirement for tasks such as academic writing. Sticky learning incorporates principles such as active learning, spaced repetition, and interleaved practice. These methods have been shown to improve both retention and the ability to apply learned material in new contexts. Through these strategies, students become better equipped to manage complex tasks, including synthesizing research and constructing well-supported arguments in their writing.

The effectiveness of sticky learning strategies extends beyond cognitive processes. Metacognitive strategies, encompassing self-monitoring and reflection, also contribute to students' ability to assess their learning and adjust study habits. Self-monitoring, in particular, has been identified as a component of academic writing development, enabling students to reflect on research processes and identify areas for improvement. This combination of cognitive and metacognitive approaches creates a comprehensive learning experience that supports both the acquisition and application of research skills [3].

This article systematically explores the pedagogical potential of sticky learning strategies in improving research skills for academic writing. It moves beyond mere description toward a structured theoretical, methodological, and empirical investigation. This effort integrates both cognitive and metacognitive strategies into the learning process. The study evaluates their effectiveness using a mixed-methods approach. The following questions guide the inquiry:

1. How do sticky learning strategies influence the retention and application of research skills in academic writing?

2. Which sticky learning components (active learning, spaced repetition, interleaved practice, metacognition) contribute most effectively to the development of research competencies?

3. What are students' perceptions of sticky learning in supporting their research skill acquisition and academic writing quality?

Thematic Review of Sticky Learning and Academic Research Skill Acquisition

Research skills in academic writing encompass the ability to formulate research questions, locate and critically evaluate sources, synthesize findings, and integrate them into coherent arguments. Developing such skills requires integrating metacognitive strategies that promote self-regulated learning Student motivation and cognitive engagement are also crucial in fostering research skill development. Sticky learning strategies operationalize these principles by incorporating active learning, spaced repetition, and interleaved practice into the research and writing process. Empirical observations confirm these strategies contribute to knowledge retention, deeper learning, and enhanced skill transfer. However, a research gap persists regarding their systematic application within academic writing instruction to enhance research competencies, particularly in non-English-dominant higher education contexts.

Theoretical Foundations: Constructivism, Socio-cultural Theory, and Bloom's Taxonomy. The current study grounds its approach in Vygotsky's socio-cultural theory, which posits learning occurs within the Zone of Proximal Development (ZPD) through scaffolded tasks. It also integrates Bloom's revised taxonomy, emphasizing the progression from understanding to applying and creating knowledge within academic writing tasks. This framework guided the development and assessment of research skills using sticky learning strategies.

Sticky Learning Strategies: Cognitive and Metacognitive Dimensions. Active learning fosters deep cognitive engagement and the social construction of knowledge—key mechanisms of sticky learning [4]. This pedagogical approach helps students translate theoretical knowledge

into practical research competencies and supports automatization of research processes while maintaining critical reflection. Meta-analyses confirm significant gains in student performance across disciplines [5]. Peer-review workshops and collaborative synthesis tasks exemplify applications that promote engagement and knowledge co-construction.

Spaced repetition, derived from cognitive psychology principles, promotes durable knowledge retention and transfer, which are essential for developing academic research competencies. This technique involves reintroducing core concepts at increasing intervals to reduce forgetting and reinforce long-term memory. Applied through weekly quizzes, flashcard-based retrieval practice, and structured concept reviews, this method supports the gradual consolidation of complex information related to research methods, citation protocols, and academic writing conventions. It helps students move from simply remembering to applying and evaluating, aligning with Bloom's revised taxonomy.

Interleaved practice involves mixing related but distinct tasks within the same learning period to foster sticky learning and the development of complex, transferable research skills. This strategy counters illusions of mastery that can arise with blocked (single-focus) practice and cultivates adaptive thinking in scholarly writing. Instead of practicing one discrete skill, students engage in multi-layered tasks that require fluid shifts between source evaluation, paraphrasing, synthesis, argument construction, and citation formatting. This approach replicates the dynamic demands of real-world academic writing, promoting deeper conceptual integration and durable learning.

Metacognition, often described as "thinking about one's own thinking," is fundamental for effective learning, especially in complex cognitive domains like academic writing. Students must plan, monitor, and evaluate their learning processes in this context. Integrating metacognitive strategies, such as goal-setting, reflective journaling, and self-assessment checkpoints, ensures that knowledge is not merely retained but actively reinforced through intentional thought [6]. These practices empower students to become more independent, resilient, and thoughtful researchers and writers, aligning with the principles of self-regulated learning.

Evolving Approaches: Integrating Research Skills within Disciplinary Contexts. A recent shift in educational approaches involves integrating research skills directly within disciplinary content, moving away from isolated instruction. Traditional "study skills" courses often lack context-specific relevance and practical application. Instead, educators increasingly advocate for models that embed research skills directly within subject-based curricula [7]. For example, blended learning approaches, such as Web-Quests, have demonstrated that integrating reading and writing research skills into academic content can significantly enhance students' writing abilities. This integration provides a more holistic and relevant learning experience, addressing the need for effective research competencies within authentic academic contexts.

Empirical evidence supports the application of sticky learning in higher education. Studies indicate that active learning, spaced repetition, and interleaved practice contribute to knowledge retention, deeper learning, and enhanced skill transfer. Active learning, through methods like collaborative projects and peer reviews, enhances student achievement and fosters deeper cognitive engagement. Spaced repetition improves retention and recall of complex information, as observed in studies on academic concept acquisition. Interleaved practice aids students in applying various skills in diverse contexts, which contributes to more flexible and robust understanding. Furthermore, metacognitive strategies, including self-assessment and reflection, empower students to monitor their learning and refine their approaches, leading to improved academic performance. These findings collectively reinforce the efficacy of sticky learning strategies in higher education settings.

Materials and methods. This study employed a mixed-methods design, grounded in a theoretical-methodological approach combining constructivist and socio-cultural learning

theories with Bloom's revised taxonomy [8]. This framework guided the development and assessment of research skills within academic writing through sticky learning strategies. To investigate the pedagogical potential of sticky learning strategies in developing research competencies within academic writing contexts, a multi-method research design was adopted. This approach integrated theoretical, experimental, diagnostic, and empirical methods to ensure a robust and comprehensive analysis.

An educational intervention was implemented over a 12-week academic writing course, integrating sticky learning strategies into the curriculum. This intervention included:

Active Learning: Applied through peer review workshops, collaborative synthesis tasks, and structured debates that encouraged engagement and knowledge co-construction [9].

Spaced Repetition: Operationalized through weekly quizzes focused on research concepts, citation practices, and synthesis skills.

Interleaved Practice: Achieved by rotating tasks such as source analysis, paraphrasing, critical reflection, and synthesis writing within each session to reinforce transferable skills.

Metacognitive Strategies: Encompassing reflection journals, self-assessment checklists, and goal-setting tasks designed to develop students' awareness and control over their learning processes.

Diagnostic and Empirical Assessment Methods. To objectively measure the development of research skills, diagnostic pre- and post-tests were administered. These tests assessed students' abilities in source analysis and evaluation, citation accuracy, and argumentation and synthesis. A standardized academic writing rubric, evaluating clarity, structure, argumentation, and use of evidence, was applied to writing samples collected before and after the intervention. A mixed-methods approach was used to analyze the data. Quantitative analysis was conducted using SPSS to assess the statistical significance of changes in pre- and post-test scores. This determined the overall effectiveness of sticky learning strategies across various components of research skills. Qualitative analysis involved thematic coding of student reflection journals and transcripts from semi-structured interviews. This allowed for deeper insight into students' experiences, challenges, and perceived impacts of the intervention on their academic development.

The combination of these methods intentionally aligned with the study's objective. The literature review provided theoretical grounding and helped identify areas where sticky learning had not been fully explored. Experimental and diagnostic methods enabled objective measurement of student progress. Empirical methods ensured data triangulation, thereby enhancing the validity and reliability of findings. The use of Bloom's taxonomy and Vygotsky's Zone of Proximal Development (ZPD) provided a pedagogical framework supporting the systematic development of higher-order thinking and research competencies within academic writing.

Results and Discussion. The implementation of sticky learning strategies resulted in statistically and pedagogically significant improvements in students' research skills, demonstrating their effectiveness in enhancing academic writing competencies and research literacy. Active learning was central to embedding sticky learning strategies, rooted in constructivist and socio-cultural learning theories. Active learning was designed as a developmental scaffold, guiding students through the acquisition and application of core research competencies [10]. Sticky learning was achieved through repeated, meaningful engagement with tasks requiring analysis, synthesis, evaluation, and creation, as structured by Bloom's revised taxonomy. Active learning tasks fostered deep cognitive engagement and the social construction of knowledge.

Peer Review Workshops and Collaborative Synthesis in Research Writing. Weekly peer review sessions required students to exchange drafts and provide structured feedback using a research-focused checklist [11]. These workshops sharpened students' evaluative skills and

awareness of academic conventions. For instance, student Madina noted how reviewing a peer's paper revealed a missing citation in her own draft. This peer-led feedback culture fostered critical thinking and mutual learning. The number of constructive feedback comments increased from an average of 2 to 6 per paper, with students more frequently identifying issues like lack of evidence or unsupported claims. Small groups were assigned research topics and tasked with co-writing thematic literature reviews. This required identifying common threads across sources, paraphrasing, and effective citation. For example, Aslan's group combined five scholarly articles on "Student Motivation in Online Learning" into categories. Aslan noted the challenge of merging ideas without copying authors. The group's final paper exhibited a 25% improvement in citation accuracy and thematic connection, based on rubric assessments.

Structured Debates were introduced to apply research skills within argumentation. Students chose positions on controversial academic topics, such as AI's impact in education, and gathered scholarly evidence. Prior to debates, annotated bibliographies ensured thorough research. Student Aizhan shared that defending points with actual sources prompted more critical reading and careful citation choices. This shifted mindset, from anecdotal claims to evidence-backed arguments, was common. Following the debates, 82% of students transitioned to fully referenced, evidence-based reasoning in essays, as measured by post-intervention rubric scores. The debates embodied cognitive interleaving, where students alternated between related sub-skills like paraphrasing, analyzing, and citing. This reinforced skill retention and transfer across writing tasks. Students' research skills were evaluated through pre- and post-intervention writing samples, scored using a validated rubric. The results were compelling: students showed an average improvement of 15% in writing performance, with scores rising from 65 to 80 ($p < 0.05$, Cohen's $d = 0.76$). The control group showed only a 3% improvement. Key improvements included accurate citation integration, enhanced argument structure with evidence-backed claims, and deeper critical synthesis.

These outcomes confirm active learning's effectiveness as both a pedagogical tool and an assessment method. Qualitative data confirmed growth: 87% reported increased confidence in applying research to writing. Reflection journals revealed increased metacognitive awareness. Attendance and participation in active learning sessions rose by 12%, indicating greater motivation. Student Assem remarked, "Now I see writing as building a conversation with other scholars. The peer review and group work made that clear." These gains align with Vygotsky's ZPD and Bloom's taxonomy, guiding progression from understanding to creating research-based content.

Effects of Spaced Repetition on Knowledge Retention and Application. Spaced repetition, a core component, promoted durable knowledge retention and transfer for academic research competencies. Implemented through weekly low-stakes quizzes, flashcards, and concept reviews, this method consolidated complex information on research methods, citation protocols, and writing conventions. Spaced repetition targeted higher-order research skills by reintroducing core concepts at increasing intervals, reducing forgetting and reinforcing long-term memory. Tasks progressed from remembering to applying and evaluating, aligning with Bloom's taxonomy.

Retrieval Practice, Flashcards, and Concept Mapping. Students completed short, timed quizzes weekly on research concepts, such as source credibility or APA citation formatting. Each quiz built on previous material, mimicking real-world research application. For example, Arman's score on source differentiation improved from 40% to over 85% by week four. He noted, "Having the same terms come back made it easier to recognize them in articles. I didn't just memorize—I started to understand how they actually work." By week five, 76% of students accurately applied research methods concepts (up from 48% at baseline). Students used Anki, a digital flashcard tool, for frequently misused citation rules and terminology. Kamila reported, "The flashcards kept asking me the same question every few days. Eventually, it just stuck."

Anki use correlated with a 32% increase in correct APA citation formatting. Weekly review sessions included concept mapping where students collaboratively reconstructed relationships among research terms. Ruslan commented, "The map helped me see how everything fits. It's not just definitions—it's a process." These reviews reduced methodological errors in essays by 40%.

Quantitative Gains in Research Concept Acquisition. Pre- and post-assessment scores on research methods concepts showed a 20% gain in the intervention group (from 70 to 85, $p < 0.01$, Cohen's $d = 0.85$), significantly outpacing the 10% gain in the control group. Rubric analysis revealed fewer factual and formatting errors in essays, especially regarding method descriptions and terminology. Students who engaged most actively with spaced repetition tools performed significantly better on cumulative tasks like annotated bibliographies. Spaced repetition also impacted students' confidence and self-regulation. 81% of students reported that repeated retrieval helped manage academic workloads and reduced feeling overwhelmed. Students cited "progress tracking," "reduced anxiety," and "increased control" as major benefits. Anya wrote, "Instead of rereading everything before an assignment, I knew I had already reviewed the core ideas many times.

That made writing easier and less stressful." The spacing structure encouraged distributed practice, making learning feel incremental. Spaced repetition fits the sticky learning paradigm by leveraging retrieval-based learning, promoting retention and application. Its alignment with Vygotsky's ZPD was evident in guided practice, initially instructor- or peer-led, becoming increasingly independent. Repeated self-testing with feedback supported scaffolding and internalization of research processes. By returning to key concepts across multiple contexts, spaced repetition ensured transferability. Spaced repetition proved effective for developing and assessing research competencies. Improvements in citation accuracy, research method application, and academic vocabulary use, coupled with reduced error rates and increased student confidence, affirm its role as a scaffold for deep academic literacy. Student Timur summarized, "This was the first time I felt like I wasn't cramming but actually learning something that stayed with me."

Enhancing Transfer through Interleaved Practice. Interleaved practice was strategically employed to support sticky learning and the development of complex, transferable research skills. This technique encourages adaptive thinking in scholarly writing by mixing related but distinct tasks. Rather than isolated skill practice, students engaged in multi-layered tasks requiring fluid shifts between source evaluation, paraphrasing, synthesis, argument construction, and citation formatting. This replicates the dynamic demands of real-world academic writing.

To develop research competencies holistically, interleaved tasks centered around writing projects requiring simultaneous integration of multiple sub-skills. This created a recursive learning environment where students recalled and applied previously learned strategies in new, complex contexts. Assignments included a mini-literature review, a critical response, and a reflective commentary. Each required alternating between understanding, analyzing, and creating with sources. For example, student Natalia described integrating summary, critique, and personal opinion in a single paper, realizing she needed to use "everything I'd been learning—analyzing, citing, and thinking critically—at the same time." This layered approach fostered deeper conceptual integration. In-class writing labs alternated between source analysis, paraphrasing, and citation correction tasks within a single session. Student Assiyal noted, "At first, it was hard switching tasks so quickly. But later, it helped me not get stuck in one way of thinking." This metacognitive awareness of distinguishing skill types and rhetorical functions was a clear developmental outcome. By mid-course, students completed full essays demanding application of all prior writing skills. Mariam's final essay, citing six sources, paraphrasing three, synthesizing four, and critically reflecting, showcased

improved synthesis and argumentation. She commented, "I didn't even realize I was using so many different techniques until we reviewed the checklist." This conscious interconnection of skills made learning more durable and transferable.

Interleaved practice facilitated embedded assessment, revealing students' ability to shift and combine research processes in coherent written products. Students in the interleaved group showed an 18% improvement in writing quality (from 75 to 88, $p < 0.05$, Cohen's $d = 0.81$), compared to an 8% improvement in the control group. Citation errors dropped by 35%, indicating formatting accuracy maintenance despite multiple cognitive demands. 79% of students distinguished between summary and analysis in post-assessment tasks (up from 42% at baseline), suggesting increased understanding of academic voice. Student feedback strongly supported interleaved practice, with many commenting it better prepared them for real academic writing unpredictability. 82% of students indicated that "juggling" different sub-skills made them more conscious of writing choices.

Aliya reflected, "It made me realize academic writing isn't just about putting information in order. It's about deciding how to present that information. I had to really think through each section." These reflections confirm interleaved practice supports deep understanding and decision-making. Interleaved practice supports constructivist learning by encouraging active cognitive engagement across skill domains. The design aligns with Vygotsky's ZPD, as students were challenged just beyond their abilities and supported through feedback. The flexible, cross-task learning promoted by interleaving mirrors Bloom's upper-order taxonomy levels—evaluating and creating—which require synthesizing, comparing, and reframing knowledge. Interleaved practice proved a powerful instructional and assessment tool, fostering transfer of knowledge across academic genres. Students became more agile thinkers, capable of evaluating source relevance, paraphrasing accurately, citing consistently, and constructing arguments in a single cohesive effort. These gains confirm interleaving challenges learners to think more deeply, ensuring research skills become internalized and ready for future academic and professional settings.

Metacognitive Engagement and Self-Regulated Learning. Metacognitive strategies were foundational to this sticky learning intervention, serving as both a developmental tool and an assessment lens for student growth in academic research and writing. Metacognition, defined as "thinking about one's own thinking," is essential for effective learning in complex cognitive domains like academic writing. The intervention focused on developing students' metacognitive awareness, self-regulation, and reflective thinking through goal-setting, reflective journaling, and self-assessment checkpoints. These tools were embedded at key moments in writing and research tasks, aligning with the sticky learning framework by ensuring knowledge was not merely retained but actively reinforced through intentional thought [12].

Metacognitive practices were scaffolded progressively. Students began each major writing task by setting SMART goals related to research demands. Amina, for example, aimed to "improve synthesis of sources by comparing three authors on one theme." Her rubric score for synthesis improved from 2 to 4. Goal-setting led to an 18% increase in timely submission rates, and students demonstrated better alignment with grading rubrics. Students submitted weekly metacognitive journals, prompted by questions like, "What did I find challenging about paraphrasing this week?" Student Ilham wrote about rewriting paragraphs and checking APA formatting with Purdue OWL. 83% of students identified specific weaknesses and used journals to set actionable improvement targets. These reflections promoted critical thinking about process. After submitting drafts, students completed structured self-assessments aligned with the academic writing rubric. Rinat marked himself low on "clarity of argument" and revised his introduction to match his conclusion, significantly increasing his final grade. 68% of students revised drafts based on self-assessment, showing iterative learning. These students earned higher scores in coherence, evidence use, and structural clarity.

Quantitative and qualitative data showed that metacognitive strategies significantly enhanced academic writing performance. A statistically significant correlation was found between metacognitive engagement (journal quality, goal tracking) and rubric-based improvements in writing quality ($r = 0.63$, $p < 0.01$). Students who regularly set and reflected on goals were more likely to submit higher-quality drafts on time, improve across multiple writing dimensions, and exhibit adaptive academic behavior.

Assiya noted, "Now I try to fix things before submitting. I feel like I'm learning to catch my own mistakes." This shift reflects metacognitive transfer. Student perceptions confirmed the value of metacognition. 81% reported reflective tasks helped them feel more in control of learning. Many commented that thinking about their own process was a new skill. One student wrote, "Now I think of it as a system—research, plan, draft, check. The journal helped me build that system for myself." These practices cultivated academic resilience. The integration of metacognitive strategies aligns with Vygotsky's ZPD and constructivist learning theory. Students received just-in-time scaffolding, allowing progressive internalization of academic writing processes. This progression moved students from reliance on instructor feedback to self-regulated learners, exemplifying Bloom's highest cognitive domains: evaluating and creating. Metacognitive strategies were integral to the sticky learning framework, offering tools to consciously manage research and writing growth. The strong correlation between metacognitive engagement and writing performance, coupled with students' growing academic identity, confirms metacognition as a driver and measure of sticky learning.

Student feedback consistently indicated positive perceptions and experiences with the sticky learning approaches. Qualitative data from reflection journals and interviews highlighted increased confidence and perceived improvements in research and writing abilities. Students frequently reported feeling more engaged and motivated by the active and iterative nature of the learning tasks. For instance, the peer review workshops were seen as beneficial for understanding common pitfalls and improving their own work through observing others [13]. The systematic nature of spaced repetition was appreciated for its ability to consolidate complex information without overwhelming them. Many students noted that the interleaved practice, though initially challenging, ultimately prepared them better for the multifaceted demands of academic writing. The metacognitive components, particularly self-assessment and goal-setting, empowered students by giving them a sense of control and agency over their learning progression. These perceptions underscore the success of sticky learning strategies in enhancing not just skill acquisition but also students' academic self-efficacy and resilience.

The implementation of sticky learning strategies within an academic writing course led to statistically and pedagogically significant improvements in students' research skills, demonstrating their effectiveness in enhancing academic writing competencies and research literacy.

Table 1 – Impact of Active Learning Strategies on Research-Based Academic Writing

Group	Pre-Test Score	Post-Test Score	Improvement (%)
Active Learning	65	80	15%
Control Group	67	70	3%

Rubric-based assessment measured clarity, structure, and argumentation aligned with Bloom's taxonomy. The results presented in Table 1 reflect the impact of active learning strategies on students' academic writing performance. Assessment used a validated academic writing rubric aligned with Bloom's revised taxonomy, focusing on higher-order cognitive skills such as clarity of argument, citation integration, and critical synthesis. Student essays were evaluated before and after the intervention. The active learning group demonstrated a 15%

improvement (from a mean score of 65 to 80), while the control group showed only a 3% gain (from 67 to 70). This difference was statistically significant ($p < 0.05$), with a large effect size (Cohen's $d = 0.76$), indicating that the active learning intervention had a meaningful impact on writing quality. These findings support the effectiveness of structured, peer-driven, and cognitively engaging tasks in enhancing academic research competencies.

Table 2 – Retention and Application of Research Concepts via Spaced Repetition

Group	Baseline Retention (%)	Post-Intervention Retention (%)	Improvement (%)
Spaced Repetition	70	85	20%
Control Group	70	77	10%

Retention measured via delayed recall tests, grounded in distributed practice theory. Table 2 illustrates the effect of spaced repetition on students' retention and application of core research concepts. Both groups began with comparable baseline retention rates (70%). However, the spaced repetition group demonstrated a significant improvement, achieving an 85% retention rate—a 20% increase. The control group improved by only 10%, reaching 77%. Outcomes were measured using cumulative quizzes, concept maps, and flashcard-based retrieval tasks. Gains in the spaced repetition group were statistically significant ($p < 0.01$), with a large effect size (Cohen's $d = 0.85$), indicating strong practical significance. This improvement reflects students' enhanced ability to accurately recall and apply research methods, academic terminology, and citation conventions over time. These findings validate the effectiveness of distributed practice in promoting durable, retrievable, and transferable knowledge, hallmarks of sticky learning.

Table 3 – Improvement in Writing Quality through Interleaved Practice

Group	Pre-Test Score	Post-Test Score	Improvement (%)
Interleaved Practice	75	88	18%
Control Group	76	82	8%

Quality measured through synthesis, citation accuracy, and coherence, confirming transfer of learning through interleaving. Table 3 presents the impact of interleaved practice on students' academic writing performance. The interleaved practice group showed an 18% improvement in writing quality, with scores rising from 75 to 88. In contrast, the control group improved by only 8%, from 76 to 82. Assessment focused on students' ability to synthesize multiple sources, maintain citation accuracy, demonstrate rhetorical clarity, and adapt to layered writing tasks. These tasks included mini-literature reviews, critical analysis, and reflective commentary, requiring students to alternate between distinct but related cognitive processes. Results were statistically significant ($p < 0.05$), with a large effect size (Cohen's $d = 0.81$), indicating a substantial educational impact. This suggests that interleaved practice supports not only knowledge retention but also students' ability to flexibly apply research skills in complex writing contexts. Findings reinforce interleaving as an effective strategy for fostering transfer, adaptability, and deeper engagement in academic writing.

Table 4 – Correlation between Metacognitive Engagement and Writing Performance

Engagement Level	Average Writing Score	Change from Baseline (%)
High (≥ weekly reflections, goal tracking)	85	20%
Low (sporadic engagement)	74	8%

Table 4 illustrates the relationship between students' metacognitive engagement and their academic writing performance. Students with high engagement—defined as consistent weekly reflections and active goal tracking—achieved an average writing score of 85, a 20% improvement from baseline. In contrast, those with low or sporadic engagement showed only an 8% improvement, with an average score of 74. A statistically significant positive correlation was found between metacognitive engagement and writing performance ($r = 0.63$, $p < 0.01$), indicating that students who actively reflected on their learning process and regulated their academic behaviors were more likely to demonstrate higher levels of writing competence. These results were derived from rubric-based assessments of final essays, as well as analysis of student journals that provided evidence of self-regulation, planning, and reflective thinking. Findings underscore the critical role of metacognitive strategies in fostering not only skill development but also academic autonomy, aligning with sticky learning goals by promoting durable, self-directed growth in research writing.

The structured integration of sticky learning strategies allowed students to progress from isolated skills to interconnected research competencies essential for academic writing. By systematically linking cognitive engagement with reflective practice, students not only retained information but applied it critically in writing tasks. This was evidenced by increased rubric scores and qualitative feedback indicating improved confidence in handling research-based writing. The findings demonstrate that sticky learning strategies substantially enhance students' research skills, particularly in academic writing. This outcome aligns with earlier research emphasizing active learning, spaced repetition, and interleaved practice for improving knowledge retention and the application of research concepts. Moreover, the results underscore that these strategies foster an environment where students engage deeply, think critically, and apply learned knowledge meaningfully.

The active learning strategies incorporated immersed students in research activities, fostering critical thinking and problem-solving abilities. These results align with Freeman et al., who demonstrated that active learning enhances student achievement across STEM disciplines [14]. Involving students in collaborative projects, discussions, and peer reviews facilitated deeper cognitive engagement and contributed to long-term retention of research skills. Chi further argues that active learning permits greater interaction with content, necessary for deeper learning processes [15]. These results underscore active learning's value in promoting a hands-on, reflective learning process, helping students develop a nuanced understanding of research practices.

The inclusion of spaced repetition contributed to improved retention and retrieval of research methods, supporting findings by Roediger and Butler, who reported that spaced learning enhances memory by allowing the brain time to consolidate knowledge [16]. This strategy proved useful where retention and recall are paramount for academic success. In research writing, spaced repetition allowed students to recall and apply methodological concepts effectively, leading to better writing outcomes. The distributed practice helped students reinforce their understanding of research methods over time, leading to deeper mastery of skills for effective academic writing.

Interleaved practice, mixing different types of learning tasks, contributed to skill development. Kang suggested that interleaving is particularly effective in complex learning environments, enabling students to differentiate between various tasks and fostering flexible understanding. This study supports Kang's findings by demonstrating how interleaved practice helped students apply research skills in diverse contexts, contributing to interdisciplinary research and stronger academic writing [17]. Kornell and Bjork indicated that interleaving leads to better understanding and retention, especially when tasks are cognitively demanding. This approach prepares students for academic challenges and equips them with adaptability for applying skills across disciplines [18].

Metacognitive strategies were pivotal in improving students' research skills. Techniques like self-assessment, reflection, and goal-setting empowered students to evaluate their learning, recognize gaps, and refine research methods. Schraw highlighted the connection between metacognitive awareness and enhanced academic performance, noting it encourages students to analyze thought processes and cultivate effective study habits. Zimmerman underscored the significance of self-regulation in achieving academic success [19] reflective approaches to research, contributing to better academic writing outcomes. They became more aware of strengths and weaknesses, employing effective strategies to overcome challenges.

Beyond cognitive gains, sticky learning strategies fostered increased engagement and motivation. Research by Pintrich suggests that motivation and cognitive engagement are intertwined, with engaged students achieving higher academic outcomes [20]. This study adds to that evidence, as students utilizing sticky learning strategies reported higher engagement levels, translating into better academic performance in research-related tasks.

The findings indicate that integrating sticky learning strategies into the academic curriculum leads to lasting improvements in students' research skills and academic writing. These strategies offer a holistic approach to learning by combining cognitive, metacognitive, and behavioral techniques to create an environment conducive to both academic and personal growth. The observed improvements in writing quality, citation accuracy, and critical thinking suggest that these gains are sustained over time, as students internalize the processes and apply them independently. The metacognitive components, in particular, equip students with self-regulatory capabilities, enabling them to continuously monitor and refine their research and writing practices beyond the intervention period. This self-directed learning capacity is crucial for long-term academic success and the development of scholarly independence.

Despite the observed benefits, implementing sticky learning strategies across diverse educational contexts presents challenges. These include the need for significant pedagogical retooling and faculty training [21]. Adapting these strategies to large class sizes, varied student backgrounds, and different disciplinary requirements may require flexible approaches. Ensuring consistent application of spaced repetition, for instance, demands careful curriculum design and technological support. Encouraging metacognitive engagement requires sustained effort from instructors to foster a culture of reflection. Resource limitations, such as access to specific digital tools or dedicated time for peer review sessions, can also impede full implementation. Furthermore, assessing the long-term impact on student outcomes across different disciplines and educational settings warrants additional investigation.

To enhance student engagement and foster long-term learning, particularly in the development of research skills, educators are encouraged to adopt sticky learning strategies within higher education curricula. The most effective way to achieve this is by embedding active learning, spaced repetition, and interleaved practice directly into course content, ensuring that these techniques are not treated as isolated “study skills” but as an integral part of the learning process.

For such integration to be successful, faculty development plays a crucial role. Instructors should be provided with professional training that addresses both the theoretical foundations and the practical applications of sticky learning, equipping them to apply these strategies with confidence in diverse teaching contexts. Technological support further strengthens this process: digital tools such as flashcard applications can facilitate spaced repetition, while collaborative platforms can enhance active learning and peer interaction.

Equally important is the promotion of metacognitive awareness among students. This can be achieved by incorporating reflective journals, self-assessment checklists, and goal-setting activities into assignments, thereby encouraging students to monitor their own learning progress and develop stronger self-regulation skills. Assessment practices must also be aligned with these strategies. Rather than focusing solely on knowledge recall, assessments should

evaluate students' ability to apply and synthesize research skills through authentic, real-world tasks.

Finally, structured feedback mechanisms should be implemented, including both instructor and peer feedback, to encourage iterative improvement and critical self-reflection. Together, these measures can help create a learning environment where research skills are not simply taught but deeply integrated, durably retained, and meaningfully applied.

Conclusion. Sticky learning strategies offer a compelling method for enhancing students' research skills in academic writing. The integration of techniques such as active learning, spaced repetition, interleaved practice, and metacognitive self-monitoring deepens student engagement with the research process, improves retention of key research concepts, and strengthens the ability to apply these skills across diverse academic contexts. This study emphasizes that when sticky learning is strategically aligned with research skill development in academic writing, it evolves into a powerful pedagogical tool. It empowers students to engage effectively in independent research, critically evaluate sources, and construct well-supported academic arguments. Moreover, embedding research skill development within subject-specific content, rather than isolating it, offers a holistic and integrated approach to education. This strategy addresses critiques of traditional methods and aligns with a consensus that skill development is most effective when contextualized within the content being learned.

While this study underscores the potential of sticky learning strategies to improve research skills, further investigation is warranted to assess their long-term impact on student outcomes across different disciplines and educational settings. Future research should explore how the ongoing use of sticky learning techniques influences student performance in a broader range of research-related tasks, such as presentations, dissertations, and collaborative research projects. Additional studies could investigate the impact of these strategies in varied educational contexts, such as online or hybrid learning environments, where student engagement can be more challenging to maintain. Understanding the broader applicability of these strategies would allow educators to implement them more effectively across a range of learning scenarios. As higher education evolves, these findings highlight the importance of innovative, research-informed pedagogical models that equip students with essential skills to thrive in a complex and rapidly changing academic environment. Ultimately, sticky learning strategies—particularly when combined with active learning, metacognition, and spaced repetition—offer a robust framework for fostering research competencies and enhancing academic writing quality. Future studies can build on these findings to optimize these strategies and adapt them to diverse disciplines, further advancing student learning outcomes in the academic sphere.

References:

[1] **Wakerkwa, D.A.P.,** Kristina D., Rochsantiningsih D. Students' written academic competence and difficulties in writing research articles for publication // ELS Journal on Interdisciplinary Studies in Humanities. – 2019. – Vol. 2, No. 3. – P. 439–451. https://doi.org/10.34050/els-jish.v2i3.7260.

[2] **Dziuban, C.,** Graham C.R., Moskal P. D., Norberg A., Sicilia N. Blended learning: The new normal and emerging technologies // International Journal of Educational Technology in Higher Education. – 2018. – Vol. 15, No. 1. – P. 3. https://doi.org/10.1186/s41239-017-0087-5.

[3] **Wischgoll, A.** Self-monitoring as a strategy to improve academic writing // Journal of Educational Psychology. – 2016. – Vol. 108, No. 5. – P. 642-654. https://doi.org/10.1037/edu0000114.

[4] **Prince, M.** Does active learning work? A review of the research // Journal of Engineering Education. – 2004. – Vol. 93, No. 3. – P. 223-231. https://doi.org/10.1002/j.2168-9830.2004.tb00809.x.

[5] **Freeman, S.,** Eddy S.L., McDonough M., Smith M.K., Okoroafor N., Jordt H., Wenderoth M.P. Active learning increases student performance in science, engineering, and mathematics //

Proceedings of the National Academy of Sciences. – 2014. – Vol. 111, No. 23. – P. 8410-8415. https://doi.org/10.1073/pnas.1319030111.

[6] **Zimmerman, B.J.** Becoming a self-regulated learner: An overview // Theory Into Practice. – 2002. – Vol. 41, No. 2. – P. 64-70. https://doi.org/10.1207/s15430421tip4102_2.

[7] **Nicol, D.J.,** Macfarlane-Dick D. Formative assessment and self-regulated learning: A model and seven principles of good feedback practice // Studies in Higher Education. – 2006. – Vol. 31, No. 2. – P. 199-218. https://doi.org/10.1080/03075070600572090.

[8] **Creswell, J. W.,** Plano Clark V.L. Designing and conducting mixed methods research. – 3rd ed. – Thousand Oaks, CA: SAGE, 2018. – 492 p.

[9] **Anderson, L.W.,** Krathwohl D.R. (Eds.). A taxonomy for learning, teaching, and assessing: A revision of Bloom's taxonomy of educational objectives. – New York: Longman, 2001. – 352 p.

[10] **Laal, M.,** Ghodsi S.M. Benefits of collaborative learning // Procedia – Social and Behavioral Sciences. – 2012. – Vol. 31. – P. 486-490. https://doi.org/10.1016/j.sbspro.2011.12.091.

[11] **Flavell, J.H.** Metacognition and cognitive monitoring: A new area of cognitive–developmental inquiry // American Psychologist. – 1979. – Vol. 34, No. 10. – P. 906-911. https://doi.org/10.1037/0003-066X.34.10.906.

[12] **Cepeda, N.J.,** Pashler H., Vul E., Wixted J.T., Rohrer D. Distributed practice in verbal recall tasks: A review and quantitative synthesis // Psychological Bulletin. – 2006. – Vol. 132, No. 3. – P. 354-380. https://doi.org/10.1037/0033-2909.132.3.354.

[13] **Chi, M.T.H.** Active-constructive-interactive: A conceptual framework for differentiating learning activities // Topics in Cognitive Science. – 2009. – Vol. 1, No.1. – P. 7-105. https://doi.org/10.1111/j.1756-8765.2008.01005.x.

[14] **Roediger, H.L.,** Butler A.C. The critical role of retrieval practice in long-term retention // Trends in Cognitive Sciences. – 2011. – Vol.15, No.1. – P. 20-27. https://doi.org/10.1016/j.tics.2010.09.003.

[15] **Eglington, L.G.,** Kang S. H. K. Interleaved presentation benefits science category learning // Journal of Applied Research in Memory and Cognition. – 2017. – Vol. 6, No. 4. – P. 475-485. https://doi.org/10.1016/j.jarmac.2017.07.005.

[16] **Kornell, N.,** Bjork R.A. Learning concepts and categories: Is spacing the "enemy of induction"? // Psychological Science. – 2008. – Vol.19, No.6. – P. 585-592. https://doi.org/10.1111/j.1467-9280.2008.02127.x.

[17] **Pintrich, P.R.,** De Groot E.V. Motivational and self-regulated learning components of classroom academic performance // Journal of Educational Psychology. – 1990. – Vol. 82, No. 1. – P. 33-40. https://doi.org/10.1037/0022-0663.82.1.33.

[18] **Andrade, H.L.,** Bennett R.E., Cizek G.J. (Eds.). Handbook of formative assessment in the disciplines. – 1st ed. – London: Routledge, 2019. – 320 p. https://doi.org/10.4324/9781315166933

ТҰРАҚТЫ ОҚЫТУ СТРАТЕГИЯЛАРЫ ЗЕРТТЕУ ДАҒДЫЛАРЫН АКАДЕМИЯЛЫҚ ЖАЗУДА ЖЕТІЛДІРУДІҢ ПЕДАГОГИКАЛЫҚ ТӘСІЛІ РЕТІНДЕ: ИНТЕГРАЦИЯЛЫҚ АНАЛИТИКАЛЫҚ ЗЕРТТЕУ

Садыкова С.А. [1], PhD
Турлан Ж.С. [1], Филология ғылымдарының магистрі
Саркулова Ж.К. [2], Филология ғылымдарының магистрі

[1]Қ.Жұбанов атындағы Ақтөбе өңірлік университеті, Ақтөбе, Қазақстан
[2]Л.Н.Гумилев атындағы Еуразия ұлттық университеті, Астана, Қазақстан

Андатпа. Қазіргі академиялық ортада зерттеу дағдыларын, әсіресе академиялық жазу саласында дамыту – студенттердің жетістігі үшін аса маңызды. Зерттеу тек ақпарат жинаумен шектелмей, жаңа білім қалыптастыру үшін сыни ойлау мен синтезді қамтиды. Тұрақты оқыту

стратегиялары (Sticky learning strategies) – білімді ұзақ мерзімге есте сақтауға бағытталған инновациялық әдістер болып табылады және олар студенттердің зерттеу дағдыларын жетілдіруде тиімді тәсілдер ұсынады. Бұл стратегиялар белсенді оқыту, интервальді қайталау, аралас тәжірибе және метатанымды ерекше назарға ала отырып, зерттеу процесіне тереңірек қатысуға ықпал етеді.

Осы мақалада сипатталған педагогикалық араласу академиялық жазудағы зерттеу дағдыларын жетілдіруге тұрақты оқыту стратегияларының әсерін бағалайды. Оқыту бағдарламасына түрлі әдістер енгізіліп, олардың білімді сақтау, сыни ойлау және білімді қолдану қабілеттерін дамытудағы тиімділігі тексерілді. Бұл зерттеу тиімді оқыту стратегиялары туралы бар ғылыми еңбектерді толықтыра отырып, жоғары білім беру жүйесіндегі оқыту тәжірибесін жетілдіруге бағытталған құнды практикалық ұсыныстар береді.

Зерттеуде аралас әдіс (mixed-methods approach) қолданылды: сандық және сапалық деректер жиналды. Студенттердің зерттеу дағдыларындағы өзгерістер алдын ала және кейінгі тестілер арқылы өлшенді, ал рефлексиялар, сұхбаттар мен сауалнамалар сапалық деректер берді. Студенттердің нәтижелерін бағалау үшін сипаттамалық статистика мен тақырыптық талдау пайдаланылды.

Нәтижелер тұрақты оқыту стратегияларының зерттеу дағдыларын айтарлықтай жақсартқанын көрсетті: тест нәтижелерінің, жазу сапасының және студенттердің белсенділігінің артқаны байқалды. Студенттер белсенді оқыту мен интервальді қайталаудың білімді есте сақтауға және қолдануға көмектескенін атап өтті. Бұл қорытындылар мұндай стратегияларды оқу бағдарламасына енгізу зерттеу дағдыларын және академиялық жазуды тұрақты түрде жақсартатынын көрсетеді.

Тірек сөздер: тұрақты оқыту стратегиялары, зерттеу дағдылары, академиялық жазу, белсенді оқыту, интервальді қайталау, аралас тәжірибе, метатаным.

СТРАТЕГИИ УСТОЙЧИВОГО ОБУЧЕНИЯ КАК ПЕДАГОГИЧЕСКИЙ ПОДХОД К РАЗВИТИЮ ИССЛЕДОВАТЕЛЬСКИХ НАВЫКОВ В АКАДЕМИЧЕСКОМ ПИСЬМЕ: ИНТЕГРИРОВАННОЕ АНАЛИТИЧЕСКОЕ ИССЛЕДОВАНИЕ

Садыкова С.А. [1], PhD
Турлан Ж.С. [1], магистр филологических наук
Саркулова Ж.К. [2], магистр филологических наук

[1]*Актюбинский региональный университет им. К.Жубанова, Актобе, Казахстан*
[2]*Евразийский национальный университет им. Л.Н.Гумилева, Астана, Казахстан*

Аннотация. В современном академическом пространстве развитие исследовательских навыков, особенно в области академического письма, является ключевым условием успешности студентов. Исследовательская деятельность выходит за рамки простого сбора информации, включая критическое мышление и синтез знаний для получения новых выводов. Стратегии устойчивого обучения (Sticky Learning Strategies), направленные на долговременное сохранение знаний, представляют собой инновационный метод совершенствования исследовательских навыков студентов. Данный подход способствует более глубокому вовлечению в исследовательский процесс за счёт акцентирования внимания на активном обучении, интервальном повторении, чередующейся практике и метакогниции.

В настоящем исследовании оценивается влияние стратегий устойчивого обучения на развитие исследовательских навыков в академическом письме. В учебный процесс были интегрированы различные методы, что позволило оценить их эффективность в формировании навыков запоминания, критического мышления и применения знаний. Работа имеет практическую значимость, так как расширяет существующие исследования об эффективных педагогических стратегиях и предлагает пути совершенствования образовательных практик в высшей школе.

Для исследования применялся смешанный метод: собирались как количественные, так и качественные данные. Сравнительный анализ с использованием входных и итоговых тестов позволил выявить динамику развития исследовательских навыков, а рефлексивные задания, интервью и опросы обеспечили качественные данные. Для анализа использовались описательная статистика и тематический анализ.

Результаты показали, что стратегии устойчивого обучения значительно повысили исследовательские навыки студентов, что выразилось в улучшении результатов тестов, качества письменных работ и уровня вовлечённости. Студенты отмечали, что активное обучение и интервальное повторение способствовали лучшему удержанию и применению знаний. Полученные данные позволяют заключить, что интеграция этих стратегий в академический процесс способствует устойчивому повышению уровня исследовательских навыков и качества академического письма.

Ключевые слова: стратегии устойчивого обучения, исследовательские навыки, академическое письмо, активное обучение, интервальное повторение, чередующаяся практика, метакогниция.