

## DIGITAL BRIDGES: HOW MULTI-MODAL AI AND AUDIO TOOLS CONSTRUCT STUDENT BACKGROUND KNOWLEDGE

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Received: 2026-03-11

Revised: 2025-04-23

Accepted: 2026-05-10

Online Published: 2026-05-16

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**Abstract:** *The fundamental reconstruction of how thirty-seven college students navigate deep-seated conceptual voids has been effectively realized through the strategic integration of multi-modal digital instruments. By transitioning from traditional paper-based instruction to a robust digital pedagogy, this qualitative inquiry demonstrates that generative AI acts as a structural foundation that successfully neutralizes "blank page syndrome," a common psychological barrier in academic writing. This instructional scaffolding is further reinforced by instructional podcasts, where the shadowing technique facilitates auditory-linguistic immersion and stabilizes cognitive focus during high-stakes discussion sessions. The procedural requirement for students to curate twenty-five APA-style references ensures rigorous academic inquiry, transforming learners from passive recipients into active architects of their own knowledge. Findings reveal a measurable convergence of lexicogrammatical proficiency and scholarly autonomy, fostered by a critical, justice-oriented relationship with technology. Ultimately, the synthesis of video-based retelling and strategic prompt engineering empowers students to internalize complex subject matter while building lasting critical thinking skills. For educators and researchers, this framework provides a transformative pathway to bridge background knowledge gaps, ensuring students are not merely users of technology but creators of intellectually grounded academic discourse*

**Keywords:** *Digital-Pedagogy; EdTech-Integration; Knowledge-Gaps; Multi-modal Learning; Scaffolding.*

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### INTRODUCTION

The conceptualization of effective teaching begins with Scaffolding, a sophisticated process where educators provide temporary support structures to help thirty-seven college students navigate complex subject matter that currently remains beyond their independent comprehension. This instructional framework is increasingly reinforced through strategic EdTech-Integration, where tools such as Artificial Intelligence and educational applications are not merely supplementary or peripheral additions but have become foundational pillars of the modern curriculum. By breaking down the intricate "mechanic of learning" into manageable, sequential steps like shadowing and critical reading, teachers empower these learners to bridge the significant gap between their current baseline abilities and their latent potential for growth. As Khan (2024) suggests,

AI revolutionizes the educational landscape by providing highly personalized pathways, while accessible platforms like WhatsApp and Duolingo offer stable environments for consistent language practice and background knowledge construction. The synergy of these diverse technologies facilitates Multi-modal Learning, an approach that engages students through auditory channels via podcasts, visual stimulation through image description, and kinesthetic activity through digital retelling. Such variety is absolutely essential for addressing persistent Knowledge-Gaps, specifically those missing conceptual links that frequently hinder critical listening and high-stakes discussion skills.

The identification of significant conceptual voids among the participants serves as the primary catalyst for this qualitative inquiry, highlighting a pervasive struggle with foundational subject matter that often stalls educational progression. These Knowledge-Gaps are not merely superficial oversights but represent deep-seated cognitive deficits in understanding the fundamental "mechanic of learning" a language, critical reading, and the technical implementation of shadowing techniques. When students lack this essential background knowledge, a profound disconnect emerges between theoretical instructions and practical application, leading to a state where they cannot effectively engage in higher-order discussion sessions. This state of "not knowing" creates a formidable barrier to academic fluency, as students find themselves unable to decode complex academic texts or participate in critical listening tasks that require prior thematic familiarity. Furthermore, without a solid grasp of the subject matter, students struggle to achieve the lexicogrammatical proficiency necessary for advanced communicative grammar development. The absence of these core competencies often manifests as a lack of confidence during classroom interactions, as students grapple with the challenge of managing new information without a pre-existing mental framework to anchor it.

Ultimately, this educational evolution culminates in a robust Digital-Pedagogy, where the teacher's role shifts from a traditional information provider toward fostering a "critical relationship" between the student and technology. By integrating ethical AI literacy and aesthetic experiences, educators ensure that students do not just use digital tools as shortcuts, but develop the critical thinking necessary to navigate a justice-oriented, tech-driven academic landscape. When students utilize instructional podcasts to manipulate and synthesize content, they transform from passive recipients into active investigators and architects of the subject matter. This transition is further reinforced by the procedural requirement to curate twenty-five APA-style references via Google Scholar, ensuring academic rigor and transforming the student into an active architect of their own inquiry. Through the synthesis of video-based retelling and media literacy, students are empowered to internalize complex subject matter, resulting in a measurable convergence of lexicogrammatical proficiency and scholarly autonomy. Consequently, these voids in understanding underscore the urgent need to analyze how such deficits impact performance and how digital scaffolding can equalize the playing field.

The current academic condition of the thirty-seven students is characterized by a systemic conceptual void, where the absence of a robust background knowledge base serves as the primary obstacle to both linguistic and cognitive advancement. This deficit manifests most prominently in the students' inability to internalize the fundamental "mechanics of learning," particularly in applying high-cognitive-load techniques such as shadowing and critical listening. Without a firmly anchored mental framework, learners

encounter paralyzing lexicogrammatical hurdles, failing to decode complex academic texts or participate in high-stakes discussion sessions that demand spontaneity and deep thematic comprehension (Suseno, 2024d; 2024f). This inability to manage knowledge schemata creates a cycle of cognitive stagnation, drastically eroding confidence when faced with demanding communicative tasks. This gap indicates a critical disconnect between the students' actual competence and the rigorous demands of modern academic discourse, which is increasingly saturated with information complexity (Suseno, 2024a; 2024e). The "blank page syndrome" in the thinking process is not merely a technical glitch but a structural barrier preventing the emergence of scholarly autonomy and critical media literacy (Suseno, 2025b).

Prior scholarly attempts to mitigate these knowledge deficits have largely prioritized conventional interventions that emphasize non-digital methods, such as intensive face-to-face peer tutoring, rote memorization, and the use of static, paper-based textbooks (Suseno, 2024f). Earlier literature also explored the utility of specific mobile applications like Duolingo or the visual interpretation of condensed short stories as alternative pathways for building thematic familiarity (Guamán Yupangui, 2025; Suseno, 2025b). While these methods offer structured approaches, research indicates that without technological support capable of dynamically synthesizing content, students tend to remain trapped in a rigid, passive learning cycle (Budhai & Heath, 2025). The limitations of traditional methods in bridging cognitive gaps often result in a failure to meet the rigorous standards of advanced communicative grammar development (Guarcello & Longo, 2024; Liu et al., 2025). Collectively, these studies identify that a reliance on a single medium without multi-modal variation often fails to provide sufficient auditory-linguistic stimulation to stabilize cognitive focus (Khan, 2024; Suseno, 2024c). Consequently, there remains an unresolved pedagogical tension regarding the most effective way to construct a knowledge base without succumbing to restrictive, paper-centric methodologies.

This qualitative inquiry seeks to systematically dissect the efficacy of integrating advanced digital instruments to bridge the identified conceptual voids among thirty-seven college students. The central focus of this research is directed toward answering the pivotal question of how the educator facilitates students in building background knowledge of the subject matter through adaptive technological support. By conducting an in-depth exploration within a naturalistic classroom setting, this study aims to evaluate how multi-modal interventions optimize the mastery of shadowing, critical reading, and critical listening techniques (Suseno, 2024d; 2024f). The primary intellectual target is to understand the transformation of students from passive information recipients into active architects of knowledge through digital scaffolding mechanisms. Furthermore, the research aims to map the pathways through which critical AI literacy and digital pedagogy can neutralize lexicogrammatical hurdles, thereby enabling participants to achieve higher proficiency in discussion sessions (Suseno, 2024a; 2024e). By documenting the interactions of twenty female and seventeen male participants with digital tools, this study aspires to generate a pedagogical framework capable of reconstructing scholarly autonomy within the modern educational landscape (Khan, 2024; Budhai & Heath, 2025).

This study adopts a qualitative research design that facilitates an exhaustive exploration of the social and cognitive dynamics involved in the construction of student

background knowledge. Data collection procedures were executed through rigorous non-participant observation, where the researcher functioned as an objective observer documenting the interactions between twenty female and seventeen male students and the provided digital ecosystem (Suseno, 2024c). The observational focus was directed toward the practical implementation of the "mechanics of learning," which encompasses the use of generative artificial intelligence as a structural foundation and instructional podcasts as instruments for auditory-linguistic immersion. Data were systematically gathered through detailed field notes to capture the nuances of student engagement during the curation of twenty-five APA-style references via Google Scholar to ensure academic rigor. The data analysis process followed an inductive approach to identify patterns of transformation in lexicogrammatical proficiency and student autonomy during intensive discussion sessions (Suseno, 2024a; 2024e). The validity of the research procedure is reinforced by integrating various methodological references to ensure that the observed shadowing and critical listening techniques align with modern media literacy standards (Suseno, 2024d; 2024f; Liu et al., 2025). This entire methodological stage is designed to provide a transparent overview of how digital interventions function as stable scaffolding to overcome cognitive deficits.

## **METHOD**

### **Methodological Foundation and Theoretical Integration**

The methodology of this study is systematically engineered to dissect the multi-layered relationship between intentional instructional interventions and the incremental evolution of student background knowledge through digital scaffolding. By adopting a robust qualitative approach, the inquiry prioritizes an understanding of the "how" and "why" behind technology integration within an increasingly intricate educational ecosystem, transcending mere statistical generalizations (Suseno, 2024c). This methodological choice reflects a profound commitment to uncovering the subtle cognitive shifts that emerge when pedagogical guidance intersects with students' digital navigation in the classroom. Within this framework, technology is treated not as a passive tool, but as an active mediator that reconstructs the instructional landscape and reconfigures the traditional hierarchy of knowledge acquisition. The investigative focus is directed toward the quality of interactions, the sequential nature of instructional stimulation, and the specific digital environments that trigger intellectual growth (Suseno, 2024d; 2024f). Utilizing a qualitative lens facilitates the capture of fleeting yet crucial instructional moments, such as a sudden surge of clarity in a student's expression or a strategic pivot made by the educator when a digital tool requires spontaneous modification. Ultimately, this methodology serves as a bridge connecting theoretical scaffolding concepts with the dynamic, vibrant reality of the modern classroom, ensuring that every observation is anchored in the lived experiences of both the educator and the learner (Khan, 2024; Liu et al., 2025).

### **Research Design and Ontological Framework**

This study implements a comprehensive Qualitative Research Design, specifically utilizing an observational framework to capture real-time, fluid dynamics within the university environment. The selection of qualitative methods is deeply rooted in the ontological necessity of understanding the social and cognitive processes that occur when students interact simultaneously with complex subject matter and novel digital instruments. Unlike rigid quantitative methods that might reduce a semester of intellectual

development to a solitary test score, this design allows for the documentation of nuanced student frustrations, "aha!" moments of creative discovery, and the rapidly evolving pedagogical strategies employed responsively by the teacher (Suseno, 2025b). By maintaining a focus on the naturalistic setting of higher education, the study ensures that findings reflect authentic educational practices rather than artificial laboratory results. This philosophical stance acknowledges that learning is not a linear path but a recursive journey of sense-making that requires thick description to be fully understood by the academic community. The observational protocol is structured to record not only verbalized discourse but also the silences, gestures, and digital pathways navigated by students as they bridge the gap between existing knowledge and new information. Consequently, this research design provides a panoramic view of the classroom ecosystem, highlighting the interdependence of human agency and technological affordance in the pursuit of academic mastery (Budhai & Heath, 2025; Guarcello & Longo, 2024).

### **Participants and Contextual Setting**

The participant cohort is comprised of a purposive sample of thirty-seven college students, characterized by a demographic distribution of twenty females and seventeen males, which ensures a multifaceted spectrum of perspectives. Selection was predicated on their enrollment in a specialized course where a verified deficit in foundational background knowledge had been pre-identified as a structural impediment to their scholarly advancement. Rather than utilizing a randomized recruitment strategy, this study employed an intentional selection process to ensure the inquiry directly confronts the specific cognitive voids present in challenging subject-specific domains. This gender-diverse demographic offers a broad array of technological user experiences, while their shared status within the higher education system ensures a necessary baseline of academic rigor and digital literacy required for a sophisticated pedagogical intervention. Within this university environment, the setting functions as a critical variable, as the demands for high-level critical thinking and self-regulation fundamentally inform how these students engage with teacher-led digital prompts. By contextualizing the study within this specific cohort, the researcher is positioned to examine how varying degrees of prior exposure—or the total absence of it—influence the efficacy of digital scaffolding techniques. Ultimately, acknowledging the unique academic pressures and social contexts of these participants allows for a more empathetic and precise interpretation of their individual learning trajectories (Suseno, 2024c; 2024f).

### **The Intervention: The Digital Scaffolding Model**

To strategically mitigate the identified knowledge gaps, the research implements a sophisticated, multi-modal intervention involving Generative Artificial Intelligence, curated instructional podcasts, and specialized educational applications. This pedagogical framework transcends the passive delivery of information, focusing instead on the metaphorical "building of bridges" between a student's current cognitive baseline and the higher-order reasoning demanded by the curriculum. By weaving these diverse technological threads into a cohesive instructional fabric, the model establishes a resilient support system that adaptively aligns with the idiosyncratic learning pace of each participant. The integration of AI facilitates immediate, personalized feedback loops that simulate one-on-one tutoring, while podcasts reintroduce a human element through narrative storytelling and expert-led discourse. Such a multi-sensory approach ensures

that students who struggle with conventional text-heavy instruction can locate alternative entry points into complex academic material. Furthermore, the scaffolding is designed with a "fading" mechanism; as students consolidate their background knowledge and gain self-assurance, digital supports are incrementally adjusted to catalyze greater intellectual autonomy. This deliberate transition from dependence to independence remains the hallmark of effective scaffolding, evolving digital tools from temporary supports into robust engines of inquiry and long-term academic resilience (Khan, 2024; Budhai & Heath, 2025).

### **Implementation of Digital Tools and Prosedural Rigor**

The deployment of Generative AI within this investigative framework prioritizes the mastery of prompt engineering to synthesize intricate topics and generate creative structures, thereby effectively neutralizing the debilitating "blank page syndrome." By engaging with these tools, students learn to deconstruct vast information volumes into manageable structural components, allowing for a focused concentration on the logical coherence of their arguments. Complementing this, instructional podcasts are integrated to provide essential auditory scaffolding, facilitating the implementation of "shadowing" techniques and critical listening exercises as advocated by Suseno (2024f). This auditory layer introduces a prosodic dimension to the learning process, assisting students in internalizing the rhythm and specialized terminology of the subject matter in a way that silent reading often fails to achieve. Simultaneously, specialized applications—including Google Scholar and dedicated educational platforms—are employed to facilitate independent resource discovery and the mastery of APA-compliant citation practices. These instruments do not merely simplify the research trajectory; they socialize students into the professional standards of the global academic community. Together, these three technological pillars—generative, auditory, and functional—create a comprehensive environment where the "mechanics of learning" become both visible and accessible. The resulting synergy ensures that the student is supported at every stage of the knowledge-building process, from the initial conceptual spark to the final, polished academic citation (Liu et al., 2025; Guarcello & Longo, 2024).

### **Data Collection: Non-Participant Observation**

The primary data collection strategy employed in this inquiry is non-participant observation, a method selected for its unique capacity to provide an authentic and unfiltered window into the classroom environment. In this capacity, the researcher maintains the role of an intentional "outsider," systematically documenting the intricate interactions between the educator, the students, and the technological tools without perturbing the natural instructional flow. This approach is fundamental to preserving the ecological validity of the educational setting, thereby mitigating the Hawthorne effect—a phenomenon where participants might modify their behavior due to the awareness of being observed. By remaining in the background, the researcher can capture raw, spontaneous instances of peer-to-peer collaboration and the nuanced non-verbal cues that indicate either cognitive engagement or conceptual confusion. The resulting observation notes offer a high-fidelity chronological map of the intervention's progression over the semester, providing the "thick description" necessary to interpret why certain digital tools resonate with learners while others might induce temporary cognitive overload. Consequently, this non-intrusive stance ensures that the gathered data serves as a genuine

reflection of the daily realities inherent in modern digital pedagogy (Suseno, 2024c; Liu et al., 2025).

**Focal Points of the Observational Framework**

The observational protocol is precisely calibrated to monitor the teacher’s introduction of AI and podcasting instruments, specifically noting the clarity of instructional delivery and the emotional resonance established during the initial implementation phase. Beyond teacher-led actions, the researcher focuses extensively on student engagement levels during individual tasks—such as shadowing exercises and critical reading—to pinpoint the exact junctures where deep learning occurs. A significant focal area is the visible transition of students from a state of conceptual hesitation to one of active, confident participation in classroom discourse. This shift is frequently signaled by observable changes in body language, an increased frequency of inquiry, and the heightened quality of contributions during collaborative sessions. Furthermore, the observation remains attuned to the technical and cognitive hurdles students encounter while implementing the "mechanics of learning," such as navigating software interfaces or synthesizing disparate data points. By documenting these challenges in real-time, the study can identify specific areas where the digital scaffolding requires refinement or where teacher intervention is most critically necessitated. Each minor breakthrough or frustration is recorded as a vital data point, contributing to a granular understanding of the learner's journey through the digital landscape (Suseno, 2024d; 2024f).

**Procedural Workflow: The Step Execution**

The study adheres to a rigorous five-phase procedural workflow designed to transition students from conceptual fragmentation to scholarly autonomy. This systematic execution is outlined in the table below:

Table 1. Workflow

Phase	Key Actions and Requirements
I. Initial Diagnosis	Students externalize their specific needs regarding shadowing and critical reading while identifying existing implementation gaps.
II. Tech-Integration	Students employ Generative AI for prompt engineering to synthesize unique, plagiarism-free titles and refine their research scopes.
III. Source Validation	Utilizing Google Scholar to curate twenty-five APA-style references (dated 2023–2025) to anchor the research in current literature.
IV. Content Synthesis	Students organize findings into ten unique subtitles and five distinct Units, adhering to a strict anti-redundancy protocol.
V. Verification	The final stage involves "retelling" the synthesized content via video to internalize subject matter and enhance speaking proficiency.

**Ethical Considerations, Data Integrity, and Analysis Plan**

To uphold the integrity of the qualitative data and satisfy anti-plagiarism requirements, the methodology incorporates strict anti-redundancy protocols, requiring students to generate unique subtopics to prevent the repetition of ideas across the five units of study. Every stage of the research draft is tethered to the twenty-five curated references, ensuring that the work of Suseno (2024), Khan (2024), and others provides a constant scholarly anchor. While demographic data—comprising twenty females and seventeen males—is noted for context, individual identities remain protected to uphold ethical research standards in higher education. The qualitative data gathered from observations and student artifacts will be processed using Thematic Analysis. This analytical plan focuses on identifying patterns in how students utilized multi-modal media to resolve initial knowledge gaps. Key themes expected to emerge include "digital autonomy," "scaffolding efficacy," and the role of critical AI literacy in fostering educational justice and joy (Budhai & Heath, 2025). This comprehensive analysis will ultimately provide a definitive answer to the central research question regarding the teacher's effectiveness in building necessary student background knowledge.

## RESULTS

### **The Efficacy of AI-Driven Scaffolding in Knowledge Construction**

The systematic implementation of generative artificial intelligence as a structural scaffold yielded significant empirical evidence regarding the reduction of cognitive load among the thirty-seven college students. Observational data indicates that by leveraging strategic prompt engineering to synthesize intricate academic themes, participants successfully bypassed the psychological paralysis often associated with "blank page syndrome," facilitating a more fluid transition into advanced subject matter engagement. The educator's role proved indispensable in this phase, evolving the digital tool from a rudimentary answer-generator into a sophisticated partner in the inquiry process; consequently, students who previously demonstrated conceptual fragmentation began to articulate coherent, original research frameworks that adhered to rigorous institutional standards. This technological bridge enabled both the twenty female and seventeen male participants to organize complex information more systematically than observed in conventional, non-digital pedagogical settings. Findings suggest that these AI-derived materials functioned as a critical cognitive baseline, which students then proactively expanded upon through intensive critical reading and the verification of external scholarly sources. As reflected in contemporary educational discourse, such tools do not merely offer immediate outputs but fundamentally revolutionize how learners interrogate subject-specific data, transforming passive information absorption into active intellectual investigation (Khan, 2024). Furthermore, the integration of these tools fostered a measurable sense of digital autonomy, allowing students to explore unfamiliar academic territories with decreasing dependence on direct teacher intervention (Suseno, 2025a; 2025d).

### **Podcast-Mediated Shadowing and Auditory Knowledge Reinforcement**

Empirical observations concerning the "mechanics of learning" demonstrated a substantial enhancement in participants' critical listening and prosodic accuracy through the targeted utilization of instructional podcasts. By executing the shadowing technique—wherein students replicate audio input in real-time—the cohort exhibited a heightened sensitivity to the linguistic and conceptual nuances of the specialized subject matter. The

teacher's strategic selection and manipulation of podcast content were vital in addressing specific thematic voids, ensuring that the auditory stimuli directly compensated for what the students initially identified as "unknown" conceptual territory. The results indicate that the repetitive yet immersive nature of podcasting stabilized the students' cognitive focus and emotional state during subsequent high-stakes discussion sessions, effectively creating a "low-affective filter" environment. Participants displayed a marked increase in confidence when retelling synthesized content, serving as a tangible manifestation of their developing background knowledge and speaking proficiency (Suseno, 2024c; 2024d).

This multi-modal strategy allowed for information processing across diverse sensory channels, which proved exceptionally effective in accommodating the varied cognitive styles present within the qualitative setting. The synthesis of auditory reinforcement with classroom discourse confirmed that podcasts serve as high-fidelity instruments for the simultaneous development of linguistic fluency and thematic expertise (Suseno, 2024e; 2024f). Moreover, this auditory scaffolding encouraged a "deep listening" practice that anchored memory retention, as evidenced by the frequency with which students cited specific audio segments during collaborative brainstorming and peer debates.

### **The Role of Specialized Applications and Digital Pedagogy in Student Autonomy**

The final phase of the investigation illuminated how specialized applications, specifically Google Scholar and various mobile learning platforms, revolutionized the research habits of the thirty-seven participants, shifting their approach from haphazard searching to academic precision. Through a structured, step-by-step procedural workflow, students navigated a transition from initial frustration toward a state of academic rigor, successfully curating an average of twenty-five APA-style references to anchor their synthesized drafts. The educator's guidance in navigating these applications was instrumental in fostering a critical, rather than passive, relationship with technology; this moved beyond simple tool utilization toward a justice-oriented digital literacy that prioritizes intellectual honesty. Observational data showed that the students became significantly more adept at identifying high-quality academic literature, directly addressing their foundational knowledge gaps by equipping them with the capacity for independent inquiry. Furthermore, the process of "retelling" findings via video functioned as a robust verification tool, compelling students to consolidate disparate learning moments into a final, coherent performance of understanding (Suseno, 2023). This outcome reflects the broader goal of fostering joy and justice in the university classroom, where technology serves as a reliable partner in the student's personal learning trajectory (Budhai & Heath, 2025). Ultimately, the synthesis of these diverse digital tools established a "Digital Pedagogy" that empowered students to overcome subject-matter deficits while building lasting critical thinking skills (Liu et al., 2025; Sison et al., 2024).

### **Strategic Implementation of Prompt Engineering and Source Validation**

Individual activity observations revealed that the neutralization of "blank page syndrome" was heavily contingent upon the students' capacity to construct sophisticated, structured instructions. The teacher facilitated this evolution by introducing layered prompting techniques that transformed the AI from a mere answer-generator into a

strategic partner in the inquiry process. The measurable shift in student mindset—from passive AI consumption to rigorous prompt engineering—is synthesized in the table below:

**Table 2.** Evolution of Student Prompting Strategies

Research Phase	Initial/Passive Approach (Before Intervention)	Strategic Prompt Engineering (After Guidance)
Title & Theme Conceptualization	"Create a title about shadowing techniques."	"Act as an educational linguistics expert. Generate 5 unique, academic, and plagiarism-free research titles regarding the integration of shadowing techniques to build background knowledge for university students."
Content Synthesis & Anti-Redundancy	"What are the key points of Digital Pedagogy?"	"Based on the principles of digital justice (Budhai & Heath, 2025), synthesize the concept of Digital Pedagogy into 10 unique subtitles. Ensure no redundancy of ideas across the 5 distinct units of study."
Source Validation Support	"Find references for AI in education."	"Identify key arguments regarding ethical AI literacy. Provide a summary that I can validate via Google Scholar to ensure alignment with APA citation standards."

The study’s findings indicate a sophisticated progression in how students managed the dual demands of critical reading and digital research. By strictly adhering to a twenty-two-step procedural workflow, the twenty female and seventeen male participants moved beyond superficial internet searches to a disciplined engagement with Google Scholar. The pedagogical requirement to generate ten unique subtitles and five distinct units compelled a level of content synthesis that actively prevented thematic redundancy. This intensive phase demonstrated that the paralyzing effects of "blank page" syndrome were effectively mitigated when students were provided with the precision tools to engineer high-quality prompts for title creation and thematic outlining. Consequently, individual activities served as a catalyst for critical thinking, as students were forced to evaluate the credibility of each cited article against their specific subject-matter gaps (Suseno, 2024f; 2025a). The transition from passive consumption to active, rigorous source validation marked a significant milestone in the students' collective journey toward academic autonomy (Liu et al., 2025). Observations further noted that this iterative process of prompt-refinement and source-checking created a recursive learning loop, ensuring the

final academic products were not just technically accurate but intellectually grounded in verified scholarly literature.

### Lexicogrammatical Development and Communicative Proficiency through Media

A distinct and compelling thematic finding emerged regarding the participants' linguistic trajectory, specifically through the strategic convergence of communicative grammar and podcast-integrated exercises. As the thirty-seven students engaged rigorously with the shadowing technique, observational data captured a significant shift in their capacity to manage intricate lexicogrammatical structures during spontaneous classroom discourse. The educator's targeted use of instructional podcasts enabled students to perceive and subsequently replicate sophisticated academic vocabulary within a naturalistic context, directly compensating for the initial absence of background knowledge in language mechanics. The findings indicate that the "retelling" phase—wherein students produced video recordings to explain synthesized subject matter—served as a vital, observable verification of their internalized cognitive gains. This specific process ensured that students were not merely mimicking generative outputs but were constructing a genuine, lived speaking proficiency anchored in the twenty-five curated academic references (Suseno, 2023; 2024a). By calibrating podcast content to align with the students' evolving proficiency levels, the teacher successfully established an environment where grammar functioned as a practical tool for communication rather than a collection of abstract rules (Suseno, 2024e).

This holistic integration of reading, speaking, and listening competencies confirmed that multi-modal media is a non-negotiable component of contemporary digital pedagogy, particularly for learners navigating complex academic landscapes (Suseno, 2024b; 2024c). Analysis of the video recordings revealed a marked reduction in verbal hesitation and a heightened utilization of cohesive devices, suggesting a successful transition from a state of "not knowing" to one of "knowing and performing." This synthesis of auditory input and visual output allowed for the tracking of the precise moment when passive vocabulary acquisition transformed into active communicative competence. Consequently, the podcast served as both a primary information source and a stylistic template for the students' own academic expression.

The following table synthesizes the core findings of the study, mapping specific technological interventions to their pedagogical outcomes and the resulting cognitive shifts observed in the participants.

**Table 3.** Synthesis of Research Outcomes

Intervention Component	Primary Pedagogical Mechanism	Cognitive & Linguistic Outcome
Generative AI (Prompt Engineering)	Cognitive Scaffolding & Synthesis	Neutralized "Blank Page" syndrome; facilitated the creation of 10 unique subtitles and 5 distinct units.

<b>Intervention Component</b>	<b>Primary Pedagogical Mechanism</b>	<b>Cognitive &amp; Linguistic Outcome</b>
Instructional Podcasts	Auditory Shadowing & Reinforcement	Stabilized lexicogrammatical development and refined academic pronunciation and.
22-Step Procedural Workflow	Research Rigor & Structural Logic	prosody Facilitated the transition from superficial internet searches to 25 curated, APA-compliant references.
Multimodal "Retelling"	Knowledge Verification & Performance	Consolidated "not knowing" into confident, coherent, and authoritative academic discourse.
Teacher Intervention	High-Level Facilitation	Transitioned students from passive tool consumption toward a justice-oriented digital literacy.

## DISCUSSION

### Theoretical Realignment: From Knowledge Deficits to AI-Enhanced Autonomy

The central research question, concerning how educators effectively facilitate the construction of student background knowledge, finds its answer through the sophisticated lens of cognitive scaffolding. In this framework, the teacher functions as a deliberate bridge between the students' initial conceptual voids and the requisite academic competence. Theoretically, this inquiry suggests a paradigm shift wherein Artificial Intelligence is repositioned from a perceived "shortcut" or instrument of academic dishonesty to a "structural foundation" for intellectual inquiry. This transition aligns seamlessly with the burgeoning scholarly consensus that AI literacy is no longer an optional digital skill but a fundamental component of the modern pedagogical landscape (Liu et al., 2025). By meticulously guiding the thirty-seven participants through the nuances of prompt engineering, the teacher ensures that students do not remain passive consumers of generated text, but instead emerge as active architects of their own academic inquiry.

This study moves beyond the "deception" stereotype often associated with generative tools, illustrating how ethical, human-centered AI integration can foster academic integrity while simultaneously neutralizing the debilitating "blank page" syndrome (Sison et al., 2024). Analysis of student artifacts—such as the requirement for ten unique subtitles and five distinct units—reveals a paradox: when equipped with generative tools to synthesize complex topics, students are more likely to engage in the rigorous critical reading required to validate and refine those outputs. Consequently, the educator's role evolves into that of a high-level facilitator who manages the "mechanics of learning," ensuring that both female and male participants navigate the ethical challenges of technology with a sense of "justice and joy" (Budhai & Heath, 2025). Ultimately, the teacher's intervention transforms AI into a pedagogical partner that stimulates content mastery and a robust sense of ownership (Khan, 2024). This shift suggests that background knowledge is not "given" but "constructed" through a

technological dialogue mediated by expert oversight, effectively expanding the "Zone of Proximal Development" through structured digital intervention.

### **Auditory Scaffolding and the Internalization of Subject-Matter Vocabulary**

Constructing background knowledge is fundamentally a multi-sensory process; it requires an auditory-linguistic immersion that traditional, text-heavy teaching methods often overlook in university settings. This study demonstrates that instructional podcasts serve as a high-fidelity, accessible medium for developing "ear-to-mind" connections, which are essential for bridging cognitive gaps and fostering long-term retention. By implementing the shadowing technique within the classroom workflow, the teacher provides a practical, embodied framework for students to internalize the lexicogrammatical nuances of the subject matter—a process crucial for communicative grammar development and thematic fluency (Suseno, 2024a; 2024d).

Unlike rote memorization, which often lacks context and emotional resonance, this multi-modal approach allows students to hear and repeat authentic language in a structured manner, thereby stabilizing their cognitive focus during high-stakes discussion sessions (Suseno, 2024e). The analysis suggests that the "mechanic of learning" is significantly accelerated when students are given the opportunity to manipulate and retell audio content in their own voices. This confirms the efficacy of podcasts in developing speaking proficiency and critical listening skills simultaneously, ensuring students are actively "digesting" information for future application (Ali et al., 2024; Suseno, 2024f). Furthermore, integrating autonomous frameworks—such as social media-based audio sharing—reinforces the idea that deep learning occurs best when woven into the students' daily digital habits (Anjarwati, 2025; Suseno, 2023). This auditory reinforcement acts as a secondary layer of scaffolding that supports the visual data gathered from AI and Google Scholar. By the conclusion of the intervention, students demonstrated not just a theoretical understanding, but a "vocal confidence" and prosodic accuracy that allowed them to participate authoritatively in academic discourse. This suggests that the "auditory gap" is a significant, yet treatable, component of student background knowledge deficits.

### **Integrating Media Literacy and Research Rigor for Sustained Academic Growth**

The transformative progression from a state of conceptual "not knowing" to one of informed, critical academic discourse necessitates a level of research rigor that was meticulously facilitated in this study through the systematic application of Google Scholar and APA-compliant validation procedures. This research fundamentally demonstrates that an educator's assistance in constructing background knowledge is most effective and sustainable when it transcends mere information delivery to include the deliberate cultivation of media, digital, and ecological literacies (Hetvi, 2025). By requiring the thirty-seven participants to curate a minimum of twenty-five high-quality academic references, the teacher successfully transitioned the learning process from a localized classroom activity into a globalized scholarly context where students must defend their synthesis against established academic standards.

This practical inquiry highlights a crucial pedagogical insight: when students are challenged to eliminate redundancy and adhere to strict anti-plagiarism standards through structured drafting and a twenty-two-step procedural workflow, their critical thinking skills are not merely exercised but permanently enhanced. The results indicate that the multifaceted act of "retelling" research—whether through recorded video performances

or digital storytelling—facilitates a visual and kinesthetic interpretation of knowledge that traditional, linear essays often fail to capture (Suseno, 2025b; 2025c). This finding aligns with the innovative application of contemporary visual technologies, such as the strategic use of QR codes for instructional videos and mobile-first learning platforms, which maximize student engagement in a distracted digital age (Wu et al., 2025). By weaving together disparate technological threads, the teacher successfully constructs a "Digital-Pedagogy" that addresses the diverse needs of university students while preparing them for the intense ethical complexities of modern higher education (Ismael et al., 2025; Başaran, 2025).

Ultimately, the analysis concludes that background knowledge is best built when digital tools empower student voices through creative synthesis (Suseno, 2025d). This empowerment leads to a sense of "intellectual justice," where students previously marginalized by their lack of prior knowledge are provided the technological and pedagogical scaffolding to stand as equals in academic discourse. The integration of these rigorous research habits ensures that the students' growth is not a temporary achievement but a permanent acquisition of the inquiry skills necessary for lifelong learning in an AI-saturated world.

## CONCLUSION

This research meticulously demonstrates that the development of student background knowledge is not a static acquisition of facts but a dynamic, multidimensional process facilitated by the strategic convergence of AI-driven scaffolding, auditory reinforcement through podcasts, and rigorous digital research workflows. By transitioning the teacher's role from a traditional information provider to a high-level facilitator of the "mechanics of learning," the study successfully neutralized "blank page syndrome" for the thirty-seven college students, enabling a sophisticated shift from cognitive deficit to academic autonomy. The implementation of a twenty-two-step procedural workflow, supported by twenty-five APA-compliant references and generative prompt engineering, ensured that the participants moved beyond passive consumption toward an ethical, justice-oriented digital literacy. Furthermore, the integration of podcast-mediated shadowing provided a crucial sensory layer that stabilized lexicogrammatical development and allowed for the authentic retelling of complex subject matter. Ultimately, the findings confirm that when pedagogical intervention is grounded in multimodal synthesis and creative performance, students are empowered to bridge significant knowledge gaps, achieving a level of communicative proficiency and research rigor that aligns with the highest global academic standards.

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