

Scrolling into Vocabulary: Learning English Through Digital Authentic Materials Among Indonesian Senior High School Students

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Abstract. Vocabulary is a foundational component of second-language acquisition, yet the rich Digital Authentic Materials (DAM) that senior high school students consume daily remain pedagogically underused. This study investigated the process, challenges, and perceived outcomes of English vocabulary learning through DAM—YouTube, TikTok, podcasts, and social media—among students of SMA Negeri 3 Bogor, Indonesia. The study adopted a qualitative instrumental case-study design with an embedded quantitative component, in which qualitative inquiry was the dominant, priority strand and the limited quantitative data played a supporting, triangulating role. Data were gathered from 28 tenth-grade students through a structured questionnaire combining five-point Likert scales and open-ended items, and from an in-depth interview with one English teacher serving as a supporting informant. Quantitative data were analysed descriptively (means, standard deviations, and internal-consistency reliability), while qualitative data were analysed thematically following Braun and Clarke [24]. Findings show that YouTube and TikTok were the dominant platforms and that students engaged actively with DAM (composite $M = 3.95$, $SD = 0.59$), most often inferring meaning from multimodal context or consulting online dictionaries. Students perceived DAM as markedly different from textbooks ($M = 4.14$, $SD = 0.83$), valuing its engaging and audio-visual nature. The most frequently reported challenges were rapid speech and unfamiliar slang, while affective and access barriers were comparatively minor. Because the study included no vocabulary test, baseline, intervention, or comparison group, all outcomes are reported as self-reported perceptions rather than measured gains: perceived vocabulary development ($M = 3.59$, $SD = 0.63$) and perceived confidence ($M = 3.68$, $SD = 0.76$) were moderately positive, and students most often reported learning slang and informal conversational vocabulary. The teacher corroborated the contextual richness of authentic materials while emphasising difficulty calibration and the need for digital infrastructure and training. The study contributes context-specific evidence for DAM-based vocabulary pedagogy and offers practical guidance for teachers, schools, and teacher-education programs in the Indonesian context.

Keywords: case study; digital authentic materials; social media; vocabulary learning

I. INTRODUCTION

Vocabulary knowledge is a fundamental component of English language acquisition. Without an adequate vocabulary, neither receptive nor productive language skills can develop optimally [1]. At the senior high school level, English vocabulary mastery is a key determinant of students' success in academic communication, national examinations, and preparation for higher education and the global workforce. Nation [1], [2] distinguishes receptive knowledge recognising and understanding words while reading or listening from productive knowledge, the ability to use words actively in speaking and writing, and argues that full mastery integrates a word's form, meaning, and use.

The rapid development of digital technology has drastically reshaped how English-language content is consumed. Indonesian senior high school students now spend several hours each day on platforms such as YouTube, Spotify, Instagram, TikTok, and X, much of it in English [3]. These resources constitute Digital Authentic Materials (DAM): English-language content produced for native speakers rather than for pedagogical purposes, yet rich in contextual vocabulary.

Although such out-of-class, beyond-the-classroom exposure is now central to how young learners encounter English [4], the potential of DAM as a meaningful source of vocabulary learning has not been widely exploited pedagogically in Indonesian classrooms.

Digital authentic materials differ from conventional print authentic materials in several important ways: their instant and free availability, their multimodal nature (simultaneous text, image, audio, and video), their topical relevance to the culture and interests of Generation Z digital natives [5], and their capacity to deliver repeated, contextual language exposure [6]. These characteristics make DAM well suited to promoting incidental vocabulary acquisition. Empirically, learners who regularly consume English digital content show higher vocabulary attainment than those who do not [7]; captioned video supports incidental vocabulary acquisition more effectively than audio alone [8]; and regular podcast use supports EFL vocabulary and language development [9]. In the Indonesian context, prior work has begun to document the benefits of social-media platforms such as Instagram and TikTok for vocabulary learning [10]. Existing Indonesian studies, however, have typically examined a single platform in isolation and have emphasised motivation or engagement rather than the learning process itself; what remains scarce is in-depth, context-specific work that traces the process, challenges, and perceived outcomes of vocabulary learning across several DAM types simultaneously within one senior high school case. The present study addresses this specific gap; its contribution is understood as contextual and integrative rather than as a broad theoretical innovation.

SMA Negeri 3 Bogor was selected on methodological grounds consistent with instrumental case-study logic: it constitutes an information-rich setting in which students routinely engage with a range of English-language digital platforms, allowing the phenomenon of interest—DAM-based vocabulary learning—to be observed in a naturally occurring form, rather than being chosen merely for convenience or infrastructure. The study addresses four research questions: (1) How does the process of English vocabulary learning through DAM unfold among the students? (2) Which type of DAM is most used and perceived as most useful, and why? (3) What technological and linguistic challenges do students face? (4) What vocabulary-learning outcomes do students perceive from their use of DAM?

A. Vocabulary Learning in a Second Language

In second-language learning, vocabulary can be acquired both intentionally—through deliberate activities that explicitly target particular words—and incidentally, through rich exposure while reading or listening to authentic texts [11], [12]. These two pathways are complementary, and research on task-induced involvement indicates that the depth of cognitive and motivational engagement during an encounter, rather than mere exposure, governs how well new words are retained [13]. At the senior high school stage, learners have moved beyond basic vocabulary but still require systematic exposure to academic and semi-technical words to prepare for the demands of higher education, making the choice of appropriate vocabulary-learning strategies particularly consequential.

B. Digital Authentic Materials

Gilmore [14] defines authentic materials as texts created for genuine communicative purposes rather than purely for pedagogy. In the digital era this definition expands to encompass content produced and disseminated through digital platforms—Digital Authentic Materials. Darvin and Hafner [6] conceptualise DAM as multimodal target-language content produced digitally for native-speaker consumption, including YouTube videos, podcasts, social-media posts, online news, and discussion forums.

DAM offers multimodality, accessibility and affordability, cultural relevance to digital natives, and repeated authentic exposure through platform recommendation algorithms [15]. However, DAM also presents challenges: the high speed of spoken language, intensive use of slang and informal registers, unfamiliar cultural references, distractions from notifications and platform features, and potential filter bubbles that may narrow rather than expand lexical variety [16].

C. Empirical Evidence and Theoretical Framework

Research on technology and vocabulary acquisition has grown rapidly. Laufer and Maree [7] documented the contribution of out-of-classroom digital activities to L2 vocabulary; Kurokawa et al. [8] meta-analytically confirmed the advantage of captioned L2 video for incidental vocabulary acquisition; and Aprianto [9] reported that podcasts support EFL vocabulary and language learning. In Indonesia, Widiya and Salmiah [17] found that TikTok enhanced senior high school students' motivation and engagement in English vocabulary learning. The present study is framed by four complementary perspectives, each used analytically rather than merely confirmatorily and each linked to a specific research question: Nation's [2] four strands of vocabulary learning, which frame the balance between meaning-focused input and deliberate study (RQ1 and RQ4); Krashen's [18] comprehensible input, which motivates the analysis of why multimodal video supports contextual inference (RQ1 and RQ2); Vygotsky's [19] sociocultural theory of scaffolding, which frames students' coping and peer strategies (RQ3); and the Technological Pedagogical Content Knowledge (TPACK) framework [20], which situates the teacher's integration of DAM (RQ4). Together they position DAM as a source of meaning-focused input that must be appropriately scaffolded and pedagogically integrated.

II. METHOD

A. Research Design

This study employed a qualitative instrumental case-study design [21], [22] with an embedded quantitative component [23]; this single designation is used consistently across the abstract, method, results, discussion, and conclusion. Qualitative inquiry is the dominant, priority strand: the case—the use of DAM by students of class X-4 at SMA Negeri 3 Bogor—was examined to generate a contextualised understanding of technology-based vocabulary learning. The embedded quantitative data (Likert-scale ratings and platform-use information) played a subordinate, supporting role. The two forms of evidence were integrated at the interpretation stage for methodological triangulation: within each results subsection, the quantitative subscale means were used to characterise the overall profile of a theme (for example, the relative prominence of linguistic challenges), while the open-ended responses and the teacher interview supplied the meaning and explanation for that profile. Data collection, separate analysis of each strand, and final integration therefore proceeded from a common instrument blueprint to a merged narrative interpretation rather than in a sequential, results-driving order.

The design was deliberately cross-sectional and non-experimental: it involved no instructional intervention and no pre-test/post-test or delayed measurement of vocabulary size, and no comparison group. Consistent with the descriptive, meaning-oriented aims of an instrumental case study, vocabulary-learning outcomes were therefore captured as students' self-reported perceptions of their development and confidence rather than as objectively measured lexical gains. Accordingly, the quantitative figures reported below are interpreted descriptively as perceptions and associations, not as estimates of causal learning effects.

B. Participants and Setting

Participants comprised 28 tenth-grade students (class X-4) of SMA Negeri 3 Bogor, West Java, selected through purposive sampling. Eligibility criteria were current enrolment in English, adequate device and internet access, active

daily use of at least one English-language digital platform, varied self-reported English proficiency, willingness to participate fully, and written parental consent. The requirement of adequate device and internet access is a feature of the sampling frame that should be read carefully: it may have excluded students facing digital-access barriers, so the comparatively low access-related difficulty reported below may partly reflect the eligibility criteria rather than the broader experience of Indonesian senior high school students. This potential selection bias is acknowledged in the limitations. As a supporting informant, one English teacher who routinely uses authentic materials was interviewed to provide a pedagogical perspective; reliance on a single teacher is a further limitation discussed below, and the teacher's role and general experience are described without disclosing identifying details.

C. Instruments

Two principal instruments were used. The first was a structured student questionnaire administered via Microsoft Forms, combining closed items (single-choice, multiple-choice, and five-point Likert scales anchored from 1 = strongly disagree to 5 = strongly agree) with open-ended narrative prompts, organised into three domains aligned with the research questions: digital habits and the learning process, technological and linguistic challenges, and perceived outcomes. Sample Likert items included, for the engagement domain, "I actively try to understand new English words I meet in digital content," and, for the outcomes domain, "I feel my English vocabulary has developed through using digital content." The second instrument was a semi-structured teacher-interview guide covering perceptions of authentic materials, observations of student processes and challenges, and recommendations. Both instruments were derived from the research blueprint and, prior to use, were reviewed by the research team for content validity against the research questions; item wording was revised following that expert review. Given the small sample and the short, exploratory nature of the subscales, no separate large-scale pilot was conducted, which the authors acknowledge as a measurement limitation.

D. Data Collection and Analysis

Questionnaire responses were collected during May 2026, and the teacher interview was conducted and transcribed verbatim. Quantitative data were analysed descriptively using means and standard deviations, and the internal-consistency reliability of each Likert subscale was estimated with Cronbach's alpha. Qualitative data from the open-ended items and the interview transcript were analysed thematically following the six phases of Braun and Clarke [24]: familiarisation, initial coding, searching for themes, reviewing themes, defining themes, and reporting. Of the 28 respondents, the open-ended prompts yielded usable narrative responses that were sufficiently detailed for coding across all three domains; responses were written in a mix of Indonesian and English, and quotations originally provided in Indonesian were translated into English by the research team, with the original wording retained in the coding file. Initial coding was carried out by one researcher and independently reviewed by a second; disagreements were resolved through discussion until consensus was reached, and the first author maintained a reflexive record of interpretive decisions. Trustworthiness was further supported through source triangulation (closed items, open responses, and the teacher interview), thick description, and member-checking, in which preliminary theme summaries were returned to the teacher informant and to a subset of participating students; their comments led to minor clarifications of wording but no substantive change to the themes. Ethical safeguards included institutional permission from the school, informed parental consent, voluntary participation, and anonymisation through participant codes (students coded S01–S28; the teacher coded T).

Because all five subscales were short (four to eight items) and were administered to only 28 respondents, the Cronbach's alpha values in Table 1 are reported and interpreted cautiously. Three coefficients (.63, .68, and .69) fall below the commonly cited .70 threshold and are therefore best described as questionable, or at most minimally acceptable for

short exploratory scales, rather than as “good,” a point that applies most clearly to the four-item challenge-agreement subscale ($\alpha = .63$). Because alpha is sensitive both to the small number of items and to the limited sample size, these values are treated here only as rough indicators supporting descriptive, subscale-level interpretation, and item-level results are read in this conservative light throughout.

TABLE 1. Internal-consistency reliability of the Likert subscales (n = 28)

Subscale	Items	n	α	Interpretation
Digital engagement (process)	4	28	.68	Questionable
Challenge frequency	8	28	.69	Questionable
Challenge agreement	4	28	.63	Questionable / minimal
Vocabulary development (outcome)	4	28	.83	Good
Behaviour change (outcome)	4	28	.72	Acceptable

Note. Interpretation follows conventional cut-offs; coefficients below .70 are treated as questionable given the small item counts and sample size.

III. RESULTS

Exact descriptive statistics for all subscales and for selected individual items are summarised in Table 2; the narrative below reports these values rather than approximate ranges, and broader interpretation is reserved for Section V.

TABLE 2. Descriptive statistics for Likert subscales and selected items (n = 28)

Subscale / item (domain)	M	SD	Scale
Digital engagement (process)	3.95	0.59	1–5
Perceived difference from textbooks (process)	4.14	0.83	1–5
Challenge frequency	3.05	0.48	1–5
Challenge agreement	3.00	0.61	1–5
Linguistic-load items (rapid speech, slang)	3.2–3.4	—	1–5
Affective / access items	2.6–2.9	—	1–5
Perceived vocabulary development (outcome)	3.59	0.63	1–5
Perceived confidence gain (outcome)	3.68	0.76	1–5
Behaviour change (outcome)	3.28	0.69	1–5
Deliberate selection of content (lowest item)	2.86	—	1–5

Note. All items used a five-point Likert scale (1 = strongly disagree, 5 = strongly agree). Ranges are given where the row summarises several individual items.

A. The Process of Vocabulary Learning Through DAM

YouTube and TikTok were the most frequently reported single most-used English-language platforms (10 and 9 of 28 students, respectively), followed by podcasts (4), Netflix/streaming and Instagram (2 each), and one other platform (Figure 1). Daily consumption varied: 10 students reported one to two hours, 9 under one hour, 6 more than four hours,

and 3 between two and four hours, indicating that most students are regular but not necessarily heavy consumers of English digital content.

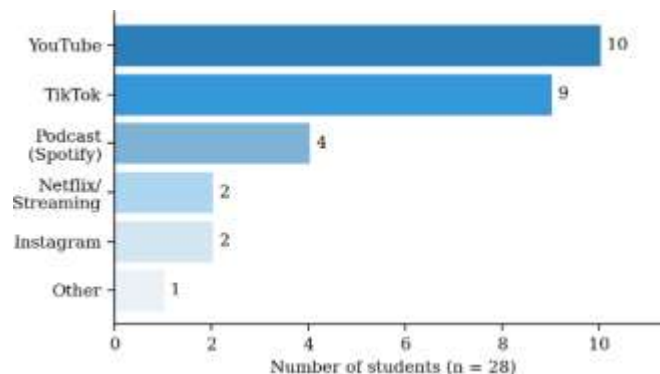


Figure 1. Most frequently used English-language digital platform (n = 28).

Students engaged actively with DAM as a learning resource, with the digital-engagement subscale producing a composite mean of 3.95 (SD = 0.59). When encountering an unknown word, the most common first response was inferring meaning from context (11 students) or immediately consulting an online dictionary such as Google Translate or Cambridge (10), while a smaller group activated subtitles or captions

(4). These patterns reflect a blend of incidental, inference-based learning and deliberate look-up strategies, consistent with the view that incidental and intentional pathways are complementary [2], [11]. The reliance on contextual inference is also evident in the qualitative accounts: one student (S07) described meeting the word “genuinely” in a YouTube video and inferring from the phrase “I’m genuinely happy for you” that it expressed sincerity before confirming the meaning, after which the word entered active use.

Students perceived learning vocabulary from digital content as markedly different from learning from textbooks (M = 4.14, SD = 0.83). When asked to name the greatest advantage of DAM, half (14 students) chose that it is “more interesting and enjoyable,” and 8 cited the supportive role of audio-visual modality, with smaller numbers valuing real usage context, everyday relevance, and anytime-anywhere access.

B. Most-Used and Most-Useful DAM

Triangulating the platform-use data with students’ narrative accounts, video-based platforms—YouTube and TikTok—were consistently identified as both most used and most useful for vocabulary learning. Students attributed this to the combination of authentic spoken language, on-screen captions, and replayability. Several described noticing specific, memorable words in video, such as “Absolutely” from a MrBeast video, “overwhelmed” and “struggle” from motivational content, and “serendipity” from audio platforms. Podcasts were valued by a smaller group for sustained, varied talk; one student (S19) noted that a podcast “talks about many things, not just that.” These self-reports are consistent with prior evidence that captioned video is conducive to incidental acquisition [8] and that audio content can support receptive vocabulary [9], though the present data reflect perceived usefulness rather than measured effectiveness.

C. Technological and Linguistic Challenges

Challenges were reported at moderate rather than severe levels overall (challenge-frequency composite M = 3.05, SD = 0.48; challenge-agreement composite M = 3.00, SD = 0.61). Among individual challenge items, the most frequently reported difficulties clustered around linguistic load—rapid speech and unfamiliar slang or informal

expressions—with item means of approximately 3.2 to 3.4, whereas purely affective and access-related barriers were lower (item means of approximately 2.6 to 2.9). The relative subscale positions are displayed in Figure 2. This profile indicates that, for these students—who by eligibility already had device and internet access—the principal reported obstacle was comprehending fast, idiomatic native-speaker language rather than accessing or navigating the technology itself; the low access-related difficulty should be interpreted in light of that sampling criterion.

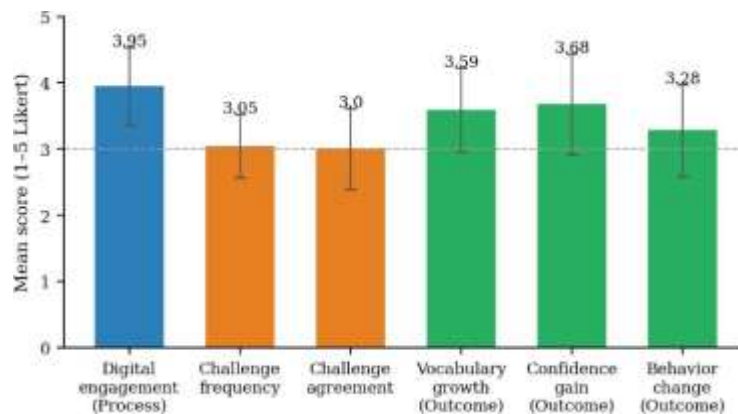


Figure 2. Mean Likert scores across process, challenge, and outcome subscales (dashed line = scale midpoint).

Students' coping strategies were predominantly self-regulatory and technological. When frustrated or confused, half (14 students) replayed the difficult segment, while others searched an online dictionary (7) or activated subtitles and auto-translation (6); only one switched to easier content. Peer support played a supplementary role, with most students reporting that they sometimes (11) or rarely (6) helped one another, and a smaller group doing so often or always (10 combined). The dominance of replaying and look-up over abandonment suggests resilient, strategic engagement that scaffolds comprehension—an everyday enactment of the scaffolding emphasised in sociocultural theory [19].

D. Perceived Vocabulary Outcomes

Students reported moderately positive perceived outcomes. The perceived-vocabulary-development subscale yielded a composite mean of 3.59 (SD = 0.63), and the perceived gain in confidence using English vocabulary was similar (M = 3.68, SD = 0.76). Because no vocabulary test or baseline was administered, these figures represent self-reported perceptions rather than measured growth. Open responses located these perceived gains in concrete communicative situations: understanding English without translating, speaking with friends, classroom participation and presentations, completing tasks, and interacting with tourists. One student (S12) explained that after extensive viewing and listening they could “understand the content without subtitles,” and another (S23) that they now felt confident “to speak or answer questions in class, especially when using new vocabulary that had been learned.”

The type of vocabulary students perceived themselves to have learned was decidedly informal. When ranking vocabulary types by how much they felt they had gained, students placed slang and popular informal expressions first (13 students) or everyday conversational vocabulary first (12), with academic/formal and idiomatic vocabulary ranked first by only 2 and 1 students, respectively (Figure 3). This skew toward informal registers is consistent with the entertainment-oriented content students consume and with findings that social media affords the development of informal, sociopragmatic, and audience-aware language [25]. It also signals a pedagogical gap: without guidance, DAM may under-develop the academic vocabulary that senior high school students most need for higher education.

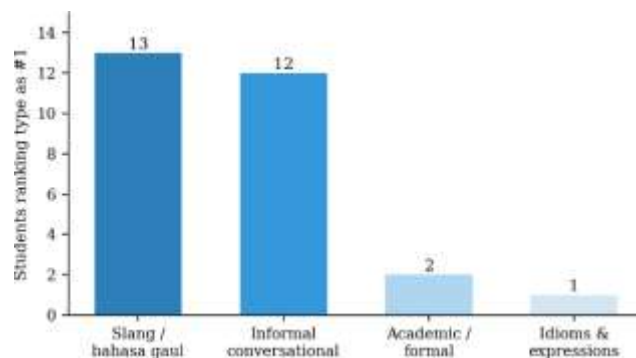


Figure 3. Vocabulary type ranked first (most perceived as learned) by students.

Finally, students reported that the experience modestly reshaped how they used digital platforms (behaviour-change composite $M = 3.28$, $SD = 0.69$), with the lowest item indicating that fully deliberate selection of English content for the explicit purpose of learning remained the least consolidated change ($M = 2.86$). Students thus increasingly recognised DAM's learning potential but had not all converted incidental consumption into systematic, goal-directed practice.

E. The Teacher's Perspective

The teacher interview corroborated and contextualised the student data. The teacher reported relying heavily on authentic materials drawn from the internet, treating the textbook as a supplement because its content is not always aligned with the target competencies of a given grade. Authentic materials were seen as more contextual, interesting, and relevant, and students were described as more engaged when given authentic, context-rich worksheets. At the same time, the teacher emphasised difficulty calibration: authentic language is sometimes too complex—owing to difficult vocabulary, complex sentence structure, or informal slang—and, if not adjusted to students' level, can reduce motivation. Consistent with the students' reliance on contextual inference, the teacher's most-observed and most-encouraged strategy was guessing meaning from sentence context, supported by hints, synonyms, and example sentences.

The teacher also identified conditions for effective DAM integration, calling for stable internet, projectors, speakers, and digital devices, together with reference resources and training on selecting, simplifying, and adapting authentic materials to the proficiency level of senior high school students. These observations map onto the TPACK framework [20], underscoring that the pedagogical value of DAM depends not on the materials alone but on teachers' capacity to integrate content, pedagogy, and technology, and on the institutional support that makes such integration feasible.

III. DISCUSSION

Taken together, the findings portray perceived DAM-based vocabulary learning as a largely incidental, self-directed, and affectively engaging process that students associate with moderate, mainly informal vocabulary development and a meaningful boost in communicative confidence. Interpreted through the study's frameworks, several patterns warrant closer analysis rather than mere restatement of the results.

First, why do students favour video-based DAM and report inferring meaning from it? Within Krashen's [18] comprehensible-input account, video platforms lower the threshold of comprehensibility by pairing spoken language with on-screen captions, visual context, and replay, so that meaning can be reconstructed from redundant cues. This

convergence of modalities plausibly explains why YouTube and TikTok were rated both most used and most useful, and why contextual inference rather than isolated look-up was students' dominant first strategy. The alignment between students' reliance on inference and the teacher's deliberate cultivation of context-guessing points to a shared, implicit pedagogy of inference that could be made explicit and systematic—arguably the study's most actionable observation [26].

Second, why does informal vocabulary dominate students' reported learning? The skew toward slang and conversational registers is best read not as an intrinsic property of DAM but as an interaction between content preferences and platform algorithms. Entertainment-oriented feeds, amplified by recommendation systems [15], concentrate exposure on informal, audience-aware language [25] and may produce filter-bubble effects that narrow rather than broaden lexical range [16]. Frequency of exposure and learner proficiency likely moderate this pattern: higher-proficiency students may be better positioned to extract academic vocabulary from the same input. On this reading, the informal skew is a curable pedagogical gap rather than a limitation of the medium itself.

Third, how do these results relate to previous work? The perceptions reported here are broadly consistent with evidence that out-of-class digital activity [7], captioned video [8], and podcasts [9] support L2 vocabulary, and with Indonesian evidence on TikTok's motivational role [17]. They differ, however, in an important respect: whereas several of those studies infer benefit from behavioural or test data, the present study documents students' perceptions across three DAM types within a single case and therefore cannot corroborate effectiveness directly. The manuscript's theoretical contribution is accordingly best characterised as contextual and integrative—assembling process, challenge, and perceived-outcome evidence for one Indonesian setting and reading it jointly through Nation's strands, comprehensible input, sociocultural scaffolding, and TPACK—rather than as a major theoretical innovation; the claim of novelty is deliberately moderated on this basis.

Finally, the TPACK-oriented teacher data suggest that realising DAM's potential depends on mediation. The chief limiting factors students reported were linguistic (speed and idiomaticity) rather than technological, and the chief unrealised opportunity is the transformation of incidental exposure into intentional, academically oriented learning. This translates the comprehensible-input and scaffolding traditions [18], [19] into a concrete instructional agenda for teachers.

A. Limitations

Several limitations qualify these findings. The study is single-site and cross-sectional, with only 28 students from one class and a single teacher informant, which constrains transferability and precludes any causal inference. Outcomes are self-reported and may be affected by social-desirability and recall biases and by students' limited ability to estimate their own vocabulary development accurately. Three subscales returned reliability estimates below .70 and the instruments were not separately piloted, so the quantitative results should be read as indicative rather than precise. The device-and-access eligibility criterion may have introduced selection bias, plausibly deflating reported access-related difficulty. Finally, because no objective vocabulary assessment was conducted, no measured gains can be claimed.

B. Implications and Suggestions

Practically, the results suggest that teachers curate level-appropriate DAM, make inference strategies explicit and teachable, and design follow-up tasks that channel incidental exposure toward academic vocabulary; that schools provide reliable digital infrastructure; and that teacher-education programs strengthen TPACK competencies. Implications directly supported by the present data—such as the need to scaffold inference—should be distinguished from proposals that require further testing, such as the expectation that structured DAM tasks measurably raise

academic vocabulary. Future research should incorporate objective vocabulary measures, larger and multi-site samples, and longitudinal or classroom-intervention designs to establish causal effects.

IV. CONCLUSION

This instrumental case study examined the process, challenges, and perceived outcomes of English vocabulary learning through Digital Authentic Materials among 28 tenth-grade students of SMA Negeri 3 Bogor, supplemented by a teacher's perspective. The reported process is dominated by video platforms (YouTube and TikTok) and characterised by active engagement that blends contextual inference with online look-up; students overwhelmingly perceive DAM as more interesting and multimodally supportive than textbooks. The principal reported challenges are linguistic—rapid speech and unfamiliar slang—rather than technological or affective, and students cope mainly by replaying content, consulting dictionaries, and enabling subtitles. Perceived outcomes were moderately positive for both vocabulary development and confidence, but the vocabulary students felt they gained was predominantly informal, and few reported using DAM in a fully deliberate, goal-directed way. These conclusions describe students' perceptions within a single class and school; they are not claims of measured improvement or of effects that generalise beyond the participating case. The study's contribution is a contextual, integrative account of DAM-based vocabulary learning in an Indonesian setting, and its central pedagogical implication is the need to combine informal digital exposure with structured, academically oriented vocabulary instruction. Future research incorporating objective measures, larger multi-site samples, and intervention or longitudinal designs is needed to establish causal effects.

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