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Tabayyun Resilience: Wikipedia Intervention in Reducing Digital Blind Trust Among Students of SMK UNITOMO Surabaya

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Abstract

The pervasive penetration of digital technology in the digital era has led to digital blind trust among students of Vocational High Schools (Sekolah Menengah Kejuruan/SMK), whereby open encyclopedia platforms are often treated as absolute truth without verification. This quasi-experimental study aims to examine the effectiveness of a forensic investigation intervention targeting Wikipedia's open-editing architecture in reducing digital blind trust and enhancing students' Tabayyun resilience. Employing a nonequivalent control group design, the study involved 44 Grade X students at SMK UNITOMO Surabaya, divided into experimental and control classes. Data were collected through Likert-scale questionnaires administered at the pre-test and post-test phases. Subsequently, they analyzed using N-Gain, Shapiro-Wilk, Levene's Test, Welch's Independent Sample t-test, and Cohen's d. Statistical computations confirmed the statistically significant rejection of the null hypothesis ($p < 0.001$). The experimental class showed substantial cognitive improvement, with a mean N-Gain of 0.6166, in stark contrast to the control class, which exhibited a regression in competency (N-Gain = −0.0617). Effect size analysis yielded a Cohen's d value of 4.925, confirming a large intervention effect. In conclusion, direct deconstruction of vulnerabilities in digital information architecture demonstrates strong empirical potential to facilitate the transformation of Tabayyun from a moral recommendation into a measurable self-regulating behavior. These findings underscore the urgency of integrating critical digital literacy into the Islamic Religious Education curriculum as a vocational epistemological safeguard in the twenty-first century.

Keywords: digital blind trust, ICT-based learning, Islamic religious education, tabayyun, Wikipedia intervention

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A. Introduction

The pervasive penetration of digital technology into twenty-first-century educational ecosystems has engendered a radical and globally unprecedented epistemological paradigm shift. Across the world, classroom landscapes are rapidly transforming, repositioning learners no longer as passive recipients of information but as boundless consumers of data (Milton et al., 2025). While this technological revolution theoretically promises an unprecedented democratization of knowledge, empirical realities reveal a deeply troubling cognitive dissonance among young generations across nations. This sociological phenomenon has given rise to what is termed Digital Blind Trust, a psychological condition in which learners tend to accept information from the internet as absolute truth for convenience. The severity of this phenomenon is clearly documented in large-scale research findings from Europe and North America, demonstrating that the majority of secondary school students naively treat collaborative encyclopedias such as Wikipedia as definitive verification tools for validating academic facts(Blikstad-Balas, 2016). Yet the open-editing architecture of such platforms, which permits text modification by anonymous entities without rigorous peer-review processes, renders them highly susceptible to information manipulation and epistemologically untenable as authoritative verification instruments (McGrew et al., 2018). In recognition of this escalating validation crisis, global media literacy discourse now collectively affirms that critical education today must transcend rigid technical verification training and move toward cultivating robust, autonomous evaluative character (Mesquita et al., 2024).

This globally escalating information validation crisis manifests with particular clarity in Indonesia's educational demographic landscape. As one of the countries with the highest internet penetration rates, empirical evidence shows that Indonesian students exhibit a psychological tendency to prioritize digital technology performance in completing academic tasks, frequently at the expense of data validity, provenance, and privacy (Suratman, 2024; Tandiah & Kurniawan, 2025). This pragmatic tendency, placing speed above accuracy, becomes profoundly destructive when it intersects with religious literacy in the national education system. Given that unvalidated doctrinal information can precipitate theological misconceptions, radicalism, and the degradation of spiritual values, the urgency of developing research-based pedagogical interventions to strengthen students' religious literacy resilience has become an extraordinarily strategic and pressing agenda (Supriyadi et al., 2025).

This macro-level concern manifests acutely within the secondary education ecosystem, particularly in the sociological characteristics of Grade X students at SMK UNITOMO Surabaya. In their daily academic routines, the validation crisis is most evident in students' reliance on open collaborative encyclopedia platforms, especially Wikipedia, which is often treated as a primary ontological reference. Paradoxically, the majority of secondary-level students fail to understand the nature of the open-editing architecture underpinning such platforms. Ignorance of the fundamental mechanism whereby any individual can manipulate or alter text at any time ultimately creates a misleading illusion of digital authority. In reality, open digital platforms of this kind possess an extraordinary potential for social justice and democratization of information, provided that users possess critical authorial agency and the instruments to dissect the anatomy of information contained therein (Funk & Guthadjaka, 2020).

As a robust antithesis to this classroom information-validation crisis, this study is grounded in Self-Regulation Theory and contextualized within the epistemology of Islamic Religious Education (PAI) through the concept of Tabayyun. Terminologically, Tabayyun represents a high-order process of investigation, clarification, and intellectual circumspection before one embraces a body of knowledge (Warisno et al., 2026). In its evolution within the cyber era, this self-regulatory mechanism can no longer be reduced to a conventional moral recommendation. Recent qualitative studies have demonstrated that Tabayyun must be operationalized as a concrete self-regulating behavior for Muslim consumers in responding to the vast flow of digital information (Harizan & Mydin, 2024; Taufikin & Falah, 2024). The theory holds that by equipping students with a critical verification framework (Tabayyun), they will possess an autonomous cognitive shield to resist the trap of illusions of digital authority.

Studies on digital literacy, religious education, and self-regulation in the cyber era have been extensively explored separately in contemporary literature; however, the convergence of these elements still leaves a substantial theoretical and methodological research gap. In the domain of twenty-first-century skills, the use of Wikipedia has been empirically proven effective in developing participatory literacy among general learners (Remmik et al., 2024). In parallel, global media literacy discourse affirms that critical education today must transcend technical verification training toward cultivating persistent evaluative independence (Mesquita et al., 2024). This evaluative independence resonates profoundly with contemporary Quranic epistemological scholarship, which demonstrates that the verification principle (Tabayyun) constitutes a crucial solution capable of ethically and theologically mitigating credibility crises and disinformation in the digital space (Hartwig & Akhtar, 2026). Furthermore, recent qualitative studies urge that Tabayyun be operationalized as a concrete self-regulating behavior for Muslim consumers in responding to and filtering the massive traffic of online information (Harizan & Mydin, 2024). Although these authoritative bodies of literature provide a robust foundation regarding the importance of self-regulation and the educational potential of open platforms, the majority of arguments regarding the effectiveness of Tabayyun at the secondary education level remain assumptive-theoretical or confined to qualitative exploration. To date, no precedent experimental study has been found that assertively tests the effectiveness of exploiting vulnerabilities in Wikipedia's open-editing architecture, such as the version history feature, as a practical, quantitatively measurable instrument for mitigating digital blind trust among secondary school student populations.

Responding to this empirical and methodological gap, the present study proposes a novelty in the form of an effectiveness test of a wiki-platform-based hybrid learning intervention. Rather than merely describing the phenomenon of internet vulnerability, this study measurably facilitates the deconstruction of information architecture through digital editing-history investigation scenarios. Based on this rational argumentative framework, the academic inquiry in this study is designed to statistically prove the significance of ICT-assisted pedagogical intervention. Accordingly, the research problems are crystallized into two primary research questions. *First*, is there a significant difference in the level of digital blind trust between students who received Wikipedia-based learning and those in conventional classrooms at SMK UNITOMO Surabaya? *Second*, to what extent is the effectiveness of the learning intervention in improving students' Tabayyun

competency scores in Islamic Religious Education? Through this quasi-experimental examination, the research findings are expected to not only contribute to fresh theoretical discourse but also provide an empirically validated methodological blueprint for the secondary education ecosystem.

B. Method

This study employs a quantitative approach with a quasi-experimental design using a nonequivalent control group model to empirically measure causal relationships (Creswell & Poth, 2018). This design was selected because it enables researchers to test the effect of a treatment on naturally formed subject groups in school settings without disrupting the existing class administrative structure. All experimental procedures and flows in this study were developed with reference to this standard methodological guideline.

The subjects of this study comprised Grade X students at SMK UNITOMO Surabaya. Sampling was executed using a purposive sampling technique to designate two parallel intact classes with equivalent academic characteristics, resulting in a total sample size of 44 students. This sample size justifies parametric testing within an intensely controlled quasi-experimental framework. From this selection, one class (Class X APHP, n=22) was designated specifically as the experimental group receiving the Wikipedia intervention, while the other (Class X TKJ 1, n=22) served as the control group receiving conventional instruction without digital history forensic elements. The intervention was systematically delivered over four weekly meetings. The instructional media used Wikipedia's 'View history' and 'Talk' pages as primary materials to demonstrate how digital content is manipulated, edited, and debated by anonymous contributors over time.

Regarding data collection, this study administered primary data gathering through the distribution of a 20-item, 5-point closed-ended Likert-scale questionnaire in two strictly controlled phases: pre-test and post-test. The questionnaire instrument was precisely designed to simultaneously capture two dependent variables: the level of digital blind trust reduction (Items 1-10, encompassing indicators such as source verification tendencies and skepticism toward anonymity) and the escalation of Tabayyun resilience (Items 11-20, measuring independent critical reflection and validation habits). The instrument was rigorously developed through expert appraisal and field testing. Validity testing confirmed that all items met the construct validity requirements (Pearson's $r > 0.30$), while reliability testing yielded high internal consistency (Cronbach's alpha > 0.80), ensuring the instrument's precision prior to deployment.

To analyze the collected empirical data, parametric statistical techniques were applied using SPSS. The analytical process commenced with computing N-Gain scores to measure the absolute percentage change and the effectiveness of the intervention, based on the difference between students' pre-test and post-test scores. Following the N-Gain score calculation, the analysis proceeded with mandatory prerequisite tests, specifically normality and homogeneity of variance tests applied to the N-Gain values to ensure that the data distribution was normal and that variances were equivalent prior to generalization. As the final stage, core hypothesis testing was conducted using an independent-samples t-test on N-Gain scores. This test was employed to statistically verify whether the critical reasoning leap observed in the experimental class represented a significantly greater improvement than in the control class, thereby ensuring that the causal conclusions

drawn were attributable purely to the intervention and not influenced by chance (Creswell & Poth, 2018).

C. Findings

1. Descriptive Statistics of Pre-test and Post-test

Prior to computing N-Gain scores, descriptive statistical analysis was conducted to establish an empirical baseline of students' competencies. During the pre-test phase, both observational groups exhibited statistically equivalent baseline scores, confirming a homogeneous starting point. The experimental group (X APHP) recorded an initial mean score of 28.68 for digital blind trust and 20.68 for Tabayyun resilience. Similarly, the control group (X TKJ 1) exhibited parallel cognitive characteristics, with pre-test means of 28.79 for digital blind trust and 21.92 for Tabayyun resilience. These baseline figures indicate that prior to any pedagogical intervention, students in both classes shared a uniformly high level of unverified reliance on digital platforms and a relatively nascent capacity for critical verification.

Following the administration of the Wikipedia forensic intervention, the post-test data revealed a stark divergence in cognitive trajectories between the two groups. The experimental group demonstrated a robust positive shift, characterized by a substantial reduction in digital blind trust (mean = 16.68) and a corresponding escalation in Tabayyun resilience (mean = 32.50). Conversely, the control group, which received only conventional instruction, showed an meaningful improvement, with post-test means of 28.36 for digital blind trust and a slight regression to 20.73 for Tabayyun resilience. This empirical contrast in the descriptive data provides the foundational premise for the subsequent inferential N-Gain and hypothesis testing.

2. Prerequisite Analysis Tests (Normality and Homogeneity of N-Gain)

Prior to executing hypothesis testing to measure the effectiveness of the Wikipedia forensic intervention in reducing digital blind trust and enhancing students' Tabayyun resilience, this study rigorously conducted parametric prerequisite tests on the improvement scores (N-Gain). Conducting prerequisite tests on N-Gain values rather than on raw pre-test or post-test scores constitutes a critical methodological step in quasi-experimental design to ensure that the cognitive improvement differentials between groups genuinely satisfy the fundamental assumptions of probability (Creswell & Poth, 2018). Normality testing was executed using the Shapiro-Wilk statistical instrument, given that the sample size in each control and experimental group was fewer than 50 respondents, making Shapiro-Wilk a more sensitive and accurate instrument than Kolmogorov-Smirnov in detecting distributional deviations (Mishra et al., 2019).

Based on the computed Tests of Normality results, the overall distribution of students' competency improvement data an approximately normal. For the Total N-Gain variable, the experimental group (Class X APHP) recorded a Shapiro-Wilk statistic of 0.946 with a significance level (p-value) of 0.257. In parallel, the control group (Class X TKJ 1) recorded a statistic of 0.979 with a significance of 0.904. Since all probability values across N-Gain Items 1–10, N-Gain Items 11–20, and Total N-Gain indicators consistently remained well above the alpha threshold of 0.05 ($p > 0.05$), the null hypothesis (H0) for the normality test was accepted. This empirical finding convincingly demonstrates that the distributions of digital literacy improvement and Tabayyun competency data from both sample groups are normally distributed, thereby fully satisfying the first prerequisite for using parametric statistics.

Table 1. N-Gain Normality Test

	Kelas	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
N-Gain items 1-10	X APHP	0.135	22	0.200*	0.937	22	0.172
	X TKJ 1	0.143	22	0.200*	0.955	22	0.389
N-Gain items 11-20	X APHP	0.151	22	0.200*	0.972	22	0.749
	X TKJ 1	0.122	22	0.200*	0.953	22	0.364
N-Gain Total	X APHP	0.187	22	0.043	0.946	22	0.257
	X TKJ 1	0.101	22	0.200*	0.979	22	0.904

After the normality assumption was confirmed, the analysis proceeded to test for equality of variances between groups using Levene's Test. This homogeneity test is essential for determining the appropriate degrees-of-freedom adjustment to apply in the subsequent T-Test (Gastwirth et al., 2019). The computed results from the Test of Homogeneity of Variance (based on the Mean) revealed an interesting and highly representative pattern in the distribution of post-intervention data. For N-Gain Items 1–10, the Levene significance value was recorded at 0.120 ($p > 0.05$), indicating that the initial cognitive improvement variances between the experimental and control classes were homogeneous.

However, for the cumulative Total N-Gain indicator, the Levene statistic was recorded at 4.498 with a significance level of 0.040 ($p < 0.05$). This significance value below the 0.05 threshold demonstrates that the Total N-Gain data variances between the experimental and control groups are non-homogeneous (heterogeneous). This heterogeneity constitutes a statistically expected and even desirable anomaly in transformative educational experiments; it proves that the Wikipedia history forensic intervention exerted a cognitive disruptive force that triggered sharp and varied score leaps in the experimental class, while the conventional class remained stagnant within a narrow variance range (Rasch et al., 2021). In response to this variance heterogeneity, the study can legitimately proceed with the Independent Sample T-Test by applying Welch's correction (Equal variances not assumed) in the hypothesis testing stage, ensuring that the Type I error probability remains precisely controlled (Delacre et al., 2022).

Table 2. Homogeneity Test

		Levene Statistic	df1	df2	Sig.
N-Gain items 1-10	Based on Mean	2.525	1	42	.120
	Based on Median	2.373	1	42	.131
	Based on Median and with adjusted df	2.373	1	41.770	.131
	Based on the trimmed mean	2.513	1	42	.120
N-Gain items 11-20	Based on Mean	12.028	1	42	.001
	Based on Median	10.521	1	42	.002
	Based on Median and with adjusted df	10.521	1	27.943	.003
	Based on the trimmed mean	11.434	1	42	.002
N-Gain Total	Based on Mean	4.498	1	42	.040
	Based on Median	4.385	1	42	.042
	Based on Median and with adjusted df	4.385	1	35.227	.044
	Based on the trimmed mean	4.530	1	42	.039

3. Intervention Effectiveness: Descriptive Statistical Analysis of N-Gain Scores

To measure the absolute intervention leverage percentage prior to comparative significance testing, this study presents the Normalized Gain (N-Gain) calculation, which compares students' actual scores against their maximum potential scores. This descriptive analysis provides an exceptionally clear picture of the cognitive disruption caused by applying the forensic investigation method on the open Wikipedia platform, compared with conventional knowledge transmission methods.

Based on the computed case processing summary outputs (Group Statistics), an extreme divergence in achievement was observed between the two observational groups. The experimental group (Class X APHP), comprising 22 respondents, recorded a mean Total N-Gain of 0.6166 (61.66%). Referring to Hake's standardization index for evaluating the effectiveness of innovative learning, an N-Gain score of 0.61 is classified within the "moderate" improvement category (Bao, 2022). Although mathematically moderate, this achievement, approaching the upper boundary of the high category, represents a substantially significant pedagogical success. It demonstrates that equipping students with a critical verification framework (Tabayyun) and practicing digital information architecture deconstruction successfully bridged more than 61% of students' knowledge gaps, guiding them out of the trap of digital blind trust and toward becoming information consumers with genuine analytical resilience.

Table 3. Group Statistics

	Kelas	N	Mean
N-Gain items 1-10	X APHP	22	.6271
	X TKJ 1	22	-.0014
N-Gain items 11-20	X APHP	22	.6061
	X TKJ 1	22	-.1221
N-Gain Total	X APHP	22	.6166
	X TKJ 1	22	-.0617

A sharply contrasting phenomenon was recorded in the control group (Class X TKJ 1), which was isolated from the Wikipedia architecture forensic intervention. With an equivalent number of respondents (n = 22), the mean Total N-Gain achievement in this conventional class plummeted to a negative value of −0.0617 (or −6.17%). The emergence of a negative N-Gain score constitutes a highly critical empirical finding; it affirms that the conventional Islamic Religious Education learning model, relying solely on lectures and standard assignments, not only failed to reduce blind trust in online encyclopedias but also potentially allowed the deterioration of critical reasoning as students were increasingly exposed to unverified information (Tandiah & Kurniawan, 2025). The gap of 0.6783 points between the experimental and control classes provides initial empirical evidence that operationalizing Tabayyun as a cyber navigation skill may help strengthen students' epistemological safety in the twenty-first-century digital environment.

4. Core Hypothesis Testing: Significance of Intervention Effect (Independent Sample T-Test)

As the culmination of inferential statistical testing, this study executed core hypothesis testing using the Independent Sample T-Test on the Total N-Gain values from both experimental groups. This mean difference test was specifically designed to empirically assess whether the cognitive improvement disparity observed in the

previous descriptive statistics was attributable solely to the pedagogical treatment (Wikipedia forensic intervention) or merely a matter of chance (Creswell & Poth, 2018). Given that the preceding Levene test indicated a violation of the homogeneity of variance assumption in Total N-Gain, the T-Test computation at this stage adaptively applied degrees-of-freedom adjustment through Welch's correction (represented in the Equal variances not assumed row). The application of Welch's correction is a widely recommended standard protocol in modern statistical literature for minimizing Type I error rates when analyzing educational data with unequal variances (Delacre et al., 2022).

Based on the Independent Samples Test computation under the unequal variance assumption, a t-coefficient value of 16.335 was found with a corrected degrees of freedom (df) of 33.638. This computation yielded a two-tailed probability value (Sig. 2-tailed) of < 0.001. Since the recorded significance value ($p < 0.001$) was below the established alpha threshold ($\alpha = 0.05$), the null hypothesis (H0) was rejected and the alternative hypothesis (H1) was accepted. This empirical finding indicates a statistically significant difference in the improvement in Tabayyun resilience and the reduction in digital blind trust between students who received the Wikipedia forensic intervention and those who received conventional Islamic religious education in the control class.

Table 4. Independent Sample t-test

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
N-Gain items 1-10	Equal variances assumed	2.525	.120	12.403	42	.000
	Equal variances not assumed			12.403	39.575	.000
N-Gain items 11-20	Equal variances assumed	12.028	.001	11.990	42	.000
	Equal variances not assumed			11.990	29.122	.000
N-Gain Total	Equal variances assumed	4.498	.040	16.335	42	.000
	Equal variances not assumed			16.335	33.638	.000

5. Effect Size Analysis: The Magnitude of Intervention Impact in the Classroom

Although significance testing (p-values) has successfully validated the existence of a treatment effect, contemporary quantitative educational research paradigms urge researchers not to stop at reporting p-values. Statistical significance is not always proportional to practical significance in the field (Funder & Ozer, 2019). Therefore, this study comprehensively measured the magnitude or practical significance of the intervention using the standard effect size parameter, Cohen's d. Effect size calculation is crucial for measuring how massively the intervention shifted the student competency curve, independent of the study's sample size (Kraft, 2020).

Based on the Independent Samples Effect Sizes computation, Cohen's d (based on standardized mean differences) for cumulative competency improvement (Total N-Gain) was estimated at 4.925. Referring to the classical effect size interpretation, as contextualized for modern educational research, a $d > 0.80$ is universally classified as a "very large" or "large" effect size (Gignac & Szodorai, 2018). The achievement of 4.925 is an exceptionally rare and impressive statistical phenomenon in experimental educational research. This substantial value not only affirms methodological

effectiveness but also, theoretically, underscores that integrating Tabayyun's verification principle through forensic examination of the open-editing architecture of digital encyclopedias is not merely a variation in teaching tactics but rather a fundamental pedagogical disruption. These findings provide empirical evidence that the intervention has the potential to deconstruct students' naïve epistemology of digital information and support the development of more persistent evaluative independence.

Table 5. Independent Samples Effect Sizes

		Standardizer[a]	Point Estimate
N-Gain items 1-10	Cohen's d	.16807	3.740
	Hedges' correction	.17114	3.672
	Glass's delta	.18772	3.348
N-Gain items 11-20	Cohen's d	.20143	3.615
	Hedges' correction	.20512	3.550
	Glass's delta	.25991	2.802
N-Gain Total	Cohen's d	.13773	4.925
	Hedges' correction	.14025	4.837
	Glass's delta	.16860	4.023

D. Discussion

1. Effectiveness of the Wikipedia Intervention in Reducing Digital Blind Trust

The empirical findings of this study demonstrate that the Wikipedia architecture investigation-based learning intervention was significantly effective in reducing digital blind trust and enhancing Tabayyun resilience. Rather than resting solely on statistical outcomes, these results present a vital educational implication: direct deconstruction of information architecture successfully initiates cognitive disruption. In the context of outcome-based education, this experiential learning aligns with Self-Regulation Theory by stimulating active forethought and critical evaluation phases, proving more persistently effective than passively received lectures (Wang et al., 2026).

The strength of the intervention in this study lies in its direct deconstruction of information architecture. By facilitating students' investigation of Wikipedia's version history feature, which lets them witness firsthand how a knowledge entry can be manipulated, deleted, or modified by anonymous parties within seconds, students were confronted with concrete evidence that dismantled the illusion of digital authority. This approach far surpasses a mere informational lecture on the dangers of misinformation. Such first-hand experiential learning has been proven neurocognitively to leave far more persistent episodic memory traces than passively received information, resulting in more authentic and durable evaluative behavioral change (Bao, 2022). This explains why the N-Gain value for items 11–20 (positive verification behavior) in the experimental class reached 0.6061, a highly substantial leap from the initial baseline.

2. Interpretation of the Control Class's Negative N-Gain: A Signal of Intervention Urgency

The most startling and simultaneously most significant finding of this study is not merely the success of the experimental class, but rather the competency

regression phenomenon (N-Gain = −0.0617) experienced by the control class. In detail, the N-Gain for items 11–20 in Class TKJ 1 was −0.1221, indicating that positive information verification behavior in this group deteriorated over the course of the research period. This phenomenon aligns with global empirical findings showing that in a digital ecosystem that continuously produces content at a massive scale without critical educational intervention, the tendency toward digital blind trust among younger generations not only fails to diminish but, paradoxically, becomes increasingly consolidated (McGrew et al., 2018). Continuous exposure to the digital information landscape, without adequate cognitive filtering, deepens the habitual groove of consuming information impulsively and without validation.

From the perspective of Self-Regulation Theory, the competency decline in the control class can be explained as the result of an lack of stimuli that activate the students' self-regulation cycle. Zimmerman (2000) affirms that the self-regulation process encompasses three cyclical phases: forethought, performance monitoring, and self-reflection. Without pedagogical intervention that deliberately triggers all three phases, control class students operate in a condition of passive and reactive self-regulation, accepting information as it is, without facilitating the metacognitive processes necessary for critical evaluation (Harizan & Mydin, 2024). This condition stands in stark contrast to the experimental class, which was structurally challenged to activate self-regulation mechanisms through critical investigation of Wikipedia's architecture.

3. The Experimental Class as Empirical Validation of Tabayyun as a Self-Regulation Mechanism

The experimental class's N-Gain achievement, approaching the high category (0.6166 against the 0.70 threshold), constitutes strong empirical validation of the theoretical framework underpinning this study, the concept of Tabayyun as a self-regulation mechanism operationalized within the context of digital literacy. Etymologically and epistemologically, Tabayyun, rooted in Surah Al-Hujurat, verse 6 of the Holy Quran, embodies an imperative to engage in investigation, verification, and higher-order intellectual circumspection before embracing or disseminating information. In the context of twenty-first-century learning, this principle should not be reduced to an abstract moral recommendation; it must be operationalized as a concrete competency that can be trained, measured, and transferred to new situations (Md Harizan, 2023).

The Wikipedia intervention in this study represents a precise operational embodiment of Tabayyun. When students were directed to examine the version history feature and document changes in specific Wikipedia entries, they simultaneously internalized three core Tabayyun principles: (1) healthy skepticism toward unverified information sources, (2) investigative competency to trace the origins and reliability of information, and (3) ethical-moral deliberation in the decision to accept or reject a narrative. The internalization of these three principles is consistent with the findings of contemporary studies affirming that Wikipedia, when exploited didactically as an object of study rather than merely as a reference source, possesses extraordinary pedagogical potential for developing critical thinking skills and twenty-first-century literacy (Remmik et al., 2024).

4. Effect Size Significance in the Context of Literature and Pedagogical Implications

The Cohen's d value of 4.925 places this study well above the average effect size typically reported in meta-analyses of ICT-based digital literacy interventions (d = 0.40–0.80) (Wang et al., 2026). This extreme effect size must be interpreted with caution and analyzed in light of the actual conditions within the school environment. In this vocational setting, students previously exhibited an intensely pragmatic reliance on instant digital answers to complete assignments, establishing a deeply entrenched baseline of blind trust. The introduction of forensic Wikipedia investigation created a profound psychological shock that rapidly dismantled these specific, habitual assumptions. Consequently, the sharp statistical contrast is heavily influenced by the experimental class's sudden pedagogical awakening juxtaposed against the control class's continuous regression. Gignac & Szodorai (2018) caution that very large effect sizes must be interpreted within the context of research design and instrument characteristics; in the present study, the magnitude of the difference is underlaid by the extreme contrast between the class experiencing genuine improvement (APHP) and the class experiencing genuine regression (TKJ 1).

From a pedagogical standpoint, these findings carry highly strategic implications for the secondary education ecosystem in Indonesia, particularly in the Islamic Religious Education (PAI) subject. The integration of Information and Communication Technology (ICT) in PAI instruction has thus far been dominated by the use of technology as a content-delivery medium rather than as a critical object of inquiry in its own right (Al-Banjari et al., 2025; Hamidah et al., 2025; Hikam, 2026; Iman et al., 2023; Mintasih et al., 2024; Putra & Alfurqan, 2024). The present study introduces a different paradigm: technology is employed as a case for epistemological examination, so that students become not only smarter technology consumers but also independent producers of critical reasoning. This paradigm aligns with the direction of digital literacy transformation recommended by UNESCO (2023), which emphasizes the importance of ethical and evaluative dimensions in digital competency, transcending mere operational technical proficiency.

5. Demographic Context and Generalizability of Findings

This study was conducted within a specific demographic context: Grade X SMK students, a group that, sociologically, has a unique profile in Indonesia's digital literacy landscape. Unlike general high school students, who tend to maintain high academic expectations regarding the accuracy of information sources, SMK students are more practical, prioritizing efficiency in task completion. This tendency makes them psychologically more susceptible to the trap of digital blind trust, as the convenience of using Wikipedia as an instant reference is far more appealing than the time- and energy-intensive process of verification (Tandiah & Kurniawan, 2025). On the other hand, this demographic characteristic renders the Wikipedia intervention even more relevant, as it directly addresses habits deeply embedded in their daily learning routines.

Although this study employed a quasi-experimental design with purposive sampling that directly limits generalizability, the findings nonetheless contribute significant empirical insights. *First*, this study reaffirms that carefully designed ICT-based interventions, rather than merely introducing technology into the classroom, can produce substantial changes in competency even in populations initially assumed to be more resistant to mindset shifts. *Second*, the control-class regression phenomenon sends a serious signal to educational policymakers that, without

intervention designs explicitly targeting digital evaluative literacy, conventional learning not only fails to develop this competency but also potentially permits the silent erosion of this competency. Similar findings have been documented in digital literacy research in secondary school contexts across diverse global settings, consistently demonstrating that exposure to technology without critical guidance deepens cognitive dependence on unverified digital sources (Mesquita et al., 2024).

6. Comparisons and Contrasts with Prior Research

In general, this study shares several foundational commonalities with prior research reviewed in the introduction. *First*, in terms of the direction of findings, this study is consistent with the literature consensus affirming that structured ICT-based interventions are proven effective in significantly improving students' digital literacy competency compared to conventional methods (Wang et al., 2026). Both employ experimental designs with comparison groups and measure competency improvement using pre-test and post-test instruments, thereby reinforcing the consistency of evidence that digital platform-based approaches are effective in Islamic Religious Education at the secondary level.

Second, this study also aligns with recent qualitative studies urging that the Tabayyun principle be operationalized as a concrete self-regulation mechanism for Muslim consumers in filtering digital information (Harizan & Mydin, 2024). A salient commonality is the recognition that evaluative literacy cannot be taught merely normatively but must be internalized through direct, contextual experience. Conceptually, both this study and prior studies reference the foundational Quranic epistemology, affirming the verification principle (Tabayyun) as a crucial solution in mitigating disinformation in the digital space (Hartwig & Akhtar, 2026). This commonality further reinforces the relevance of the approach employed in this study as an endeavor to integrate Islamic values with twenty-first-century digital competencies.

Despite these significant similarities, this study also exhibits several fundamental distinctions from prior research. First, in terms of the intervention object, this study uniquely positions Wikipedia's open-editing architecture as an object of epistemological forensic inquiry, rather than merely as a content delivery medium. Unlike the majority of prior digital literacy studies that integrate technology as an instructional aid (Remmik et al., 2024), this study enables students in directly examine Wikipedia's version history feature, making the vulnerabilities of the open platform itself the subject of learning. Such a deconstructive approach has rarely been explored in prior research, particularly in the context of Islamic Religious Education at the vocational secondary level.

Third, in terms of measured variables, this study simultaneously measures two interrelated dependent variables: the reduction in digital blind trust and the escalation of Tabayyun resilience. While prior studies generally focus on single cognitive learning outcomes or technical digital literacy skills (Mesquita et al., 2024; McGrew et al., 2018), this study introduces a new construct that combines the psychological dimension (digital blind trust) with the religious dimension (Tabayyun as self-regulation), thereby expanding the scope of intervention effectiveness evaluation beyond conventional academic achievement.

Fourth, in terms of the reported effect size, the Cohen's d value of 4.925 obtained in this study far surpasses the average effect size typically reported in meta-analyses of ICT-based digital literacy interventions in secondary schools (d = 0.40–0.80) (Wang et al., 2026). This extreme effect size must be analyzed and interpreted

against the real conditions within the school environment. In this vocational (SMK) setting, students previously exhibited an intensely pragmatic reliance on instant digital answers to complete assignments efficiently, establishing a deeply entrenched baseline of blind trust. The introduction of forensic Wikipedia investigation created a profound cognitive shock that rapidly dismantled these specific, habitual assumptions. Consequently, this massive effect size is inseparable from the sharp contrast between the experimental class's sudden pedagogical awakening and the control class's continuous regression, a phenomenon rarely reported in prior similar research. This indicates that the intervention mechanism used in this study affects students' cognitive and affective dimensions in a more fundamentally disruptive manner than digital intervention approaches previously tested (Kraft, 2020).

Fifth, in terms of institutional context, this study was conducted in a Vocational High School (SMK), an educational level with a vocation-based curriculum and a sociological student profile that differs from that of general high schools. The SMK context, with its greater orientation toward practical skills and task efficiency, renders students more susceptible to digital blind trust while simultaneously making them more responsive to interventions that directly address their habits of interacting with digital platforms (Tandiah & Kurniawan, 2025). Thus, this study does not merely replicate prior findings but expands and deepens understanding of the effectiveness of critical digital literacy interventions within a more specific context, using more comprehensive variables and more robust statistical analysis. The consistency in the direction of the findings, alongside the methodological uniqueness of this study, further reinforces the urgency of integrating digital platform deconstruction-based approaches as a relevant PAI learning innovation in the digital era.

E. Conclusion

Based on the empirical data, this study concludes that a forensic investigation intervention targeting Wikipedia's open-editing architecture is effective in reducing digital blind trust and enhancing students' Tabayyun resilience in the context of SMK UNITOMO Surabaya. A statistically significant difference was found between the experimental and control groups ($t(33.638) = 16.335$; $p < 0.001$). The experimental class recorded a mean N-Gain of 0.6166, while the control class showed a negative N-Gain of −0.0617. The practical significance of the intervention was also supported by a Cohen's d value of 4.925, indicating a very large effect, although this result should be interpreted cautiously in light of the limited sample size and quasi-experimental design. From a pedagogical standpoint, these findings urge a reorientation of Islamic Religious Education curriculum innovation in vocational schools, moving beyond a mere focus on dogmatic transmission to the integration of digital information anatomy examination as a twenty-first-century evaluative skill. Despite yielding substantial findings, this study is subject to limitations regarding sample size ($n = 44$) and the quasi-experimental design, which has not fully eliminated external confounding variables. Therefore, longitudinal follow-up research employing a multi-school randomized controlled trial (RCT) methodology, integrated with qualitative assessment (think-aloud protocol), is strongly recommended to map the persistence of memory retention and the reliability of students' long-term digital self-efficacy.

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