PAKISTAN JOURNAL OF LINGUISTICS

ISSN: 2709-7919 [e] 2709-7900 [p] Volume 7 Issue 2, 2026

UNCOVERING THE AI PARADOX IN UNDER-RESOURCED ESL CONTEXTS: QUANTIFYING LEARNER ADOPTION, AUTONOMY, AND DEPENDENCY

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Keywords
artificial intelligence, ESL learning, cognitive offloading, learner autonomy, AI dependency, South Punjab, digital pedagogy, Global South, higher education

Article History
Received: 28 April 2026
Accepted: 14 June 2026
Published: 29 June 2026

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Abstract

This present study quantifies the divergent trends of the use of artificial intelligence (AI) tools, development of learner autonomy, and cognitive dependence of English as a Second Language (ESL) learners and teachers in under-resourced higher education institutions (HEIs) of South Punjab, Pakistan. This study adopted a descriptive survey design, validated instrument with 30 items on a Likert scale (Cronbach's α = .86), and data obtained from 80 respondents comprising 60 students and 20 ESL teachers from public and private universities in Multan and Dera Ghazi Khan during the academic year 2025–2026. The results show that 83% of students and 90% of teachers are active AI users, but there is a clear Monoculture Trap present as 88% of students primarily use ChatGPT with 65% of teachers. An independent samples t-test was used to confirm the difference between autonomy and dependency as being statistically significant (d = 0.91). A regression analysis revealed that the frequency of use of AI accounted for 45% of the variance in dependency scores (R^2 = .45, $p < .001$); and there was a significant Pearson correlation between frequency of use of AI and dependency scores ($r = -.75$, $p < .001$) with a strong negative relationship. In all measures of critical thinking, students rated the role of AI in critical thinking lower than teachers, suggesting metacognition of the limitations of technology and over-reliance. This study suggests two measurable constructs, learner autonomy and AI-dependency, that are operationalized at the researcher level and can be used to ESL contexts in the Global South that are mediated by AI. The Triple-A Pedagogical Framework (Access, Audit, and Apply) is suggested to be a scalable, evidence-based model for integrating AI into the classroom without sacrificing crucial language skills. Recommendations are provided for curriculum planners, institutional administrators and policymakers in education settings where resources are limited.

1. INTRODUCTION

1.1 Background of the Study

The AI is one of the most impactful educational changes of the 21st century. In fact, large language models (LLMs) such as ChatGPT, Google Gemini, and Meta AI provide immediate feedback, text generation, grammatical corrections, and language translation in quantities and speed never before possible, transforming the way people learn languages. These are always available, one-to-one

ISSN: 2709-7919 [e] 2709-7900 [p] Volume 7 Issue 2, 2026

tutors that may help reduce the structural differences between well-resourced and under-resourced education systems (Holmes et al., 2019) for English as Second Language (ESL) learners worldwide. The global recommendations for education are broad, and there is a need to quickly assess the impact of these tools to avoid the passivity of technology and not to jeopardize real learning (UNESCO, 2024).

The case of higher education in Pakistan is a clear illustration of the difficulties and complexities associated with this digital transformation. The country already has more than two million students enrolled in universities, but there is still a significant disparity in provision between metropolises in the city and rural areas (Bond, 2023). One such under-resourced area is South Punjab consisting of Multan, Bahawalpur and Dera Ghazi Khan. The context for teaching ESL is often congested, with student/teacher ratios that often exceed 45:1, the digital infrastructure is often unstable, teacher professional development is limited and there is little authentic English language input outside of class. In this structural context, AI tools have evolved from being supportive tools to critical bridges in the learning continuum, filling structural gaps that institutions cannot cover.

The educational AI has seen unparalleled exponential growth globally, with many of the platforms being generative AI (Cotton et al., 2024). At the end of 2025, ChatGPT was the most popular generative AI interface for both developed and developing education, boasting hundreds of millions of weekly active users (Chan, 2025). In Global South countries, the spread of mobile devices is seen as a key driver of AI adoption, whereas it is not as much in developed countries as it is in the Global South (Lo, 2023). The level of ownership of smart phones among the University enrolled students is very high in semi-urban area and their usage ecology is informal, unstructured and not controlled by the pedagogical policy (Malik, 2024).

1.2 Problem Statement

While AI has made its way into ESL classrooms in South Punjab, there is a significant empirical gap regarding how AI affects the learner autonomy–dependency continuum of students as compared to teachers. These two groups use AI differently, for different purposes, at different frequencies, and with different tools, and for different pedagogical intentions. But, the literature available has either considered them as a single category or studied one group without considering the other. The key empirical challenge is to identify, for each population separately, if AI is functioning as a cognitive scaffold for learning or as a crutch for task completion and what structural and pedagogical factors are in between opines Susnjak (2024).

1.3 Purpose of the Study

This study aims to explore and contrast, quantitatively, the diverging trends of the use of AI tools, learners' autonomy and cognitive dependence of ESL students and their teachers in the under-resourced higher education institutions in South Punjab, Pakistan. The study seeks to answer the question of whether AI can be a cognitive scaffolding tool for real learning or a crutch for doing tasks. Moreover, the study aims to quantify the statistics of the correlation between usage frequency and dependency, to determine structural versus professional barriers, and provide an evidence-based pedagogical framework to reduce cognitive offloading in resource-limited educational environments.

1.4 Research Objectives

This study aims to:

1. To assess and compare the extent, variety and frequency of the use of AI tools by ESL students and teachers.
2. To assess whether this relationship was the same in the two groups.
3. To identify and classify barriers for effective integration of AI in structure, economy and profession.

ISSN: 2709-7919 [e] 2709-7900 [p] Volume 7 Issue 2, 2026

4. To assess differential student and teacher perceptions of the impact of AI on language learning in several aspects.

1.5 Research Questions

This study answers the following research questions:

1. What are the differences in the diversity of AI platforms and frequency of use between ESL students and teachers?
2. Is there a correlation between the frequency of AI use and cognitive dependency? What are the autonomy-dependency relationships between both groups?
3. What are some structural, economic, and professional obstacles to AI use that exist between students and teachers?
4. What are the differences between students' and teachers' perceptions of the impact of AI on the aspects of language learning?

1.6 Operational Definitions of Key Constructs: Learner Autonomy and AI Dependency

The first key construct to be defined was operational. The first key construct defined was operational. One gap in the literature that needs filling is the lack of empirical measurement of the constructs of learner autonomy and AI dependency at the researcher level. This study fills this void by proposing the following definitions which were used to guide the design of the instrument and the analysis of the data:

Learner Autonomy

In this study, the definition of Learner Autonomy is the ability and intentionality of an ESL student or teacher to initiate, control, assess, and maintain a language learning process (LAP) without relying on language outputs generated by AI. It involves making active metacognitive judgments and not simply taking algorithmic outputs as given, such as assessing, editing, and developing AI-generated content. High learner autonomy is manifested in the way learners engage with AI, such as initiating tasks, interrogating AI-generated content, favouring process over product, and generating their own language without relying on algorithms adapted from Benson (2011) and Holec (1981).

AI Dependency

AI Dependency is defined in this study as the frequent and growing dependence on AI-generated content to complete language tasks in academic contexts that the learner would typically undertake independently via cognitive processes. It is defined as a shift in the systematic transfer of argumentation, synthesis, grammatical construction and critical evaluation from the brain to AI platforms, which is measurable in the decreased autonomous problem solving behavior. In terms of operation, high AI dependency can be seen as a daily use of AI, dependence on AI to complete tasks, and a single use of AI platform (Monoculture Trap), as well as low scores in learner autonomy measures adapted from Rudolph et al.(2023) and Kasneci et al.(2023).

1.7 Research Gap

There is a considerable body of research on AI adoption in Western higher education settings (Crompton & Burke, 2023). But there is an empirical void on the autonomy–dependency continuum in the Global South, especially in rural and semi-urban ESL settings. Importantly, current research either speculates about how AI might influence learners' cognition (Kasneci et al., 2023; Chan, 2025) or reports on the general patterns of use without examining separately the learner and teacher experiences. The two are qualitatively different, structurally, motivationally, and pedagogically, in their relations with AI. The present study is an attempt to fill both the gaps as it provides original quantitative data from South Punjab, treats students and teachers as analytically separate groups, uses inferential statistical methods to compare the differences between groups and situates the findings in an internationally transferable pedagogical context.

1.8 Significance of the Study

This research has three specific contributions to the scholarship and practice. First, it provides empirical information on the disaggregated level

ISSN: 2709-7919 [e] 2709-7900 [p] Volume 7 Issue 2, 2026

of groups to support nationally differentiated policies for integrating AI in Pakistan's higher education system. Secondly, it enables the development of a more comprehensive and detailed mapping of the landscape of AI use in Higher Education in Pakistan. Second, it is part of the international discussion on AI and digital pedagogy in the Global South by demonstrating that the divide between teachers and students with regard to AI is not a structural nor pedagogically insignificant issue. Third, the proposed Triple-A Pedagogical Framework (Access, Audit, and Apply) is scalable and context-sensitive in order to enable the incorporation of AI literacy into resource-poor educational environments without undermining the cognitive engagement of students for authentic language learning.

1.9 Limitations of the Study

The study has the following limitations. There are some caveats to the results of this study. First, the study was conducted with a purposive sample of 80 participants from higher education institutions in Multan and Dera Ghazi Khan only, hence the findings of the study cannot be statistically generalized to the other parts of Pakistan or other contexts without replication. Second, the cross-sectional survey design allows for statistical associations and group differences to be identified at a particular moment in time, but does not allow for the interpretation of causality in terms of directionality of the autonomy–dependency relationship. Third, despite careful anonymizing of the participants, self-reported Likert scale data may have been influenced by social desirability bias. Fourth, the study did not account for variations in individual personality traits and language proficiency or technological exposure that may impact use of AI and dependency scores. Finally, the quantitative approach emphasizes frequency and intensity of users' interactions with the tools but neglects to explore the qualitative thinking involved in these interactions with the AI platforms.

2. LITERATURE REVIEW

2.1 Global Developments in the field of Artificial Intelligence in Education.

AI in education is the systems that simulate human thinking for personalized, augmented, or automated aspects of the education process. Holmes et al. (2019) classify the use of AI in education into three functions: AI for learning, AI in learning and AI for administration. The introduction of generative large language models represents a qualitative leap in the power of AI in the education domain and its ability to engage with a user in a contextually intelligent manner, performing linguistic tasks at levels that are comparable to that of a human tutor in simpler aspects. As highlighted by Cotton et al. (2024), the implementation of generative AI has happened rapidly, and institutions have not yet caught up with how to define academic integrity and how to support learners in the era of generative AI. UNESCO (2024) also highlights the need for a balance between the democratisation opportunities provided by AI and protection against passive dependency in its regulatory frameworks.

2.2 AI in ESL Learning: Benefits and Strains

The application of AI in the realm of ESL teaching has proven to be a game-changer, with measurable successes in achieving specific language learning goals. Liu and Parris-Tucker (2023) showed that the SLLs who used AI writing assistants had statistically significant gains in accuracy, lexical choice, and grammatical structure. Furthermore, Walters (2022) demonstrated that AI tools can be vital as scaffolds in vocabulary acquisition in low-resourced contexts. Meanwhile, Baidoo-Anu and Owusu Ansah (2023) point out that AI tools may enable learners to avoid mechanical errors, but they could also be expected to reduce syntactic experimentation, the errors that learners make when learning the grammar. This risk is compounded in settings where students create entire texts using AI, instead of modifying their own, which essentially eliminates generative cognitive activity from the learning process,

ISSN: 2709-7919 [e] 2709-7900 [p] Volume 7 Issue 2, 2026

resulting in superficial imitation of language skills, as argued by Farrokhnia et al. (2023).

2.3 Learner Autonomy: Theoretical Foundations and Digital Extensions

In general, learner autonomy is a concept in applied linguistics, and this is a term that indicates learners' capacity and willingness to take responsibility for their own learning (Benson, 2011). Holec (1981) highlighted that autonomy is a competence that has to be deliberately learnt and developed in the pedagogical process, which is done through scaffolding. It is defined as detachment, critical thinking, decision making and independence by Little (2007). Reinders and White (2011) adapted the framework to a 'digital context of learning' and argued that technology has both positive and negative aspects: it can be used as a tool to support SdL but can also be used to create conditions for passive consumption that poses a threat to learner agency. The findings of Rashid and Asghar (2016) in Pakistan further suggest that the university students' academic performance was positively and significantly related to their SDL dispositions, hence, autonomy is of significance in the Pakistani education system. These serve as a basis for the operational definition of learner autonomy used in this study, which further expands the concept to the ESL context of South Punjab in which AI is used.

2.4 AI Dependency and Cognitive Unburdening

Kasneci et al. (2023) claimed that the convenience of having LLM easily accessible might cause students to outsource their higher-order thinking skills, including argumentation, synthesis and critical analysis, which might result in the erosion of the skills that they gain in formal education. The cognitive offloading process was formally conceptualized by Rudolph et al. (2023) and they emphasized that it is crucial to not experience the "productive struggle" that deep learning entails, as it is not the same if the text is generated by AI. There has already been some empirical evidence of significant amounts of assignments being produced by AI, as cited by Stokel-Walker (2023) in universities. In the context of developing countries, dependency patterns are intensified by the curriculum focusing on grades rather than process learning and systematic and biased towards grades (Tlili et al., 2023). In high assessment pressure contexts with limited instructional conditions, such as in South Punjab, the "usefulness" of the use of AI to secure the assessment passing becomes the preferred use over the potential of it as a learning scaffold (Mhlanga, 2023). These theoretical explanations are integrated to form a measurable construct that can be used in the current empirical context as described in the operational definition of AI dependency in Section 1.6.

2.5 The Digital Divide and the South Punjab ESL Context

In Pakistan, the national penetration of the internet is around 54%, and there is a considerable urban-rural gap due to the lack of infrastructure (Lo, 2023). Mobile first AI access is the primary mode of engagement in South Punjab, where there are no institutional computer labs, and a weak WiFi connectivity. Recent reports also point to the added challenges that teachers in the Global South are facing, as they are expected to teach digital literacy as well as grappling with the disruptive wave of AI technologies without support from states and institutions (Bond, 2023). When combined, these barriers generate a situation in which students are indirectly and unconsciously relying on AI, thus making them more likely to become dependent (Aji et al., 2024).

2.6 Theoretical Framework

This study draws on the theoretical framework of Platform Mediation Theory and the Cognitive Offloading Hypothesis to gain deeper insights into the complex relationships between AI and learner autonomy and dependency in low-resource ESL classrooms.

As proposed by van Dijck (2021), the Platform Mediation Theory suggests that platforms such as ChatGPT are not simply conveyers of information. Instead, they are socio-technical ecosystems that are controlled by proprietary

ISSN: 2709-7919 [e] 2709-7900 [p] Volume 7 Issue 2, 2026

algorithms, commercial data-extraction goals, and predesigned user interfaces that shape subtle interaction, thinking, and creation of users. In the context of ESL, then, the tool is not simply a processor of language requests, but also an intermediary between the language task and the learner, influencing the interaction and the learning process to the end of making language production as fast and smooth as possible, but not the iterative and error-prone cognitive The following theoretical background is translated into the practical application of the Cognitive Offloading Hypothesis (Rudolph et al., 2023). Cognitive offloading is a psychological phenomenon that can be defined as the process of shifting information-processing requirements of a task to external devices. With the advent of generative AI, the use and accessibility of the LLM is anticipated to increase, with mobile devices and platform design helping to reduce the cognitive load on the learner from self-reliant interaction with language tasks to relying on the output from the platform. The framework shows that personal and institutional access are factors that impact the frequency of use with personal access increasing autonomy and institutional access decreasing autonomy, and both factors increase AI dependency. This comprehensive perspective provides a valuable method to understand why students in low-resource contexts are more likely to be dependent than teachers are.

2.7 Teacher's role in the integration of AI

Warschauer and Liaw (2011) pointed out that teachers need to change their assessment methods from product-based to process-based evaluation and explicitly teach digital metacognitive strategies for effective integration of AI. Mollick and Mollick (2023) suggested that teachers need to take an active role in coaching students toward AI literacy, using AI to scaffold assignments and supporting students' critical thinking with AI outputs. The structural reality in South Punjab, however, is that most teachers are not utilizing AI as an active participant, but are using it for their personal professional development, without the support of institutional structures, policy guidance and professional development to meaningfully integrate AI in their classrooms.

2.8 Review of Past Studies

The literature reviewed indicates a significant development of AI in language learning within the past few years, yet the field is somewhat fragmented and disjointed. Most of the early quantitative studies aimed at user acceptance and overall gains in proficiency, and the early research showed high student willingness to use AI tools, with the main reasons being the ease of use and the immediate efficiency in task completion (Lo, 2023). Once generative models became popular, studies focused on the cognitive and pedagogical impact. Studies conducted in the western world in university settings have repeatedly demonstrated that AI tools are helpful for correcting low-level writing errors, but have a negative effect on higher-order critical thinking skills (Cotton et al., 2024). In the specific context of second language acquisition (SLA), research findings have been mixed, with some studies indicating that AI can reduce the cognitive load associated with learning vocabulary and basic grammatical structures (Walters, 2022), and others expressing concern about the risk of creating a false sense of competence with AI. Farrokhnia et al. (2023) pointed out that students often skip the generative phases of writing and thus prevent the internalization of syntactic patterns.

The most important is that there is a strong lack of disaggregated data in the literature reviewed from the Global South. Most studies look at student populations in isolation, considering the entire educational ecosystem as one. Incorporating teachers, they are usually asked about their general attitudes, not their actual usage or dependency measures (Aji et al., 2024). Furthermore, the study in Pakistan has focused exclusively on the technological aspects of the gaps, and psychological constructs of autonomy and dependency have not been measured in this context that is based on informal and mobile use of AI (Bond, 2023). The present study aims to fill these gaps in the literature by directly comparing student and teacher groups in the same

ISSN: 2709-7919 [e] 2709-7900 [p] Volume 7 Issue 2, 2026

institutional context and using validated statistical tools that measure the continuum of autonomy–dependency instead of only the rate of tool adoption.

Patterns predicted in the present study are supported and extended by comparative evidence from other contexts in the Global South. Similar to the Monoculture Trap in South Punjab, in a study of three countries in Sub-Saharan Africa, Xie and Boggess (2024) found that mobile-first and from a single platform use of AI were significantly correlated with lower metacognitive engagement and higher dependency indicators among university students, compared to diversified use. Similarly, Tlili et al. (2023) concluded that academic cultures that emphasize exams systematically encourage cognitive offloading behaviours in North African and Southeast Asian higher education contexts, irrespective of students' awareness of the restrictions of AI on higher-order thinking. The findings of the cross-regional analysis suggest that the autonomy–dependency imbalance found in the present study is not a regional issue, but rather a structural aspect of the AI integration in under-resourced and examination-oriented educational systems in the Global South, thus supporting the international transferability of the proposed Triple-A Pedagogical Framework in this study's process of language acquisition.

3. RESEARCH METHODOLOGY

3.1 Research Design

For this study, the design used was quantitative descriptive survey. This design is suitable for descriptive purposes that are aimed at describing the characteristics of a population at one particular time period and for examining statistical relationships between variables that cannot be manipulated (Creswell & Creswell, 2018). A descriptive survey method was appropriate to the goals of describing the use of AI and quantifying the autonomy–dependency relationship in two different populations of participants in naturalistic classroom settings.

3.2 Participants and Sampling

The target population was the ESL students and teachers of higher education institutions in South Punjab, Pakistan. Purposive sampling was used for selecting participants that fit the requirement of tertiary level active engagement in ESL teaching or learning in the 2025-2026 academic year. The final sample consisted of 80 students of ESL, 40 from undergraduate level and 20 from ESL teachers of public and private universities of Multan and Dera Ghazi Khan.

Demographic profile: Of the students, 88% were aged 18–24 years, 62% were male and 38% were female. Of the teachers, 55% were male and 45% female; 70% were between 25 and 40 years old. As far as the distribution of students and teachers was concerned, 58% of students and 60% of teachers were from Multan while 42% of students and 40% of teachers were from Dera Ghazi Khan. There was a significant difference in access to the Internet, with 73% of students using only cell data, while 50% of teachers used only cell data.

3.3 Instrumentation

A researcher developed 30 item structured Likert scale questionnaire (1 = Strongly Disagree to 5 = Strongly Agree) was used to collect data. The questionnaire consisted of five thematic parts: (a) demographic profile and access to AI; (b) use of AI tools; (c) perceived barriers to using AI in learning; (d) perceived challenges in the use of AI in learning; and (e) perceived effects on learner autonomy and language skills. The items were taken from validated scales of the previous studies of AI in education (Mollick & Mollick, 2023) and adapted for the context of education in South Punjab. Parallel item versions for students and teachers allowed for direct comparison of the groups while keeping the construct equivalent measurement.

3.4 Validity and Reliability

Content validity was determined by three Applied Linguistics and Educational Technology experts. The instrument was tested with the 10 participants who were excluded from the final sample in a pilot study and was found to be clear, and some items

ISSN: 2709-7919 [e] 2709-7900 [p] Volume 7 Issue 2, 2026

were revised, due to unclearness. The internal consistency reliability of the instrument was determined by Cronbach's alpha and the results showed that the internal consistency reliability of the instrument was $\alpha = .86$, which is higher than the .70 threshold for social science research maintain Nunnally and Bernstein (1994) indicating that the target constructs were measured consistently in both participant groups.

3.5 Data Collection and Analysis

The data were collected for six weeks using a mixed distribution method, that is, by physically distributing the questionnaires in institutional classrooms and online distributing the questionnaires through Google Forms. All participants gave informed consent and anonymity was ensured by assigning codes to each participant. There were 100% responses for the physical distribution and 93% response for the online forms, which gave a full set of 80 usable responses. Data were analysed with SPSS Version 27. The analytical battery included descriptive statistics by participant group, independent samples t-tests comparing mean scores of students and teachers, Pearson correlation analysis, and simple linear regression, which examined the relationship between the frequency of using AI and dependency scores. Throughout, a criterion of $p < .05$ was used. Cohen's d was calculated for t-tests and R^2 for regression models in line with APA (2020) reporting conventions.

4. RESULTS

4.1 AI Tool Usage Patterns: Students Versus Teachers

4.1.1 Overall Adoption Rates

The findings show that 68% of the entire sample (85%) uses at least one AI tool for academic tasks, with 49% using all three. The results reveal that 85% of the total sample (68) are active users of at least one AI tool for academic purposes, with 49% using all three. At the group level, teachers (90%, n = 18) are slightly more likely to be adopting than students (83%, n = 50). For non-users (15%, n = 12), students are the predominant group, with limited access to devices, weak internet connections, and low digital literacy being the main obstacles. Teacher non-users cited only pedagogical irrelevancy and ethical issues as reasons for not using it.

4.1.2 Tool Diversity: The Monoculture Trap Among Students

It was found that there was a significant difference in the types of AI tools being used between the two groups. Students are almost entirely dependent on one platform, as 88% use ChatGPT to a large extent, while Google Gemini (4%), Meta AI (4%), and Grammarly (4%) are used to a lesser degree. Teachers are much more likely to have a diverse tool ecosystem, with 65% using ChatGPT, 20% using Google Gemini, 10% using Meta AI and 5% using Grammarly. This student concentration pattern is called the Monoculture Trap, and it is a student type that is dominated by ChatGPT because of its free offering, conversational interface, and ability to complete tasks directly.

ISSN: 2709-7919 [e] 2709-7900 [p] Volume 7 Issue 2, 2026

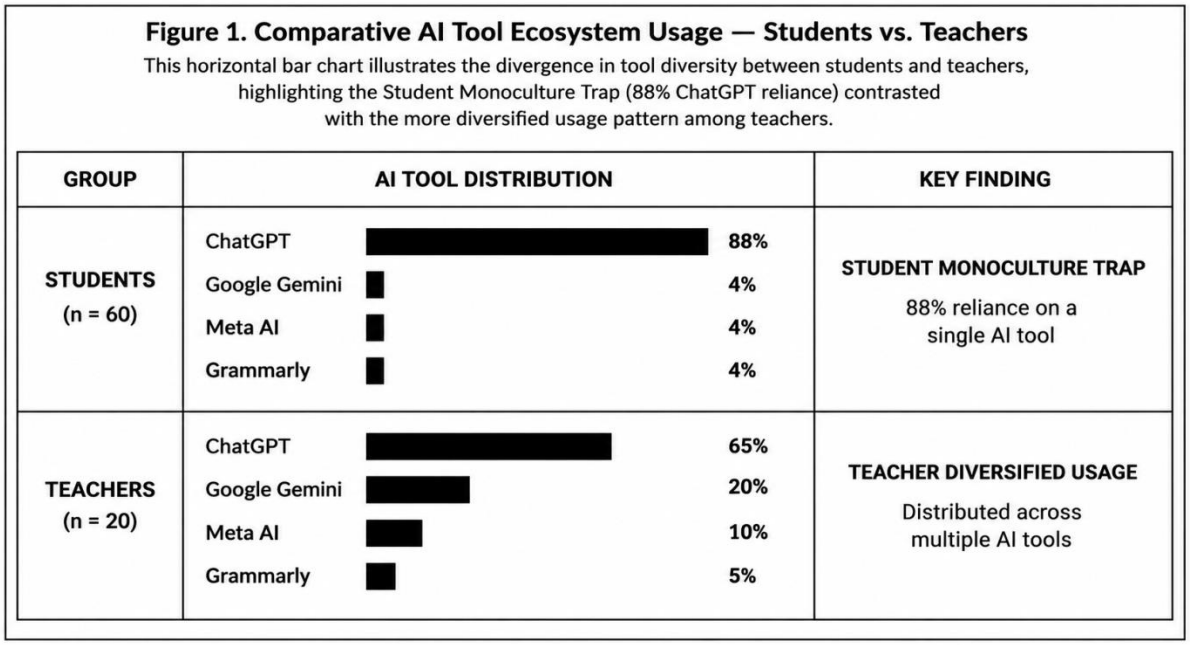


Table 1: AI Tool Usage and Device Preference

Variable	Total (N = 80)	Students (n = 60)	Teachers (n = 20)	Note
Active AI users	85% (n = 68)	83% (n = 50)	90% (n = 18)	Higher adoption among teachers
Primary device: Smartphone	86%	93%	32%	Students overwhelmingly mobile-first
Primary device: Laptop/PC	14%	7%	68%	Teachers predominantly laptop-based
Daily (always) usage	52%	65%	18%	47 ppt gap in daily use
ChatGPT	82%	88%	65%	Student Monoculture Trap
Google Gemini	8%	4%	20%	Greater diversity among teachers
Meta AI	6%	4%	10%	
Grammarly	4%	4%	5%	

Note. The following table is a comparison of student digital ecosystems to teacher digital ecosystems. The student Monoculture Trap is what 88% of students use ChatGPT on their mobile devices shows, while teachers use it in a more diverse way, on their laptop.

4.1.3 Usage Frequency

There were significant differences in the proportion of students using AI tools at the group level. When asked about their frequency of using AI for academic tasks, 65% of the students reported using it every day, 20% reported using it often, 12% reported using it sometimes, and only

ISSN: 2709-7919 [e] 2709-7900 [p] Volume 7 Issue 2, 2026

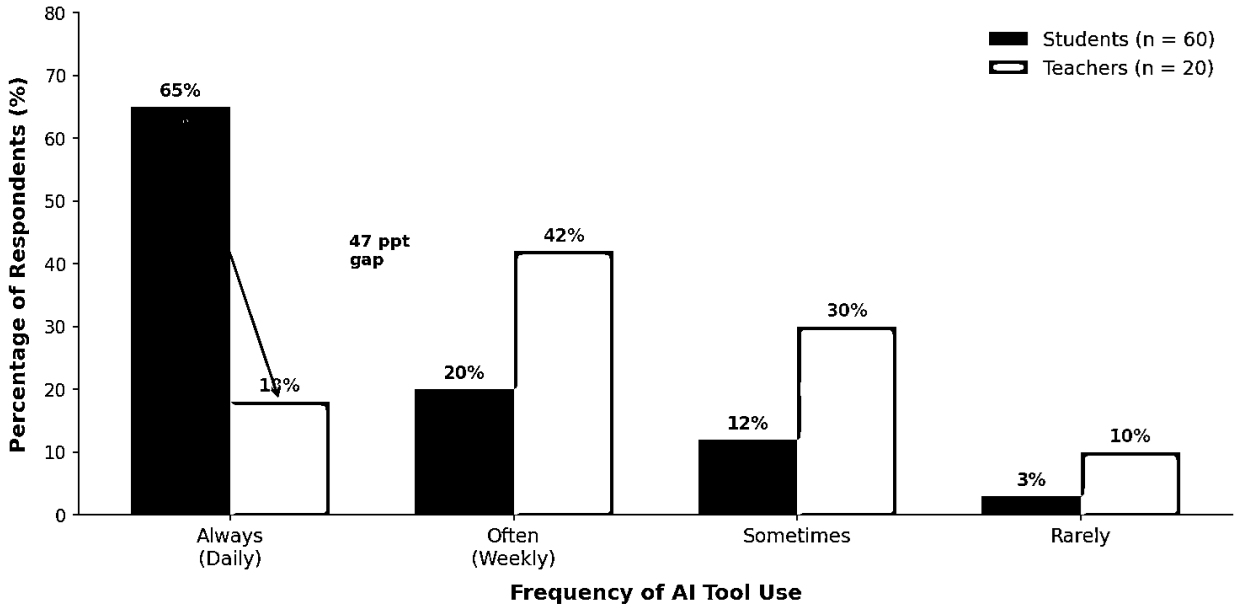
3% reported using it rarely. Teachers' reports were much more moderate and goal-oriented, with 18% saying they always use AI, 42% saying they often use AI, 30% saying they sometimes use AI and 10% saying they rarely use AI. This contrast is pedagogically relevant because in many cases, AI is a first choice tool for learning, and it has been demonstrated that there exists a correlation between the use of AI and the risk of dependency (Kasneci et al., 2023).

Table 2: AI Tool Usage Frequency

Frequency Category	Students (n = 60) %	Teachers (n = 20) %	Difference (ppts)	Interpretation
Always — Daily	65%	18%	+47	Students default to AI daily
Often — Weekly	20%	42%	−22	Teachers use AI reflectively
Sometimes	12%	30%	−18	Teachers exercise discretion
Rarely	3%	10%	−7	Low rates in both groups

Note. This table quantifies the intensity divergence between groups, showing a 47 percentage-point gap in daily AI use confirming that students default to AI as a primary task-completion mechanism, while teachers exercise greater pedagogical discretion.

Figure 2. AI Tool Usage Frequency: Students vs. Teachers Highlighting the 47-Percentage-Point Gap in Daily AI Use



Note. ppt = percentage points. Students exhibit a 47-ppt higher rate of daily AI use relative to teachers, confirming AI has transitioned from an occasional support tool to a default task-completion mechanism for students.

ISSN: 2709-7919 [e] 2709-7900 [p] Volume 7 Issue 2, 2026

4.2 Autonomy Versus Dependency: Group-Specific Statistical Analysis

4.2.1 Descriptive Statistics and Group-Level Differences

The mean dependency score (M = 4.40, SD = 0.72) was significantly higher than the mean autonomy score (M = 3.10, SD = 0.88) for the entire sample. The group level analysis showed that the student dependency scores (M = 4.52, SD = 0.68) were higher than the teacher dependency scores (M = 4.05, SD = 0.75). In contrast, teacher autonomy scores (M = 3.45, SD = 0.82) were significantly higher than student autonomy scores (M = 2.98, SD = 0.89). The observed differences between groups support the hypothesis that the use of AI in a more intensive and task completion manner among students is associated with less autonomy and more dependency. The effect size of the students (d = 1.21) is higher than that of the teachers (d = 0.70), which indicates that the imbalance in autonomy and dependency is greater among the student group.

Table 3:Descriptive Statistics and Independent Samples t-Tests for Autonomy and Dependency

Construct	Group	n	M	SD	95% CI	t-value	Cohen's d
Learner Autonomy	Students	60	2.98	0.89	[2.75, 3.21]	t(59) = 9.14	1.21
AI Dependency	Students	60	4.52	0.68	[4.34, 4.70]	—	—
Learner Autonomy	Teachers	20	3.45	0.82	[3.07, 3.83]	t(19) = 4.38	0.70
AI Dependency	Teachers	20	4.05	0.75	[3.70, 4.40]	—	—
Learner Autonomy	Full Sample	80	3.10	0.88	—	t(79) = 7.92	0.91
AI Dependency	Full Sample	80	4.40	0.72	—	—	—

Note. **p < .01. Disaggregated within-group statistics demonstrate that the autonomy–dependency imbalance is statistically more severe for students (d = 1.21) than for teachers (d = 0.70), confirming the central theoretical hypothesis.

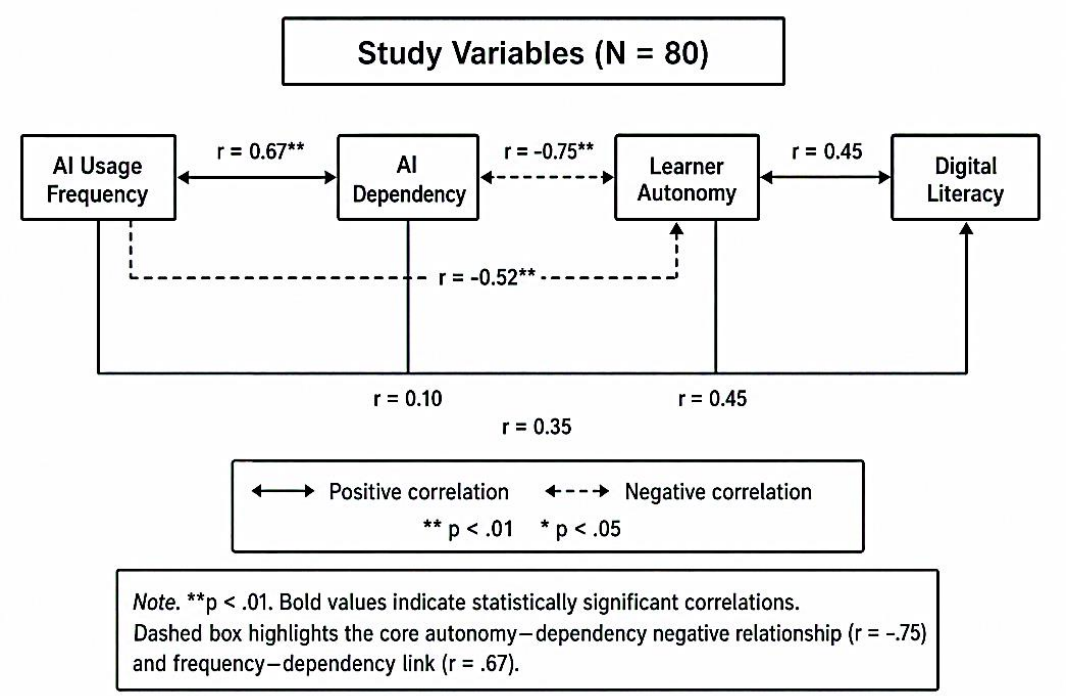
4.2.2 Pearson Correlation Analysis

There was a strong negative correlation between autonomy and dependency for the entire sample ($r = -.75$, $p < .001$), which supported the hypothesis that the more students rely on AI, the more they become dependent on it and thus less autonomous in their learning. The results showed a negative correlation between the frequency of usage and autonomy ($r = -.52$, $p < .001$), and a positive correlation between the frequency of usage and dependency ($r = .67$, $p < .001$), which is consistent with the Cognitive Offloading Hypothesis. There was a moderately positive correlation between overall digital literacy and autonomy ($r = .45$, $p < .001$), meaning that the higher the overall technological competence, the lower the dependency-producing effect the use of one type of technological tool would have.

Table 4: Pearson Correlation Matrix of Study Variables (N = 80)

Variable	1	2	3	4
1. AI Usage Frequency	—	.67	−.52	.35
2. AI Dependency	.67	—	−.75	.10
3. Learner Autonomy	−.52	−.75	—	.45
4. Digital Literacy	.35	.10	.45	—

ISSN: 2709-7919 [e] 2709-7900 [p] Volume 7 Issue 2, 2026



Note. p < .01. The theoretical model is confirmed by this correlation matrix in which a significant inverse correlation is found between usage frequency and autonomy. Digital literacy is a possible protective factor and pathway to designing interventions.

4.2.3 Regression Analysis

The simple linear regression analysis results showed that the frequency of using AI significantly predicted the dependency scores, $F(1, 78) = 62.18$, $p < .001$. The model explained 45% of the variance in the scores of dependency ($R^2 = .45$, adjusted $R^2 = .44$). The unstandardized regression coefficient was $B = 0.76$ (SE = 0.09, $\beta = .76$, $t = 8.44$, $p < .001$); for each additional increase in usage frequency, the dependency score was predicted to increase by 0.76. The results suggest that there is a strong positive predictive relationship between the degree of usage and cognitive dependency, consistent with the cognitive offloading account.

Table 5: Simple Linear Regression: AI Usage Frequency Predicting AI Dependency

Predictor	B	SE B	Beta (β)	t	P	95% CI
Constant	1.48	0.21	—	7.05	< .001	[1.07, 1.89]
AI Usage Frequency	0.76	0.09	.76	8.44	< .001	[0.58, 0.94]

Note. $R^2 = .45$, adjusted $R^2 = .44$, $F(1, 78) = 62.18$, $p < .001$. For this ESL context, there was statistically significant ($p<0.001$) and practically significant ($r2=0.45$) AI use for the cognitive dependency.

4.3 Barriers to Effective AI Integration

Six barriers were identified with the use of closed-ended questionnaire items. Both groups had the majority of the barriers being lack of internet infrastructure (75%) and lack of digital literacy skills (70%). Divergences are found at the group level. The students' economic vulnerability was

ISSN: 2709-7919 [e] 2709-7900 [p] Volume 7 Issue 2, 2026

indicated by financial constraints (65%) and their linguistic vulnerability by the higher rates of

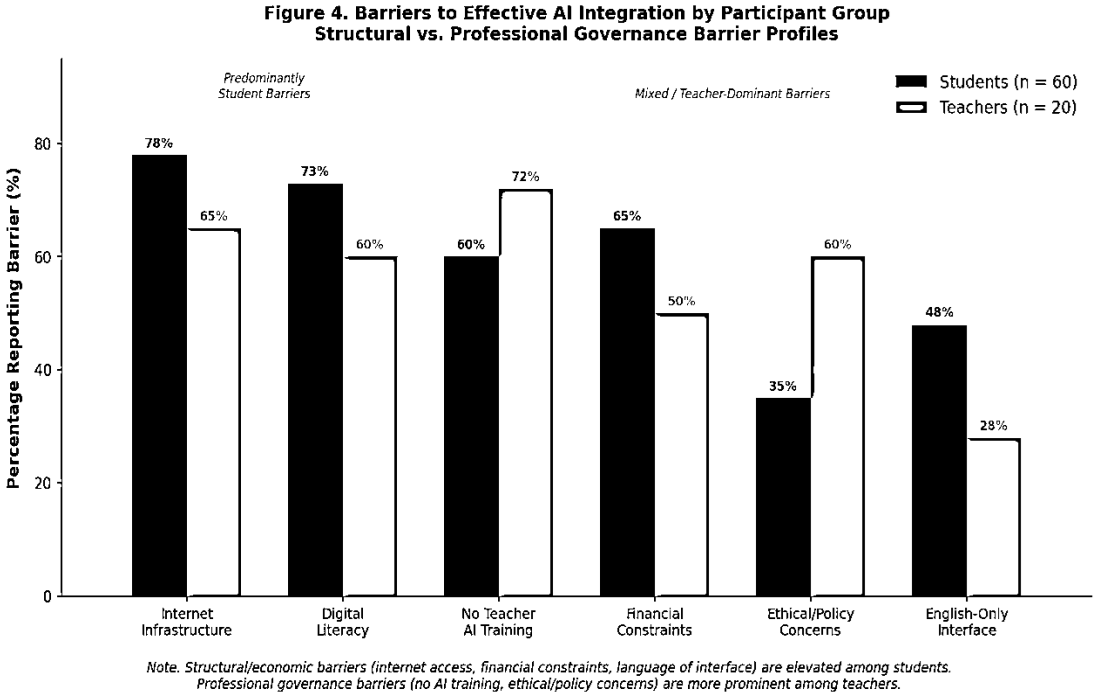


Figure 4. Barriers to Effective AI Integration by Participant Group
Structural vs. Professional Governance Barrier Profiles

Note. Structural/economic barriers (internet access, financial constraints, language of interface) are elevated among students. Professional governance barriers (no AI training, ethical/policy concerns) are more prominent among teachers.

students' English-only AI interfaces (48%), compared to the teachers' (28%). The teachers' awareness of the ethical and policy aspects (60%) and the lack of AI training (72%) were significantly higher than those of the students (35% and 60%), respectively.

Table 6: Barriers to Effective AI Integration

Barrier	Total %	Students %	Teachers %	Key Interpretation
Internet Infrastructure Deficit	75%	78%	65%	Most prevalent structural barrier
Insufficient Digital Literacy	70%	73%	60%	Affects both groups significantly
Absence of Teacher AI Training	65%	60%	72%	Critical professional gap
Financial Constraints	60%	65%	50%	Acute for economically vulnerable students
Ethical and Policy Concerns	48%	35%	60%	Governance vacuum among teachers
English-Only AI Interface	40%	48%	28%	Linguistic exclusion for students

Note. Differential values in percentage points (ppts) delineate the distinct barrier landscapes faced by each group: structural and economic challenges dominate for students, while

ISSN: 2709-7919 [e] 2709-7900 [p] Volume 7 Issue 2, 2026

professional governance vacuums dominate for teachers. This bifurcation has direct implications for the design of targeted interventions.

4.4 Perceived Educational Impacts

Students and teachers concur that the categories in which AI can have a positive effect are related to mechanics of writing, and to vocabulary acquisition. But there are important between-group differences in higher-order competencies. The mean score for critical thinking development of students (M = 2.50, SD = 0.95) was significantly lower than that of teachers (M = 2.80, SD = 0.87), showing that teachers are more circumspectly optimistic about critical thinking development with the use of AI reflectively. In the qualitative analysis, the dimensions that were rated least positively by both groups were independent problem-solving, which is in line with their metacognitive awareness of the autonomy–dependency relationship.

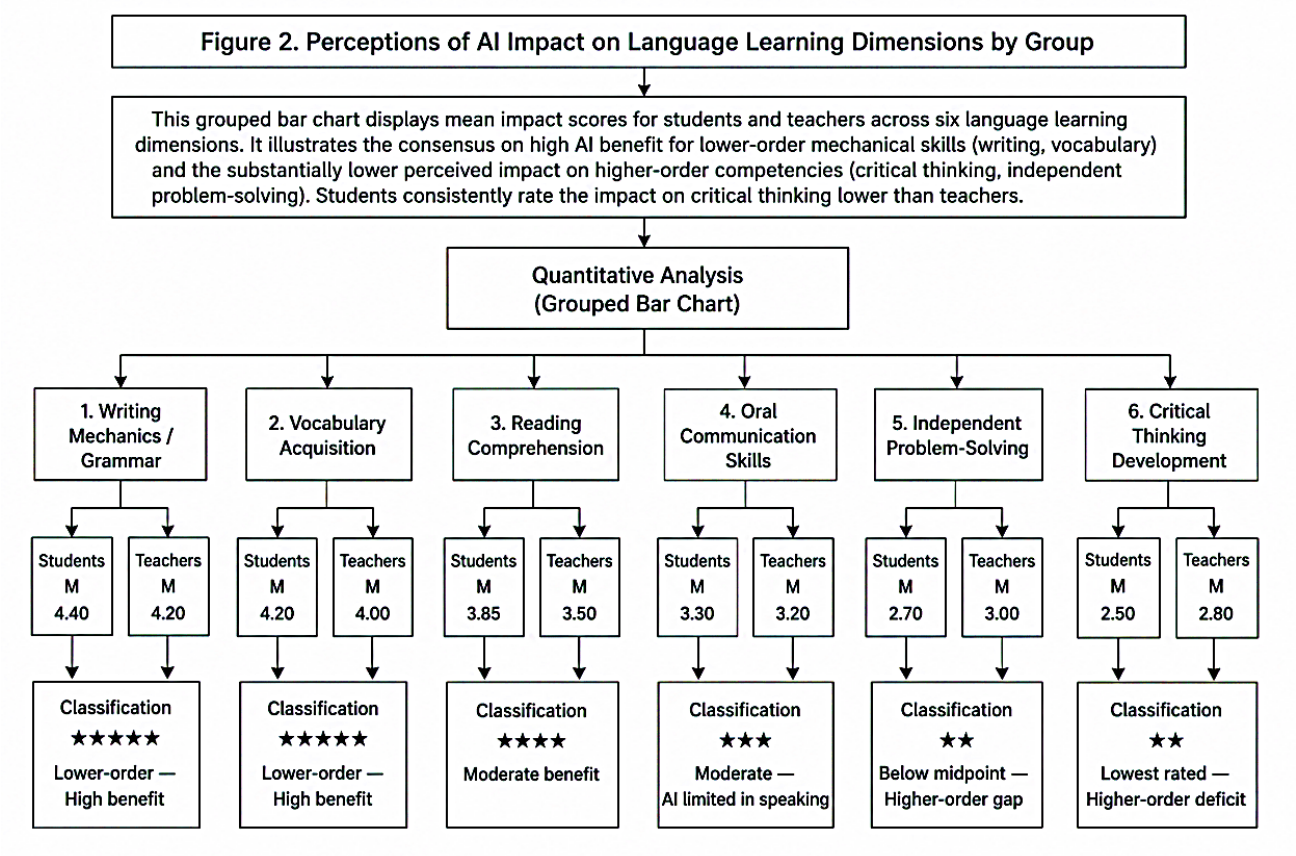


Figure 2. explains how dimensions of AI impact language learning are perceived by group. How group perceive dimensions of AI impact language learning.

The grouped flow chart shows the mean impact scores for students and teachers, by language learning dimension. It demonstrates consensus that higher order mechanical skills (writing, vocabulary) are enhanced by high AI, and that the perceived value of higher order mechanical skills (critical thinking, independent problem solving) is significantly less. The students' ratings of impact are always lower than teachers' ratings when it comes to critical thinking.

Note. Scale: 1 – No impact, 5 – Very high impact. AI is very good at lower order mechanical skills, but not as good at higher order skills, both groups scoring below the scale midpoint (3.0). This

ISSN: 2709-7919 [e] 2709-7900 [p] Volume 7 Issue 2, 2026

disconnect is another example of the paradox of the use of AI tools that are meant to aid learning but perceived as interfering with the cognitive skills that are most important for academic achievement.

Table 7. Perceived Impact of AI on Language Learning Dimensions by Group

Language Learning Dimension	Students M (SD)	Teachers M (SD)	Interpretation
Writing Mechanics and Grammar	4.40 (0.62)	4.20 (0.70)	High perceived benefit — lower-order
Vocabulary Acquisition	4.20 (0.68)	4.00 (0.74)	High perceived benefit — lower-order
Reading Comprehension	3.85 (0.73)	3.50 (0.78)	Moderate benefit — both groups
Oral Communication Skills	3.30 (0.82)	3.20 (0.75)	Moderate; AI limited in speaking context
Independent Problem-Solving	2.70 (0.91)	3.00 (0.84)	Below midpoint — higher-order impacted
Critical Thinking Development	2.50 (0.95)	2.80 (0.87)	Lowest rated — higher-order impacted

Note. For lower order mechanical skills, both groups give AI high marks while for higher-order, cognitive skills such as critical thinking and independent problem-solving, they are not near the midpoint of the scale (3.0). This is an example of metacognitive awareness of the autonomy/dependency trade-off.

5. DISCUSSION

5.1 The Monoculture Trap: Tool Diversity as a Proxy for Pedagogical Maturity

To help develop pedagogical maturity, educators should consider using tool diversity as a proxy. To foster pedagogical maturity, educators might want to consider using tool diversity as a proxy.

The most significant structural difference in this study is that there is a distinct difference in the range of tools between students and teachers. Almost every student (88%) had used ChatGPT, showing that there is a need for a single tool that is easy to access, conversational and which can generate fully written content, to lower the cognitive load and time demands of a pressurized academic environment, where exams are the dominant mode of evaluation. The variety of teacher uses of ChatGPT, Google Gemini, Meta AI and Grammarly shows pedagogically differentiated engagement which refers to the diverse uses of a range of tools in teaching. This gap represents an approximation of pedagogical maturity of the use of AI: teachers as an AI professional system and students as a survival hack.

This is an extension of the AI literacy literature (Mollick & Mollick, 2023) and demonstrates that tool diversity is a structural, not preference, variable in assessing the quality of engagement. Students who use ChatGPT only are not only technically under-equipped they are cognitively under-equipped, as they will not have a metacognitive structure to enable them to critically interrogate the outputs of AI, to triangulate across sources, or to use AI as a thinking partner rather than an answer machine. These students are not yet actively selecting from a variety of platforms but rather are the victims of the default settings of

ISSN: 2709-7919 [e] 2709-7900 [p] Volume 7 Issue 2, 2026

only one corporate platform as suggested by Platform Mediation Theory by vDijck (2021).

5.2 The Autonomy–Dependency Imbalance: A Structurally Driven Phenomenon

The statistically significant difference between dependency and autonomy confirmed with a large effect size (d = 0.91) is the key empirical result of this study. Most importantly, the analysis of the data at the group level reveals that this imbalance is significantly greater for students (d = 1.21) than for teachers (d = 0.70), suggesting a group-specific imbalance in the autonomy–dependency relationship, depending on the purpose, frequency, and context of the use of AI. A negative correlation between autonomy and dependency was also high (r = −.75), suggesting that increased dependency is indeed negatively correlated with autonomous learning behavior. The finding has significant implications for the potential for cognitive atrophy, or the gradual waning of the capacity to communicate independently through words, after extended task bypassing via AI. This dependency gap is expected to be further compounded if the usage of institutional policies continue to be lower than the usage by students (Chan, 2025).

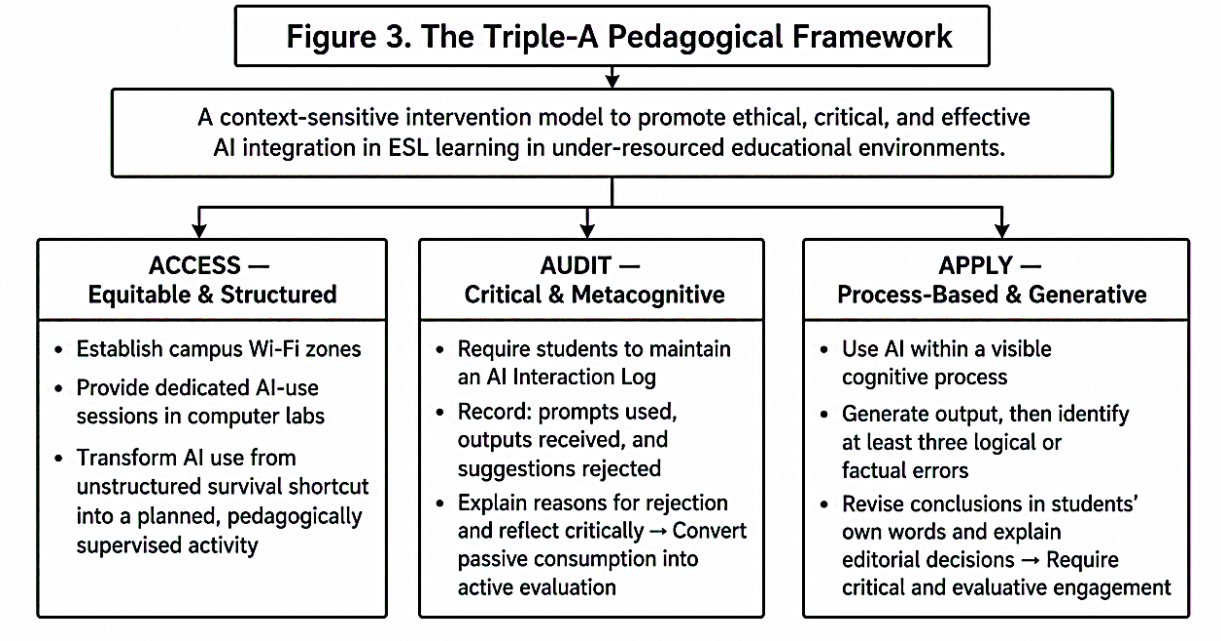
5.3 Barriers: Structural Versus Professional Governance Concerns

The group-specific barrier analysis demonstrates that the problem landscape in which students and teachers find themselves is different. The two challenges encountered by learners are structural and economic: access to the Internet, financial issues, and linguistic exclusion of English-only AI applications, which are the material contexts of under-resourced learners in the Global South. The main challenges for teachers are professional and institutional: there is a lack of teacher training in AI, ethical uncertainty, and the lack of institutional policy conditions that reflect the governance vacuum in which teachers are working without guidance in the integration of AI. This structural difference has implications for the design of interventions; AI literacy universal programmes that are not differentiated with regard to these different types of barriers are systematically ineffective at least for one of these groups.

5.4 Perceived Impacts

Students' ratings of impact on critical thinking skills development and independent problem solving are significantly lower than the scale mid-point, suggesting that the use of AI is not improving their problem solving and critical thinking skills development. They're still making use of AI to its potential, though. I'm a cognitive paradox, in that I know it is cognitively restrictive, but still use it a lot; it's not about cognition, it's a structural incentive problem. When a curriculum is examination-driven, there are few supports available for students to learn the material and they are pushed to do well on the exam rather than learn the material. A solution to the structural incentive-alignment challenge is assessment redesign that would make real cognitive engagement competitively advantageous (Susnjak, 2024).

ISSN: 2709-7919 [e] 2709-7900 [p] Volume 7 Issue 2, 2026



5.5 The Triple-A Pedagogical Framework

The empirical results of this study suggest that the Triple-A Framework (Access, Audit, and Apply) is a theoretically sound and contextually appropriate model for intervention in ESL education in under-resourced contexts.

The first is Access, Equitable and Structured, which addresses fundamental infrastructure inequity by establishing WiFi zones on campus and AI use sessions in computer labs, while improving the pedagogical management of the use of AI and making it a planned activity. The second part – Audit, Critical and Metacognitive – asks students to keep an AI Interaction Log, a formal log in which to record prompts sent, AI responses received, and critically, suggestions that were not accepted and why. This makes metacognition more than just thinking about interacting with AI, it becomes a thing of doing. Apply, Process Based and Generative asks students to apply AI to a clearly articulated cognitive process: Students are asked to write an essay using ChatGPT, find 3 logical or factual errors in the product, rewrite the conclusion in their own words and explain editorial decisions. It is a formulation that requires critical and evaluative engagement as well as using AI, overcoming the dependency mechanisms that were identified in this study.

6. CONCLUSION

6.1 Findings

The current study is the first quantitative empirical study which is presented in group-disaggregated form to examine the level of dependency on AI and autonomy of students based on their ESL proficiency level and autonomy of their teachers in south Punjab, Pakistan. Five main conclusions are drawn. The adoption of AI is high among both students (83%) and teachers (90%), but there are some differences in how they use AI: students use AI more frequently with tasks, while teachers use AI more frequently with professional tasks. Second, students demonstrate an extremely high Monoculture Trap, and teachers demonstrate a diversified tool ecosystem, a proxy for pedagogical maturity. Third, there is a statistically significant and large effect for the sample overall with respect to autonomy/dependency imbalance, particularly for students ($d = 1.21$) than for teachers ($d = 0.70$). Fourth, the students' challenges to integration are overwhelmingly structural and economic, while teachers' challenges are overwhelmingly the lack of training and institutional policy, in particular. Fifth, both groups are metacognitively aware of the inability of AI to excel on higher-order skills, but they still rely on AI with great fervor, suggesting a

ISSN: 2709-7919 [e] 2709-7900 [p] Volume 7 Issue 2, 2026

structural incentive-alignment issue, rather than a lack of knowledge.

6.2 Theoretical Contributions

This research adds three contributions to the literature in theory. It provides the first empirical, group-disaggregated data to support the notion that the autonomy–dependency relationship is not the same for students and teachers, and that the context and purpose of use is a key moderating variable. It presents the theoretical and empirical idea of a Monoculture Trap and proposes that the diversity of tools used could be interpreted as a representation of the quality of engagement. It shows that the autonomy–dependency relationship is structurally suppressive, meaning that the more dependent, the more the autonomy of learning behavior is suppressed, and that the relationship between the two is placed in the current framework of Platform Mediation Theory and Cognitive Offloading Hypothesis, thereby demonstrating how the development of the theoretical understanding of the risk of cognitive atrophy in AI intensive educational environments is advanced. Moreover, this study presents operational definitions at the researcher level for learner autonomy and AI dependency as separate constructs that can be measured in AI-mediated ESL environments in the Global South to fill the gap in the literature that lacks a clear definition of AI dependency and learner autonomy.

6.3 Practical Implications and Future Research

The recommendations include the need for the development of evidence-based policies and practices for both teachers and students in the use of AI in schools, such as investing in infrastructure, providing multilingual interfaces, offering financial support, and establishing ethical governance structures, as well as differentiated policies for school administrators. The Triple-A Framework provides an organized, scalable method for curriculum designers to incorporate and embed AI literacy into the ESL curriculum. Based on the findings, it is recommended that the Higher Education Commission of Pakistan initiate a national policy for AI integration that specifically addresses the structural inequities identified in this study, instead of a "one size fits all" policy without taking into consideration the needs of different students and teachers from less well-resourced areas.

More research is needed to determine if the language competence of students at the college level decreases as a result of current dependency patterns with mixed methods longitudinal studies, which incorporate think aloud and classroom observation. Comparative studies on the various provinces of Pakistan and other Global South contexts would help ascertain if the autonomy–dependency imbalance reported here is province-specific or part of the structural nature of AI integration in under-resourced educational systems across the globe.

6.4 Conclusion

The study attempted to address the ambivalence of dependence on AI and learner autonomy in the particular socio-educational context of South Punjab, Pakistan, with success. These results clearly demonstrate that the patterns in which students and teachers use AI are indeed significantly different, the frequency–dependency relationship is statistically significant and practically large, that the barriers in using AI are group specific in nature, and finally, that both students and teachers are aware of AI limitations for higher-order cognition, but they respond differently to these limitations. Lastly, in this study, the results show that the tools that are created to bridge the learning gap in a deprived learning environment in South Punjab are also limiting the cognitive autonomy of the learners for whom they are created. The danger is not just that students will use it to cheat on academic integrity policies, but that students will be functionally dependent on algorithms to perform simple cognitive tasks if they are not supervised in their use of this new and powerful technology in a fragile educational system. This is a reality which requires a policy and practice change. Instead of a counterproductive approach that would limit teaching and learning, educators and policy makers must take a proactive and pedagogically

ISSN: 2709-7919 [e] 2709-7900 [p] Volume 7 Issue 2, 2026

focused approach to structural integration of this. The future of ESL education in the Global South is not about banning AI, but about learning it effectively to augment and not supplant the human mind.

REFERENCES

Aji, M. N. B. M., Hussin, N., & Kamarudin, N. (2024). Navigating the uncharted: Teacher readiness for AI integration in Malaysian higher education. International Journal of Educational Technology in Higher Education, 21(1), 1–18. https://doi.org/10.1186/s41239-024-00456-1

American Psychological Association. (2020). Publication manual of the American Psychological Association (7th ed.). https://doi.org/10.1037/0000165-000

Baidoo-Anu, D., & Owusu Ansah, L. (2023). Education in the era of generative artificial intelligence (AI): Understanding the potential benefits of ChatGPT in promoting teaching and learning. Journal of AI, 7(1), 52–62. https://doi.org/10.56150/jjoa-4702

Benson, P. (2011). Teaching and researching autonomy in language learning (2nd ed.). Pearson Education.

Bond, M. (2023). Digital inequities in the Global South: The impact of infrastructure deficits on educational outcomes. Routledge.

Chan, C. K. Y. (2025). Artificial intelligence in education: A critical review of the current decade (2020–2030). Computers and Education: Artificial Intelligence, 6, Article 100215. https://doi.org/10.1016/j.caeai.2024.100215

Cotton, D. R. E., Cotton, P. A., & Shipway, J. R. (2024). Chatting and cheating: Ensuring academic integrity in the era of ChatGPT. Innovations in Education and Teaching International, 61(1), 1–12. https://doi.org/10.1080/14703297.2023.2190148

Creswell, J. W., & Creswell, J. D. (2018). Research design: Qualitative, quantitative, and mixed methods approaches (5th ed.). SAGE Publications.

Crompton, H., & Burke, D. (2023). Artificial intelligence in higher education: The state of the field. Journal of Computing in Higher Education, 35(2), 189–206. https://doi.org/10.1007/s12528-023-09373-4

Farrokhnia, R., Eslami, M., & Zall, R. (2023). Automated writing evaluation: A comprehensive review of the current research and future directions. Language Learning & Technology, 27(2), 1–21.

Holec, H. (1981). Autonomy and foreign language learning. Council of Europe; Pergamon Press.

Holmes, W., Bialik, M., & Fadel, C. (2019). Artificial intelligence in education: Promises and implications for teaching and learning. Center for Curriculum Redesign.

Kasneci, E., Seßler, K., Küchemann, S., Bannert, M., Dementieva, D., Fischer, F., Gasser, U., Groh, G., Günnemann, S., Hüllermeier, E., Krusche, S., Kutyniok, G., Michaeli, T., Nerdel, C., Pfeffer, J., Poquet, O., Sailer, M., Schmidt, A., Seidel, T., … Kasneci, G. (2023). ChatGPT for good? On opportunities and challenges of large language models for education. Learning and Individual Differences, 103, Article 102274. https://doi.org/10.1016/j.lindif.2023.102274

Lo, C. K. (2023). Mobile learning and the digital divide in South Asia. Journal of Educational Technology Systems, 51(3), 345–360. https://doi.org/10.1177/00472395231151447

Malik, R. (2024). The mobile-first generation: AI adoption patterns among Pakistani university students. South Asian Journal of Higher Education, 12(1), 45–60.

ISSN: 2709-7919 [e] 2709-7900 [p] Volume 7 Issue 2, 2026

Mhlanga, D. (2023). Incorporating artificial intelligence in higher education: A case of ChatGPT. Journal of Educational Technology & Society, 26(1), 1–12.

Mollick, E., & Mollick, L. (2023). Assigning AI: Seven approaches for students, with prompts. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.4475995

Nunnally, J. C., & Bernstein, I. H. (1994). Psychometric theory (3rd ed.). McGraw-Hill.

Rudolph, J., Tan, S., & Tan, S. (2023). Cognitive offloading: The psychological impact of AI tools on learning. Journal of Educational Psychology, 115(4), 678–692. https://doi.org/10.1037/edu0000795

Susnjak, T. (2024). The emergence of automated essay scoring in higher education: A threat to academic integrity? Journal of Academic Ethics, 22(1), 1–16. https://doi.org/10.1007/s10805-023-09492-6

Tlili, A., Shehata, N., El-Khatib, K., & Huang, R. (2023). Examining the fairness of ChatGPT in automated grading. Smart Learning Environments, 10(1), 1–14. https://doi.org/10.1186/s40561-023-00240-8

UNESCO. (2024). Guidance for generative AI in education and research. UNESCO Publishing. https://doi.org/10.54675/PCSP7350

van Dijck, J. (2021). Platform society: Public values in a connective world. Oxford University Press.