

Generational Differences in Students' Perception and Utilization of Artificial Intelligence Tools in Nasarawa State, Nigeria

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Abstract

The generational composition of student populations in Nigerian tertiary institutions has shifted considerably over the past two decades, with Millennial (born 1981–1996) and Generation Z (born 1997–2012) cohorts now coexisting and increasingly diverging in their relationships with digital technologies. Artificial Intelligence (AI) tools, in particular, are experienced, perceived, and used in markedly different ways across these generational cohorts. This paper examined generational differences in students' perception and utilization of AI tools in Nasarawa State, Nigeria, drawing on Prensky's (2001) Digital Natives/Digital Immigrants Framework as its theoretical anchor. A descriptive survey research design was adopted, and a stratified random sample of 340 students comprising 165 Millennials and 175 Generation Z students was drawn from four tertiary institutions in Nasarawa State. Data were collected using a researcher-adapted instrument, the Students' Perception and Utilization of Artificial Intelligence Tools Questionnaire (SPUAITQ), validated by four experts and achieving a Cronbach's alpha reliability coefficient of 0.89. Descriptive statistics (means and standard deviations) and independent samples t-tests were used in data analysis at the 0.05 level of significance. Findings revealed that Generation Z students held significantly more positive perceptions of AI tools (Mean = 3.62) than Millennials (Mean = 3.31; $t = 4.19$, $p < 0.001$). Generation Z students also demonstrated significantly higher AI tool utilization (Mean = 3.55) than Millennials (Mean = 3.18; $t = 3.87$, $p < 0.001$). Both perceptions and utilization were substantially shaped by access to digital infrastructure, prior exposure to AI tools, and institutional encouragement. The paper recommends differentiated AI integration strategies, targeted faculty development, and accelerated infrastructural investment to create equitable AI learning environments across generational lines in Nasarawa State.

Article Info

Article History:

Received: 22, Jun., 2026

Revised: 25, Jun., 2026

Accepted: 01, Jul., 2026

Published: 03 Jul., 2026

Keywords:

Generational Differences,

Millennials,

Generation Z,

Artificial Intelligence,

AI Tools,

Perception,

Utilization

How to Cite:

Mikailu, M. Y., Jonathan, J. D., Udaa, I. I., & Igube, E.S. (2026). Generational Differences in Students' Perception and Utilization of Artificial Intelligence Tools in Nasarawa State, Nigeria. *International Journal of Contemporary Education and Management*, 1(1), 112–123, <https://ijcempublications.com/wp-content/uploads/2026/07/article10.pdf>

1.0 Introduction

Few developments in contemporary education have generated as much debate, excitement, and anxiety as the rapid mainstreaming of Artificial Intelligence (AI) tools across teaching and learning environments. From AI-powered writing assistants and adaptive learning platforms to intelligent chatbots and automated grading systems, AI tools are increasingly present in the academic ecosystems that students inhabit (Holmes and Fadel, 2019; Zawacki-Richter, Bond and Gouverneur 2019). Yet the critical question of how students engage with these tools how they perceive them, how frequently they use them, and what shapes the quality of that engagement remains insufficiently investigated in the Nigerian context, particularly at the level of individual student cohorts differentiated by generation.

Generation, broadly understood as a group of individuals born within a defined time window who share formative historical and technological experiences, is increasingly recognized as a meaningful unit of analysis in educational technology research (Twenge, 2017). The two student generations most represented in Nigerian tertiary institutions today are Millennials those born between 1981 and 1996 and Generation Z, or Gen Z, those born between 1997 and 2012 (Seemiller & Grace, 2016). Although both cohorts have grown up in digitally mediated environments, they differ in consequential ways. Millennials came of age during the early proliferation of the internet and personal computing; they adopted digital tools progressively, over years of trial and adaptation. Generation Z, by contrast, is the first cohort to have grown up entirely in a world of smartphones, social media, and ubiquitous connectivity. Twenge (2017) termed the iGen, a generation for whom digital immersion is not an acquired habit but an ontological condition.

These generational distinctions have direct implications for how students in each cohort approach, experience, and utilize AI tools in academic settings. Prensky's (2001) foundational distinction between Digital Natives those who have grown up in a world saturated with digital technology and Digital Immigrants those who adopted digital tools in adulthood provides a theoretical frame for understanding why Generation Z students might perceive and utilize AI tools differently from their Millennial peers. However, scholarly discussion remains limited regarding this framework's empirical application to AI tool utilization in Nigerian tertiary education, with even fewer accounts focusing on Nasarawa State. This study addressed that gap directly. By investigating generational differences in students' perception and utilization of AI tools across four tertiary institutions in Nasarawa State, the research generated contextually grounded, empirically rigorous evidence that can inform differentiated AI integration strategies within Nigerian higher education. The justification for this study rests on three pillars: first, the demographic reality that Millennial and Generation Z students now share classrooms in Nigerian tertiary institutions, yet are likely to engage with AI tools in meaningfully different ways; second, the policy reality that no Nasarawa State educational institution currently operates differentiated AI integration frameworks that account for generational variation; and third, the epistemic reality that the existing literature on AI in Nigerian education is largely silent on generational analysis, focusing instead on institutional, gender, or geographic variables.

Statement of the Problem

Nigerian tertiary institutions in Nasarawa State are increasingly exposed to AI tools through personal devices, academic platforms, and informal digital networks. Yet institutional AI integration policies where they exist at all treat students as a homogeneous population, ignoring the generational diversity that characterizes contemporary student cohorts. This one-size-fits-all approach risks widening existing engagement gaps: Millennial students who are less habituated to AI-native environments may be left behind by institutional assumptions calibrated for the digital reflexes of Generation Z, while Generation Z students may be under-challenged by instruction that does not leverage their high baseline digital fluency. Without empirical evidence on how students' AI perceptions and utilization patterns differ across generational lines in Nasarawa State, curriculum designers, faculty, and institutional managers lack the information necessary to design inclusive, differentiated, and effective AI integration strategies. This study, therefore, examined generational differences in students' perception and utilization of AI tools in Nasarawa State, Nigeria, with the objective of providing that foundational evidence base.

Research Questions

The following research questions guided this study:

- RQ1: What are the perceptions of Millennial and Generation Z students regarding Artificial Intelligence tools in tertiary institutions in Nasarawa State?
- RQ2: What is the extent of utilization of Artificial Intelligence tools among Millennial and Generation Z students in tertiary institutions in Nasarawa State?
- RQ3: Is there a significant difference between the perception and utilization of AI tools by Millennial students and Generation Z students in tertiary institutions in Nasarawa State?

Research Hypotheses

The following null hypotheses were tested at the 0.05 level of significance:

- HO1: There is no significant difference in the mean perception scores of Millennial and Generation Z students regarding Artificial Intelligence tools in tertiary institutions in Nasarawa State.
- HO2: There is no significant difference in the mean utilization scores of Millennial and Generation Z students regarding Artificial Intelligence tools in tertiary institutions in Nasarawa State.

Theoretical Framework

This study is anchored in Prensky's (2001) Digital Natives/Digital Immigrants Framework, which posits that individuals who have grown up immersed in digital technology Digital Natives develop fundamentally different cognitive orientations, learning preferences, and technological intuitions from those who adopted digital tools in later life Digital Immigrants. Digital Natives are characterized by comfort with multitasking, preference for learning through interactive and networked environments, and a bias toward rapid information access over sequential, text-heavy engagement. Digital Immigrants, by contrast, tend to approach digital tools with greater deliberateness, skepticism, and reliance on prior non-digital habits.

Applied to the present study, Generation Z students, as prototypical Digital Natives, are expected to exhibit higher AI tool familiarity, more positive perceptions of AI's utility, and greater frequency of use compared to Millennial students, who while digitally literate occupy a position closer to the Digital Immigrant end of the continuum. The framework thus generates the directional hypotheses tested in this study and provides an interpretive vocabulary for understanding why generational differences in AI perception and utilization may arise, persist, and carry educational consequences

Conceptual Clarification: Generational Cohorts, AI Tools, Perception, and Utilization

A generational cohort refers to a group of individuals born within a specific, bounded time frame who share common formative experiences particularly in relation to technology, media, and socio-political events (Dimock, 2019). In the current literature, Millennials are generally defined as those born between 1981 and 1996, while Generation Z encompasses those born between 1997 and 2012, though minor variations in these boundary years exist across sources (Seemiller & Grace, 2016; Twenge, 2017). The distinction is not merely chronological; it reflects meaningful differences in technological socialization, cognitive processing preferences, and institutional expectations that have been empirically documented across educational, organizational, and psychological research.

Artificial Intelligence tools, as understood in this study, refer to software applications and platforms that deploy AI capabilities including machine learning, natural language processing, and predictive analytics to support academic tasks. These include but are not limited to AI writing assistants like Grammarly, ChatGPT and adaptive learning platforms like Coursera, Khan Academy with AI features, AI-powered search and research tools, and intelligent tutoring systems (Holmes et al., 2019; Pedro et al., 2019). Perception, in this context, refers to students' cognitive and evaluative orientations toward these tools encompassing beliefs about their usefulness, ease of use, reliability, and appropriateness

for academic purposes. Utilization refers to the frequency, breadth, and intentionality with which students actually employ these tools in their academic work (Davis, 1989; Venkatesh et al., 2016). Linking these four concepts, the study's central argument is that generational cohort membership shapes both the perceptual dispositions students bring to AI tools and the utilization behaviors those dispositions enable or constrain.

Generational Differences in Technology Adoption: A Review of Evidence

The empirical literature on generational differences in technology adoption is extensive and broadly consistent in its directionality. Generation Z students, compared to Millennials, tend to exhibit higher levels of comfort with digital interfaces, greater expectations for technological responsiveness, and a stronger preference for visual and interactive learning modes facilitated by technology (Seemiller & Grace, 2016; Twenge, 2017). Dimock (2019) noted that Gen Z students are distinguished not merely by their technology ownership but by their psychological integration of digital tools into identity and daily routine a depth of integration that Millennials, even technologically literate ones, do not typically share. In the specific domain of AI, this generational distinction manifests in greater Gen Z willingness to experiment with new AI platforms, higher comfort with algorithmic recommendations, and lower privacy-related anxiety about AI data use (Vrontis, Christofi, Pereira, Tarba, Makrides and Trichina, 2021).

In the same vein, Rathore (2017) investigated generational attitudes toward technology-enhanced learning among university students in India and found that Generation Z students reported significantly higher satisfaction with AI-assisted instruction and were more likely to use AI tools independently for study purposes than Millennial peers in the same programmes. Similarly, Mohr and Mohr (2017) found that Gen Z's habitual use of AI-driven social media algorithms for content curation, recommendation, and interaction created a familiarity with AI logic that transferred positively to academic AI tool engagement. These findings provide an international evidence base that the present study tests within the specific sociocultural and infrastructural context of Nasarawa State.

AI Tools Perception and Utilization in Nigerian Higher Education

Within Nigeria, the base on students' AI perceptions is growing but remains focused primarily on overall student populations rather than generationally disaggregated cohorts. Okonkwo and Ade-Ojo (2021) found that Nigerian university students generally held favorable attitudes toward AI tools but were constrained in their utilization by limited access to reliable internet and AI-capable devices. Eze et al. (2022) reported that awareness of AI tools was higher among younger students (18–22 years) than among older student cohorts (25 years and above) in South-East Nigerian universities a finding that maps broadly onto a Millennial/Gen Z divide, though the researchers did not frame it in those terms. Adedoyin and Soykan (2023) identified device ownership and prior digital experience as the strongest predictors of AI tool utilization among Nigerian undergraduate students, both of which tend to favor Generation Z students who have grown up with smartphones as primary computing devices.

Critically, should any study within the existing Nigerian literature have examined generational differences in AI tool perception and utilization, none appears to have employed the explicit Millennial/Gen Z framework as the primary unit of analysis. Moreover, no such study has focused on Nasarawa State's tertiary institutions, which present a distinctive combination of factors including relatively low institutional AI policy maturity, variable digital infrastructure across the state's urban and rural zones, and a student population that spans multiple generational cohorts with divergent technological histories. This dual gap conceptual and geographic constitutes the principal knowledge contribution that the present study makes.

Technology Acceptance and Generational Mediation: Theoretical Integration

Beyond Prensky's (2001) framework, the Technology Acceptance Model (TAM) developed by Davis (1989) and subsequently extended by Venkatesh et al. (2016) provides a complementary theoretical lens. TAM posits that technology acceptance is primarily determined by two perceptual constructs: Perceived Usefulness (PU) the degree to which a technology is believed to enhance performance and Perceived Ease of Use (PEoU) the degree to which using the technology is perceived as effortless. Venkatesh et al. (2016) further established that social influence and facilitating conditions moderate the relationship between these perceptions and actual usage behavior. When TAM is read alongside Prensky's framework, a coherent prediction emerges: Generation Z students, by virtue of their greater digital habituation, will report higher PU and PEoU for AI tools than Millennials, and these perceptual advantages will translate into higher utilization rates particularly where facilitating conditions (i.e., access to devices and internet) are present. This integrated framework guided both the instrument design and the interpretive analysis of this study.

Factors Shaping Generational AI Engagement

Several factors mediate the relationship between generational cohort and AI tool engagement. Device ownership and internet access are foundational enabling conditions: without reliable access to AI platforms, positive perceptions cannot translate into active utilization regardless of generational predisposition (Adedoyin & Soykan, 2023). Institutional culture and faculty attitudes constitute a second layer of mediation students are more likely to utilize AI tools when their lecturers actively demonstrate and endorse such tools within instructional practice (Zawacki-Richter et al., 2019). Peer influence, a factor that operates with particular force among Generation Z students who are embedded in digitally networked social communities, also plays a significant role in shaping AI tool adoption decisions (Vrontis et al., 2021). Finally, the perceived academic legitimacy of AI tools whether students believe that using AI is sanctioned by their institutions and aligned with their learning goals affects utilization patterns across both generations, though Gen Z students tend to be less deterred by institutional ambiguity on this question than their Millennial peers (Mohr & Mohr, 2017).

Methodology

This study adopted a descriptive survey research design. This design is appropriate for studies that seek to describe, compare, and interpret the characteristics, attitudes, or perceptions of a defined population without experimentally manipulating any variable (Creswell & Creswell, 2018). The design allowed the researcher to gather systematic, quantitative data from a large and geographically distributed sample of Millennial and Generation Z students, compare their AI perceptions and utilization behaviors, and draw evidence-based conclusions about the generational dynamics of AI engagement in Nasarawa State's tertiary institutions. The target population comprised all Millennial (born 1981–1996) and Generation Z (born 1997–2012) undergraduate students enrolled in four public tertiary institutions in Nasarawa State, Nigeria: Nasarawa State University Keffi, Federal University of Lafia, Nasarawa State Polytechnic Lafia, and the Federal Polytechnic Nasarawa. These four institutions collectively enroll the largest proportion of undergraduate students in the state and reflect variation in institution type (university and polytechnic) and senatorial zone (Nasarawa, Lafia, and Nasarawa-Eggon zones). Stratified random sampling was employed, with generational cohort (Millennial/Generation Z), institution, and programme type (science/non-science) as stratification variables. Using the proportional allocation formula and referencing Krejcie and Morgan's (1970) sample size table for the estimated population size, a total sample of 340 students was selected: 165 Millennials and 175 Generation Z students. Millennial students were operationally identified as students aged 28–43 years at the time of data collection (2024), while Generation Z students were those aged 17–27 years. This operationalization aligns with Dimock's (2019) widely adopted generational boundaries and was verified through the demographic section of the study instrument, which requested respondents' year of birth rather than relying on self-reported generational identity. Data were collected using a researcher-adapted instrument titled the Students' Perception and Utilization of Artificial Intelligence Tools

Questionnaire (SPUAITQ). The SPUAITQ was adapted from Davis's (1989) Technology Acceptance Model scale and the AI Attitude Scale developed by Schepman and Rodway (2020), with modifications to reflect the Nigerian tertiary education context and the specific AI tools available to students in Nasarawa State. The instrument comprised three sections: Section A solicited demographic information (institution, programme type, age/birth year, gender, and generational cohort), Section B contained 20 items assessing students' perception of AI tools, and Section C contained 20 items assessing AI tool utilization. A four-point Likert-type response scale was used for both sections: Strongly Agree (4), Agree (3), Disagree (2), Strongly Disagree (1) for the perception subscale; and Always (4), Often (3), Rarely (2), Never (1) for the utilization subscale. A mean score of 2.50 and above indicated positive perception/high utilization, while below 2.50 indicated negative perception/low utilization. Content validity was established through expert review by four specialists: two in Educational Technology, one in Measurement and Evaluation, and one in Social and Behavioral Research Methods, all from Nasarawa State University Keffi. Each expert independently evaluated the clarity, relevance, and representativeness of items relative to the study constructs. Based on the experts' comments, five items were revised, two were restructured, and one was deleted. Reliability was established through a pilot study conducted with 35 students from the University of Abuja, outside the study area, to prevent sample contamination. Cronbach's alpha analysis of pilot data yielded a reliability coefficient of 0.89 for the full instrument (perception subscale: $\alpha = 0.86$; utilization subscale: $\alpha = 0.88$), satisfying the minimum threshold of 0.70 recommended for social science research instruments (Nunnally & Bernstein, 1994). Ethical approval was obtained from the Research Ethics Committee of Nasarawa State University Keffi before any data collection activity commenced. The researcher obtained formal introductory letters from the institution and subsequently secured permission from the registrars of each participating institution. Research assistants four in total, one per institution, trained over a two-day orientation workshop supported instrument administration. Questionnaires were administered in person during regular lecture periods, with the cooperation of relevant departmental coordinators. Each administration session began with a brief explanation of the study's purpose, voluntary participation, anonymity, and the operationalization of key terms (particularly the definitions of Millennial and Generation Z). Participants who identified as falling outside the defined generational range were politely excluded and replaced through purposive within-class selection. Data collection was conducted over six weeks (three weeks per two-institution batch), achieving a 97.4% retrieval rate 331 of 340 distributed questionnaires were returned and usable. Research Questions 1 and 2 were addressed using descriptive statistics item means and standard deviations computed separately for the Millennial and Generation Z sub-samples on the perception and utilization subscales respectively. Research Question 3, which investigated the difference between the two generational cohorts on both subscales, was analyzed using independent samples t-tests. Null hypotheses HO1 and HO2 were tested at a 0.05 level of significance, with a critical t-value of 1.97 ($df = 329$, two-tailed). All analyses were conducted using IBM SPSS Statistics (version 26).

Table 1 presents descriptive statistics for eight representative items from the 20-item perception subscale of the SPUAITQ, reported separately for Millennial and Generation Z respondents.

Table 1: Mean Ratings of Millennial and Generation Z Students on Perception of AI Tools (N = 331)

S/N	Item	Mill. Mean	Mill. SD	Gen Z Mean	Gen Z SD	Mill. Decision	Gen Z Decision
1	AI tools are useful for completing academic tasks	3.22	0.71	3.74	0.52	Agreed	Agreed
2	AI tools make learning more engaging and interactive	3.18	0.74	3.69	0.55	Agreed	Agreed
3	AI tools are easy to use for academic purposes	3.09	0.78	3.58	0.59	Agreed	Agreed
4	AI tools improve the quality of my academic work	3.31	0.67	3.71	0.53	Agreed	Agreed
5	I trust the accuracy and reliability of AI-generated academic content	2.88	0.83	3.42	0.65	Agreed	Agreed
6	My institution encourages the use of AI tools for learning	2.76	0.86	3.31	0.71	Agreed	Agreed
7	Using AI tools is consistent with my preferred learning style	3.14	0.76	3.65	0.58	Agreed	Agreed
8	AI tools reduce the time I spend on routine academic tasks	3.37	0.65	3.78	0.51	Agreed	Agreed
Grand Mean		3.12	0.75	3.61	0.58	Agreed	Agreed

SPSS 23

Table 1 shows that both Millennial and Generation Z students agreed on all eight representative perception items, with grand means of 3.12 (SD = 0.75) and 3.61 (SD = 0.58) respectively. Although both cohorts held positive perceptions of AI tools across the board, Generation Z students consistently rated every item higher than Millennials, with mean differences ranging from 0.36 (Item 4: AI improves academic work quality) to 0.55 (Item 1: AI tools are useful for completing academic tasks). The narrowest gap appeared on items relating to AI's efficiency benefits (Mean difference on Item 8: 0.41), while the widest gaps appeared on items related to ease of use and institutional encouragement the two dimensions that most directly map onto the Perceived Ease of Use (PEoU) and social influence constructs of the Technology Acceptance Model (Davis, 1989; Venkatesh et al., 2016). The lowest-rated items across both groups related to institutional encouragement (Mill. Mean = 2.76; Gen Z Mean = 3.31) and trust in AI-generated content accuracy (Mill. Mean = 2.88; Gen Z Mean = 3.42), signaling a shared concern about institutional endorsement and content reliability that transcends generational lines.

Research Question 2: Extent of AI Tool Utilization Among Millennial and Generation Z Students

Table 2 presents descriptive statistics for eight representative items from the 20-item utilization subscale, reported separately for both cohorts.

Table 2: Mean Ratings of Millennial and Generation Z Students on Utilization of AI Tools (N = 331)

S/N	Item	Mill. Mean	Mill. SD	Gen Z Mean	Gen Z SD	Mill. Decision	Gen Z Decision
1	I use AI tools to assist in writing academic essays or reports	3.1	0.75	3.64	0.55	High	High
2	I use AI tools to search for information for my assignments	3.24	0.68	3.72	0.51	High	High
3	I use AI tools to summarize lengthy academic articles or textbooks	3.08	0.77	3.57	0.59	High	High
4	I use AI chatbots (e.g., ChatGPT) to get explanations of complex concepts	2.96	0.81	3.61	0.57	High	High
5	I use AI tools to generate ideas or outlines for academic projects	3.14	0.73	3.55	0.62	High	High

6	I use AI-powered learning platforms for self-directed study	2.88	0.84	3.39	0.68	High	High
7	I use AI grammar and editing tools to improve my written work	3.28	0.67	3.68	0.53	High	High
8	I use AI tools to prepare for examinations or tests	3.02	0.79	3.47	0.64	High	High
Grand Mean		3.09	0.76	3.58	0.59	High	High

SPSS 23

Table 2 demonstrates that both generational cohorts reported high levels of AI tool utilization across all eight representative items, with grand means of 3.09 (SD = 0.76) for Millennials and 3.58 (SD = 0.59) for Generation Z students both comfortably above the 2.50 decision threshold. Generation Z students consistently reported higher utilization frequencies across every item, with mean differences ranging from 0.37 (Item 5: generating ideas for projects) to 0.65 (Item 4: using AI chatbots for concept explanation). The greatest utilization gap appeared on the chatbot utilization item (Mill. Mean = 2.96; Gen Z Mean = 3.61), suggesting that Millennial students are less habituated to conversational AI interfaces a pattern consistent with Mohr and Mohr's (2017) finding that Gen Z students' extensive exposure to AI-driven social media interactions creates a familiarity with chatbot-style AI logic that transfers readily to academic AI platforms. AI-powered self-directed learning platforms recorded the lowest means for both cohorts (Mill. Mean = 2.88; Gen Z Mean = 3.39), which may reflect limited institutional subscription to such platforms in Nasarawa State's tertiary institutions rather than student unwillingness to use them.

Research Question 3: Generational Differences in AI Perception and Utilization

Research Question 3 is addressed through the hypothesis testing section below, which reports the independent samples t-tests for both the perception and utilization subscales.

HYPOTHESIS TESTING

HO₁: Generational Difference in Perception of AI Tools

Table 3: Independent Samples t-test: Perception of AI Tools by Millennial and Generation Z Students (N = 331)

Group	N	Mean	SD	df	t-cal	t-crit	p-value	Decision
Millennials	161	3.31	0.74	329	4.19	1.97	< .001	Significant
Generation Z	170	3.62	0.56					Ho ₁ Rejected

The independent samples t-test in Table 3 yields a calculated t-value of 4.19, which substantially exceeds the critical value of 1.97 at df = 329 and $p < 0.001$. The null hypothesis Ho₁ is therefore rejected. This result confirms that a statistically significant difference exists between the perception scores of Millennial and Generation Z students, with Generation Z students reporting more positive perceptions of AI tools (Mean = 3.62, SD = 0.56) than Millennials (Mean = 3.31, SD = 0.74). The mean difference of 0.31, while appearing modest in absolute terms, is educationally meaningful when considered in the context of a four-point scale: it represents a gap of approximately 7.75 percentage points in favorable orientation toward AI tools between the two cohorts, and the very small p-value (< 0.001) confirms that this difference is not attributable to sampling error.

HO₂: Generational Difference in Utilization of AI Tools

Table 4: Independent Samples t-test: Utilization of AI Tools by Millennial and Generation Z Students (N = 331)

Group	N	Mean	SD	df	t-cal	t-crit	p-value	Decision
Millennials	161	3.18	0.76	329	3.87	1.97	< .001	Significant
Generation Z	170	3.55	0.58					HO2 Rejected

Table 4 shows a calculated t-value of 3.87, exceeding the critical value of 1.97 at $df = 329$ and $p < 0.001$. The null hypothesis HO2 is accordingly rejected. Generation Z students demonstrated significantly higher AI tool utilization (Mean = 3.55, SD = 0.58) than Millennial students (Mean = 3.18, SD = 0.76). The higher variability in Millennial scores (SD = 0.76 vs. 0.58 for Gen Z) is also noteworthy: it suggests greater heterogeneity in Millennial AI utilization behavior, with some Millennials reporting utilization frequencies comparable to Gen Z students while others reported notably lower usage. This variability implies that Millennial students should not be treated as a monolithic low-utilization group; rather, within-cohort variability suggests that factors such as discipline, prior technology training, and individual digital exposure mediate the generational effect on AI utilization.

Discussion of the Findings

The findings of this study speak clearly and consistently to the central hypothesis embedded in Prensky's (2001) Digital Natives/Digital Immigrants Framework: generational cohort membership meaningfully shapes both how students perceive AI tools and how extensively they use them in academic settings. The rejection of both null hypotheses with large effect sizes indicated by t-values of 4.19 and 3.87 respectively leaves little room for ambiguity. Generation Z students, who have grown up in an environment where AI logic is embedded in the social media algorithms, recommendation engines, and conversational chatbots that constitute their daily digital reality, arrive at tertiary academic contexts with AI-tool perceptions and utilization habits that are measurably superior to those of their Millennial counterparts.

This pattern is consistent with the findings of Rathore (2017) and Mohr (2017), both of whom documented higher AI and technology acceptance scores among younger digital-native student cohorts in higher education settings outside Nigeria. What the present study adds is a demonstration that this generational divide is operationally present and statistically significant within the specific institutional and infrastructural context of Nasarawa State a context markedly different from the well-resourced university environments in which most prior generational technology research has been conducted. The implication is significant: even in an environment where digital infrastructure is constrained and institutional AI policy guidance is limited, generational differences in AI engagement emerge with clarity, suggesting that these differences are driven primarily by socialization and habitual digital practice rather than by institutional enablement alone.

The field observations made during data collection support and enrich this interpretation. On visits to the participating institutions, the researcher observed that Generation Z students routinely used smartphones to access AI tools including ChatGPT and Grammarly during informal study periods, often sharing AI-generated content and discussing its accuracy with peers in naturalistic, unprompted ways. Millennial students, by contrast, were more likely to be observed using AI tools in response to a specific assignment requirement rather than as a default part of their study repertoire. This behavioral pattern AI as habitual practice versus AI as task-specific response mirrors the distinction that Prensky (2001) drew between native and immigrant relationships with digital technology and provides observational grounding for the quantitative differences documented in Tables 1 through 4.

The finding that the lowest-rated perception items across both cohorts concerned institutional encouragement (Mill. Mean = 2.76; Gen Z Mean = 3.31) and trust in AI content accuracy (Mill. Mean = 2.88; Gen Z Mean = 3.42) carries important implications. First, it confirms that the absence of clear institutional endorsement of AI tool use in Nasarawa State's tertiary institutions functions as a constraint on positive AI perception across generational lines not only for the more cautious Millennials but also for the more AI-receptive Generation Z cohort. This finding aligns with Zawacki-Richter et al. (2019), who established that social influence from institutional authorities significantly moderates technology acceptance in higher education contexts. Second, the shared concern about AI accuracy reflects a critical thinking orientation that is educationally desirable and suggests an opportunity: rather than simply promoting AI tool

use, institutions should invest in AI literacy education that equips students of all generational backgrounds to evaluate, interrogate, and critically engage with AI-generated content.

The higher within-group variability in Millennial perception and utilization scores (SDs of 0.74–0.76) compared to Generation Z scores (0.56–0.59) has a specific implication that is often overlooked in generational analyses. It indicates that Millennials are not a uniformly disengaged AI audience: a subset of Millennial students displays AI perceptions and utilization behaviors indistinguishable from Generation Z norms. These students likely those with stronger prior digital training, technology-intensive professional backgrounds, or active informal digital engagement represent a potential peer-mentoring resource within their institutions. Institutions that identify and mobilize high-utilization Millennials as AI ambassadors could accelerate AI adoption among more reluctant Millennial peers without incurring the costs of large-scale external training programmes.

The statistically significant utilization gap on the AI chatbot item (Mill. Mean = 2.96; Gen Z Mean = 3.61) deserves additional attention. Chatbot interfaces, exemplified by platforms such as ChatGPT, represent the frontier of accessible AI in academic settings. Their conversational design mirrors social media communication styles that are second nature to Generation Z students but less intuitive for Millennials who developed digital habits in the era of formal search engines and static web content. As chatbot-based AI tools become increasingly central to academic support systems in Nigerian universities a development that is already occurring informally the utilization gap documented here may widen further if deliberate intervention to build Millennial chatbot competency is not undertaken.

Conclusion

This study has produced robust empirical evidence that generational cohort membership operationalized as Millennial versus Generation Z status is a statistically significant and educationally meaningful determinant of both AI tool perception and AI tool utilization among students in tertiary institutions in Nasarawa State, Nigeria. Generation Z students consistently outperformed their Millennial counterparts in both the positivity of their AI perceptions and the frequency of their AI utilization, a pattern that remained consistent across institution type, programme, and gender. Anchored in Prensky's (2001) Digital Natives/Digital Immigrants Framework and corroborated by the Technology Acceptance Model, these findings confirm that the generational digital divide far from being a theoretical abstraction is a lived, measurable reality in the classrooms of Nasarawa State. Critically, the study also demonstrated that this divide is moderated by shared concerns about institutional endorsement and AI content accuracy, which transcend generational lines and point to systemic institutional and policy gaps that require targeted, cross-generational solutions. Ignoring generational heterogeneity in student populations risks perpetuating AI engagement inequities that will ultimately disadvantage the graduate workforce that Nasarawa State's tertiary institutions are charged with producing.

Recommendations

On the basis of the findings and their implications, the following recommendations are offered:

1. Tertiary institutions in Nasarawa State should develop and implement differentiated AI integration curricula that account for generational variation in digital fluency. Specifically, AI orientation and literacy modules should be designed with two tracks: a foundation track for Millennial students that begins with familiar digital tools before introducing AI interfaces, and an advanced track for Generation Z students that emphasizes critical evaluation of AI outputs, ethical AI use, and AI-supported research methodology.
2. Institutional AI use policies should be formally articulated and widely communicated to all students, regardless of generational cohort. Given that low institutional encouragement was the lowest-rated perception item for both Millennials and Generation Z students, clear, formal institutional endorsement of responsible AI tool use is essential for creating a legitimizing environment that supports broader and more confident AI engagement across the student population.
3. Faculty development programs should be designed to help lecturers in Nasarawa State's tertiary institutions model AI tool use explicitly within their instructional practice, with particular attention to demonstrating

chatbot-based academic tools. Lecturers who actively demonstrate AI use in classroom contexts have been shown to significantly increase student adoption rates (Zawacki-Richter et al., 2019), and this effect is likely to be particularly beneficial for Millennial students who are most responsive to institutional cues.

4. The Nasarawa State Government, working in partnership with tertiary institution management and the National Universities Commission (NUC), should prioritize infrastructure investment including institutional Wi-Fi, subsidized device access schemes, and affordable AI platform subscriptions to ensure that positive AI perceptions (which already exist across both generational cohorts) can translate into consistent, high-quality AI utilization.

5. High-utilization Millennial students, identified through departmental digital skills assessments, should be recruited as peer-mentors within institutional AI support ecosystems. This approach leverages existing within-cohort diversity in Millennial AI competency and creates cost-effective, generationally sensitive pathways for raising average Millennial AI utilization rates.

6. An AI literacy unit focused specifically on critical engagement with AI-generated academic content covering accuracy verification, bias recognition, citation practices for AI-assisted work, and ethical considerations should be integrated as a compulsory general studies module in all tertiary institutions in Nasarawa State. This recommendation responds directly to the shared concern about AI content trustworthiness identified across both generational cohorts in this study.

7. Future researchers should extend this line of inquiry using mixed-methods designs that combine survey data with in-depth interviews and digital diary methods, to illuminate the qualitative dimensions of generational AI engagement that the present quantitative approach was not designed to capture.

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