Investigation of GPT-Based Tools in Preventing Plagiarism and Enhancing Research Skills for University Students with Technical English Language Challenges: An Experimental Approach to Promoting Ethical Awareness

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***Abstract*—This study explores the students' Continuous Intention (CI) to use the GPT-based tools in academia, including the tools for overcoming machine written content, in enhancing research skills and addressing technical English language challenges among university students. Focusing on preventing plagiarism and raising ethical awareness, an experimental approach was employed to measure the tools' effectiveness via the combination of AI Engagement Theory (AET), Ethical Decision-Making (EDM), and Research Skill Development (RSD) to analyze how GPT-based tools impact plagiarism prevention, research quality, and academic integrity. The findings revealed a significant 70% reduction in plagiarism detection scores following the intervention, showcasing the tools' capability in supporting original content creation and reducing academic dishonesty. Furthermore, 80% of participants demonstrated improved citation accuracy, and 65% reported enhancements in their research competencies. Ethical awareness also increased, with 50% more students recognizing the implications of AI-generated content by the study's conclusion. To better address these components, external niceties, here in the Sultanate of Oman, are considered to avoid influencing the research findings. These results underscore the potential of GPT-based tools, particularly the Human Intelligence X (Cross-Platform)); an AI-powered writing and research assistant platform, in advancing ethical research practices and supporting students in overcoming linguistic barriers in technical academic contexts.**

***Keywords*—NoteGPT, ChatGPT, human intelligence, learning, plagiarism, humanize**

I. Introduction

The integration of Artificial Intelligence (AI) tools in education have shown an unpreceded academic practices, particularly in research and writing [1–3]. At the time, where for university students conducting research in English as a non-native language, mastering technical English poses significant challenges. These include structuring coherent arguments, adhering to academic conventions, and producing original, high-quality content. Such challenges often impact the quality of assignments and research, limiting students' ability to fully engage in scholarly activities [4]. AI tools, particularly GPT-based systems like ChatGPT and NoteGPT.AI, offer transformative potential to address these challenges while teaching essential academic values. These tools provide invaluable support in multiple ways:

- Content Generation and Refinement: ChatGPT aids in drafting well-structured and coherent academic texts, ensuring clarity and precision in presenting ideas.
- Language and Expression: ChatGPT enhances grammatical accuracy, vocabulary usage, and sentence fluency, helping non-native English speakers communicate effectively in technical English.
- Ethical Research Practices: ChatGPT shows originality and educates students on avoiding plagiarism through proper paraphrasing and citation guidance.
- Efficient Note-Taking: NoteGPT.AI assists students in synthesizing lecture materials, converting key points into actionable knowledge while ensuring accuracy and relevance.
- Notably, NoteGPT.AI plays a critical role in upholding academic values such as integrity and respect for intellectual property. By encouraging students to engage deeply with their materials and structuring their notes ethically, NoteGPT.AI reduces the risk of inadvertent misuse of information. It promotes thorough comprehension, ensuring that students internalize ideas instead of merely reproducing them. The tool also serves as a bridge between passive learning and active application, empowering students to critically analyze and responsibly integrate knowledge into their work.

The work procedure of the NoteGPT.AI is described in Fig. 1:

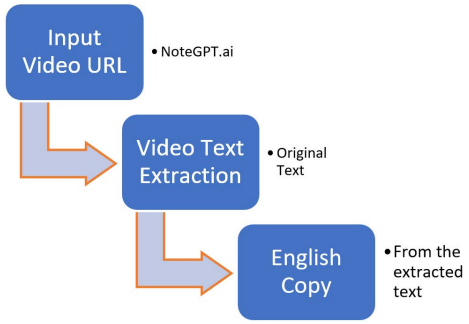

Fig. 1. NoteGPT work procedure.

At this level, the humanized non plagiarized work remains a pressing concern in academia, especially for students with limited English proficiency who may unintentionally over-rely on external sources [5]. AI tools like ChatGPT and NoteGPT.AI not only support the creation of original content but also embed academic values into the research process, reinforcing the importance of ethical practices and

intellectual responsibility [6, 7].

In addition to ChatGPT and NoteGPT.AI, originality.ai and HIX.AI offer unique capabilities for supporting university students in overcoming challenges related to technical English and academic integrity. Originality.ai provides advanced plagiarism detection, enabling students to verify the uniqueness of their content and ensure it aligns with ethical research standards. Where, and at the same time, HIX.AI assists in generating and refining content, guiding users in paraphrasing effectively and crafting original work that adheres to academic norms. Together, these tools empower students to maintain high standards of academic honesty while enhancing their research and writing skills [8–11].

This study investigates the role of GPT-based tools, including ChatGPT, HIX.AI, and NoteGPT.AI, in preventing plagiarism and enhancing the research skills of university students conducting assignments in English as a non-native language. Through an experimental approach, this research evaluates the effectiveness of these tools in supporting originality, improving citation accuracy, and promoting ethical academic practices (illustrated in Fig. 2). The findings aim to demonstrate how AI can empower students to overcome linguistic barriers, improve assignment quality, and uphold academic integrity in higher education [8–11].

Workflow with ethical consideration:

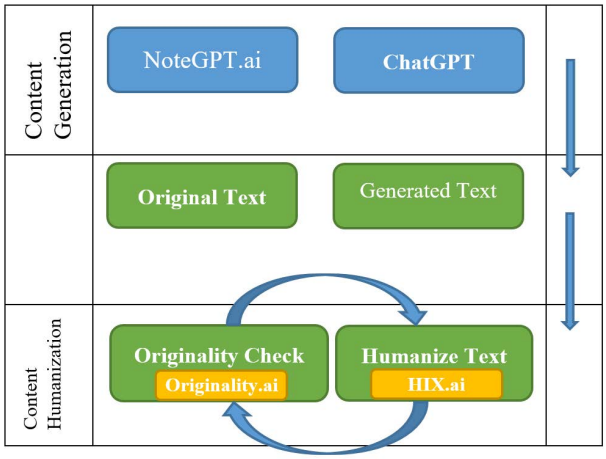

Fig. 2. Humanization of research reports.

II. Literature Review

A. The Role and Impact of ChatGPT in Higher Education

The integration of generative AI tools, particularly ChatGPT, into higher education has gained considerable attention in recent years. As educational institutions increasingly explore these technologies, it is essential to examine the factors influencing their adoption, their impact on academic practices, and the potential opportunities and challenges they bring. This review synthesizes key findings from various studies to understand the diverse aspects of ChatGPT's role in higher education.

1) AI tool adoption and student acceptance

Mahmud *et al*. [9] examined ChatGPT adoption among university students using the Value-Based Adoption Model (VAM). Key factors influencing attitudes included usefulness, enjoyment, technicality, cost, social influence, self-efficacy, and personal innovativeness, with personal innovativeness and self-efficacy having the strongest impact. The study used Partial Least Squares (PLS), ANN, and DNN to analyze correlations, highlighting AI's role in improving academic performance and engagement [9].

Dwivedi *et al*. [10] applied UTAUT2 to assess ChatGPT's impact on research assistance. Performance expectancy and social influence were the most significant drivers of adoption, while habit and information accuracy reinforced trust in AI-based research [10].

Cortez *et al*. [12] analyzed students' behavioral intention and actual use of communicational AI in education, finding perceived relatedness and autonomy as key factors influencing adoption, with productivity enhancement as a primary motive. Their study, grounded in UTAUT2 and self-determination theory, identified facilitating conditions, habit, and performance expectancy as significant predictors of behavioral intention and academic use. The research highlights the evolving teaching-learning environment and suggests extending this framework to broader educational technology studies [12].

Table 1 presents a summary of key studies on AI adoption in education, outlining the technologies used, influencing variables, and theoretical frameworks. By consolidating these findings, the table discloses tendencies in student adoption, usability factors, and ethical considerations, providing a foundation for understanding the opportunities and challenges of AI integration in academic settings.

a) AI Engagement Theory (AET)

Research beyond adopting theories to measure students' engagement level are centric to Human-AI interactions. Jiang *et al*. [13] in their research examine AI Engagement Theory (AET) in the context of human-AI interaction, highlighting how conversational AI, such as chatbots and virtual assistants, enhances engagement through natural language processing and adaptive learning mechanisms. Additionally, personalized recommender systems are identified as key engagement tools, as they utilize machine learning to predict user preferences and sustain long-term interaction through tailored content delivery. Furthermore, the study discusses the role of virtual humans and embodied AI, emphasizing their ability to foster social bonds and immersive experiences by replicating human-like expressions and behaviors [14–17].

b) Ethical Decision-Making (EDM)

Singh *et al*. (2025) investigate decision-making in autonomous vehicles using supervised machine learning models, focusing on predictive analytics to assess human responses under time constraints. Their study identifies age, distraction, and trust in automation as key factors influencing decision outcomes, emphasizing the role of cognitive and behavioral variables in shaping choices. The research highlights the effectiveness of Gaussian Naïve Bayes models in predicting decisions, demonstrating their superior performance compared to other machine learning approaches. While the study does not explicitly discuss Ethical Decision-Making (EDM), its findings provide valuable insights into human decision processes that could inform future ethical considerations in AI-driven autonomous systems [14–17].

c) Research Skill Development (RSD)

D'Ippolit *et al*. [14–17] investigate knowledge

systematization and reconfiguration, highlighting how firms formalize and disseminate knowledge to expand its applicability beyond its original context. Their research underscores the role of structured problem-solving and iterative learning in refining expertise within professional and educational settings. While neither study explicitly addresses Research Skill Development (RSD), both suggest that engagement-driven learning and systematic knowledge organization contribute to the cultivation of inquiry, analytical thinking, and methodological rigor, which are foundational to RSD. Strzelecki [18] demonstrate that online climate simulations, such as Model United Nations and COP role-plays, actively engage students by involving them in problem formulation and negotiation of climate solutions. This hands-on approach deepens understanding and encourages critical thinking about real-world climate challenges. Strzelecki [19] emphasize the importance of students identifying and framing their own climate problems, often related to local issues. Empowering students to formulate problems enhances their engagement, motivation, and connection to the material, leading to more meaningful learning experiences. Kalinkara [20] show that interactive climate data and visualizations in online settings increase students' knowledge and motivation. By working with real data, students are encouraged to analyze and define climate problems, which supports deeper engagement and critical reasoning. Similarly, Vilhunen *et al*. [21] examine student engagement in online climate education, emphasizing the role of problem formulation, ideation, and solution design in fostering active participation and critical thinking. Their study employs ecological momentary assessment (EMA) to analyze real-time engagement, demonstrating that optimal learning occurs when students balance interest, skill, and challenge.

B. Factors Influencing the Adoption of ChatGPT

A number of studies have investigated the factors that drive students' and educators' intentions to adopt ChatGPT. Wang [22] explores the factors that influence IT students' intention to use ChatGPT for educational purposes, identifying perceived ease of use and perceived usefulness as significant determinants. Similarly, Javaid *et al*. [23] and Zhang *et al*. [24] focus on economics students, utilizing a hybrid structural equation modeling-artificial neural network approach to identify self-efficacy and performance expectancy as key factors in students' behavioral intentions toward ChatGPT.

Sumanjeet [25] modifies the unified theory of acceptance and use of technology (UTAUT) model to study the factors influencing the adoption of virtual classrooms and AI tools like ChatGPT, concluding that facilitating conditions, social influence, and performance expectancy are crucial to adoption. Camilleri [26] explores factors influencing performance expectancy and students' intentions to use ChatGPT, emphasizing the importance of perceived usefulness and ease of use as key drivers.

1) ChatGPT's role in academic writing support

The impact of ChatGPT on education has been widely explored in recent literature. Hoernig *et al.* [27] discuss the broader challenges and opportunities of generative AI tools in higher education, arguing that while ChatGPT can improve administrative efficiency and offer personalized learning experiences, it poses risks related to misinformation, bias, and dependency on technology. Mogali *et al*. [28] assess the use of ChatGPT in an anatomy course, finding that it can supplement traditional teaching methods by offering real-time assistance, but should not replace hands-on learning experiences.

Table 1. Assessment technology used, variables and theories

Research	Technology Used	Variables	Theory
[9]	ChatGPT for education	Usefulness (PU), Enjoyment (PE), Technicality (PT), Cost (PC), Social Influence (SI), Self-Efficacy (SE), Personal Innovativeness (PI), Attitude (ATT), Behavioral Intention (BI)	Value-Based Adoption Model (VAM)
[12]	Generative AI adoption	AI Risk, Ethics, Algorithmic Bias, Decision-Making, Responsible AI Use	Utilitarianism, AI Risk Management Framework (AI RMF)
[10]	ChatGPT-based research assistance	Performance Expectancy (PE), Effort Expectancy (EE), Facilitating Conditions (FC), Social Influence (SI), Hedonic Motivation, Learning Value, Habit, Information Accuracy, Innovativeness, Behavioral Intention (BI)	UTAUT2, Readiness Index (TRI)
[27]	Online chat and chatbots for student engagement	Peer Engagement, Sense of Belonging, Student-Led Online Communities, Digital Student Mentors (DSMs), Retention, Social Integration	Community of Practice (CoP), Zone of Proximal Development (ZPD), Student Engagement Theory

Lo [29] offers a rapid review of the literature, noting that ChatGPT can assist students by generating content, offering personalized feedback, and supporting various academic tasks. However, Lo cautions about the accuracy of the tool and the potential for misuse, such as plagiarism.

C. Ethical Challenges in Using AI Tools

Ethical issues regarding ChatGPT's use in education have been a major concern. Moisés [30] provides a conceptual analysis of the challenges and opportunities associated with ChatGPT, stressing the importance of addressing issues like AI biases and ensuring ethical use in academia. These responsibilities underscore the need for appropriate training and support for both educators and students, ensuring the responsible use of AI technologies in academic settings [31]. Besides, they caution that while ChatGPT can enhance learning, its use must be carefully monitored to ensure responsible practices. Also, highlight the potential for ChatGPT to be misused for cheating and generating plagiarized content, suggesting that academic institutions must update their policies to address these challenges [31, 32].

D. Opportunities and Educational Benefits of AI

Despite the challenges, ChatGPT offers substantial opportunities for enhancing education. Berson *et al*. [31, 32] emphasize that generative AI tools like ChatGPT can democratize education by offering scalable support to large numbers of students, particularly in underserved regions. Saif [32] examines economics students' behavioral intention and usage of ChatGPT to find that factors such as system quality,

hedonic motivation, and social influence significantly impact students' intention to use ChatGPT, with attitude serving as a key mediator. Also, authors, further stressed that ChatGPT can address knowledge gaps and provide tailored support, especially in specialized fields like engineering and medicine. However, Saif also argues that ChatGPT should be seen as a tool to complement, rather than replace, traditional teaching methods [32].

In the 2025 research [33], the study explores ChatGPT that presents a significant advancement in managing diverse and complex tasks, offering considerable potential in education. A study integrating ChatGPT into Computer Engineering courses found that 92.5% of students considered it useful and easy to use for academic tasks, although faculty support was slightly lower at 80%. Despite the benefits, students highlighted challenges in verifying the accuracy of responses and noted that ChatGPT's answers could be generic if prompts were not well-defined. However, students with prior experience using ChatGPT found it beneficial when used complementarily with traditional learning methods. Atlas further discusses ChatGPT's generative AI capabilities, which allow it to produce content that mimics human creation, improving text quality and handling large volumes of data. Nevertheless, the tool faces high computational demands and potential biases due to its training data, posing challenges to its broader application in educational settings.

Alam *et al.* [34] highlights the importance of system quality, content quality, and usability in ensuring students' acceptance of AI tools like ChatGPT. These factors also play a significant role in determining the success of ChatGPT in virtual classrooms, where its use can foster deeper learning engagement if integrated properly.

E. AI and Specialized Disciplines

Several studies focus on the application of ChatGPT in specialized fields such as healthcare and engineering. John *et al.* [35] compare the performance of GPT-3.5, GPT-4, and human participants in an ophthalmology written exam, finding that while AI performed well in general, human expertise still outperforms ChatGPT in specialized fields. This underscores the importance of critical thinking and professional expertise in domains like medicine, where AI should assist but not replace human judgment.

F. Virtual Classrooms and AI Tools in Education

The role of AI tools in virtual classrooms has been a topic of considerable interest. Several research studies analyze the factors that influence the adoption of virtual classrooms and AI tools, concluding that successful integration requires strong institutional support, adequate technological infrastructure, and comprehensive training for students and faculty [6, 35]. In this context, AI-powered tools like ChatGPT can significantly enhance the learning experience, providing real-time support and feedback.

The ChatGPT shown in this rich literature has strong supporters seen continuously emerging upon tools like NoteGPT.ai and HIX.ai. which they do the complementary tasks to raise the research quality every time they have been called into action.

Table 2. Investigation technologies, tools, gaps and mitigations

Category	Technology/Tool	Purpose/Function	Gaps	Mitigation
AI-Powered Tools	Adaptive learning platforms, virtual assistants, intelligent tutoring systems	Personalize learning, provide real-time feedback, and enhance problem-solving and critical thinking.	Dedicated research with clear limitation on their impact and adoption in higher education, especially in developing countries.	Investigation study in diverse cultural and educational contexts to understand AI adoption globally.
Data Collection Tools	Google Forms	Distribute and collect survey data from university students.	Limited exploration of cultural and contextual factors in data collection.	Conducting interviews as a qualitative method.
	7-point Likert scale	Measure constructs like autonomy, relatedness, competence, PU, PEOU, and CI.	Potential bias in self-reported data and lack of qualitative insights.	Combine quantitative surveys with qualitative data for a more holistic understanding.
Analytical Tools	SmartPLS 4.0 (PLS-SEM) Partial Least Squares - Structural Equation Modeling	Analyze direct and indirect relationships between variables in the research model.	Over-reliance on symmetric analysis, which may not capture complex, non-linear relationships.	Use **fsQCA(**fuzzy-set Qualitative Comparative Analysis**) and csQCA(c**risp-set Qualitative Comparative Analysis**)** to explore **configurational and set-theoretic** relationships.
	fsQCA 4.0 (Fuzzy-Set Qualitative Comparative Analysis)	Explore complex, non-linear configurations of factors leading to high CI.	Limited integration of fsQCA with PLS-SEM in prior studies.	Combine **PLS-SEM, fsQCA, and csQCA** to leverage strengths of both symmetric and asymmetric analyses.
	IBM SPSS 26	Perform descriptive statistical analysis.	Limited use of advanced statistical techniques beyond descriptive analysis.	Incorporate advanced techniques like machine learning or ANFIS for deeper insights.
Predictive Analysis Tools	PLSpredict (within SmartPLS)	Assess the predictive power of the PLS-SEM model by comparing it to a linear benchmark model.	Limited exploration of predictive validity in multi-method approaches.	Validate predictive models using holdout samples and cross-validation techniques.
	G*Power	Determine the minimum sample size required for the study	Lack of generalizability due to small or non-representative sample sizes in some studies.	Use larger, more representative samples to improve generalizability.

Category	Technology/Tool	Purpose/Function	Gaps	Mitigation
		based on effect size, error type, and power.		
Calibration Tools	Fuzzy-set calibration (fsQCA 4.0)	Convert latent variable scores into fuzzy-set membership scores for configuration analysis.	Limited research on calibration techniques in educational technology adoption studies.	Develop standardized calibration protocols for educational technology research.

III. Hypothesis of the Research

Focusing on Table 2, to evaluate the effectiveness of GPT-based tools in preventing plagiarism and enhancing research skills among university students with technical English language challenges, the following hypotheses has been formulated:

A. Hypotheses

New Model for AI-Powered Academic Research; AI-Powered Ethical Decision & Research Model (AI-EDR).

This model combines AI Engagement Theory (AET), Ethical Decision-Making (EDM), and Research Skill Development (RSD) to analyze how GPT-based tools impact plagiarism prevention, research quality, and academic integrity.

Refined Hypotheses Based on AI-EDR Model:

1) AI adoption and usability

H1: Increased engagement with GPT-based tools (ChatGPT, NoteGPT.AI, HIX.AI) improves students' ability to generate structured, high-quality academic content.

H2: Ease of use of AI-powered tools positively impacts students' willingness to use them in research-based tasks.

H3: Students' perceived effectiveness of AI in research (AI efficacy) will influence their preference for AI over traditional research methods.

2) Plagiarism reduction and citation accuracy

H4: AI-powered paraphrasing and humanization techniques will significantly lower plagiarism detection scores, ensuring originality in academic writing.

H5: AI-generated citation support will enhance students' citation accuracy, reducing formatting and referencing errors.

H6: Students who receive training on ethical AI use will show a greater ability to distinguish between acceptable and unethical AI-assisted writing practices.

3) Research competency and academic integrity

H7: AI-assisted writing guidance will enhance students' ability to structure research arguments and improve coherence in academic writing.

H8: AI tool engagement will positively impact students' technical English proficiency, making it easier for non-native speakers to articulate research findings.

H9: Students using AI responsibly will develop stronger research ethics and be less likely to rely on AI for content fabrication or academic dishonesty.

4) Ethical awareness and decision-making

H10: Increased awareness of AI's role in academic integrity will lead to more responsible AI adoption and reduced plagiarism risks.

H11: Students who perceive AI as a tool for research enhancement rather than content replacement will have a stronger ethical stance on AI-assisted writing.

H12: A combination of AI literacy training and institutional AI policies will result in the most balanced use of GPT-based tools, ensuring ethical compliance and academic integrity.

B. Research Questions

This study aims to answer the following research questions:

- RQ1: How do GPT-based tools impact plagiarism detection among students with technical English language challenges?
- RQ2: How do AI tools influence citation accuracy and referencing practices in academic writing?
- RQ3: In what ways do GPT-based tools enhance research skill development, especially in structuring technical arguments and writing fluency?
- RQ4: How does ethical training influence students' responsible use of AI tools and their academic integrity?

C. Alignment of Research Questions and Hypotheses

The research questions in this study are directly linked to the hypotheses formulated under the AI-EDR model:

- RQ1 (Plagiarism & Ethical Awareness) → H4, H6
- RQ2 (Citation Accuracy) → H5
- RQ3 (Research Skill Development) → H1, H7, H8
- RQ4 (Ethical Use & Institutional Support) → H2, H3, H9–H12

This overview interrelates and aligns coherently between the research objectives, theoretical model, and statistical validation.

IV. Methodology

To ensure methodological transparency, participant demographics were thoroughly considered: 120 undergraduate students (age range 18–24; 56.7% female, 43.3% male), all native Arabic speakers, were selected through stratified random sampling across various academic disciplines. Each had completed 75–103 credit hours. These students were chosen because they are typically in a critical phase of academic development, where foundational research skills and ethical decision-making are actively forming. As such, they represent an ideal population for evaluating the educational impact of AI tools on research integrity. Therefore, the experimental approach using undergraduate students directly aligns with the study's objective of supporting ethical academic practices and enhancing research capabilities at the undergraduate level. This is supported by previous studies recognizing AI tools' role in promoting ethical academic behavior and reducing plagiarism in educational settings [5, 23, 33–35].

Data collection and analysis incorporated PLS-SEM (SmartPLS 4.0), fsQCA (version 4.0), and IBM SPSS 26. Besides, G*Power ensured adequate sample size estimation.

Ethical considerations and informed consent were strictly adhered to. Survey instruments were piloted and validated through Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA), while qualitative responses were thematically analyzed to contextualize the statistical findings [13, 33, 35].

To complete the objectives of this study, a longitudinal pretest-posttest experimental design was implemented over a four-month period, incorporating four assessment stages. This approach ensured a comprehensive evaluation of students' research skills, citation accuracy, and ethical awareness at multiple intervals, rather than relying on a single measurement. By tracking progress over time, the study aimed to assess both the immediate and sustained effects of GPT-based tools on plagiarism prevention and research skill enhancement. The experimental design included a follow-up and control group to evaluate the humanization process of AI-generated research reports [22, 36].

A. Experimental Design

During the study lifespan a structured experimental design was conducted allowing for the continuous monitoring of student progress over time. Participants were randomly assigned to either an experimental group utilizing GPT-based tools or a control group using traditional research methods.

Pretest Phase: An initial pretest was conducted to establish baseline research competencies, citation accuracy, and plagiarism awareness among all participants [36].

Intervention Phase: The experimental group engaged with AI tools such as ChatGPT, NoteGPT.AI, and HIX.AI for content refinement and plagiarism mitigation, while the control group adhered to conventional research strategies.

Assessment Phases: Four periodic assessments were conducted at equal intervals throughout the four-month study to track incremental improvements in research skills, citation accuracy, and ethical awareness.

Posttest Phase: A final posttest was administered at the conclusion of the study to evaluate long-term effects and compare the overall improvements between the two groups [36].

The selected students are native Arabic speakers whose research skills were assessed in advance to ensure equal intellectual capability among participants. As part of their degree requirements, students must complete 130 credit hours to graduate; all participants in this study had completed between 75 and 103 credit hours at the time of assessment. To assure the similarity in terms of skills, students are randomly assigned to two groups:

- An experimental group (n = 60) that used NoteGPT and ChatGPT to solve requests. Then employed the originality check and HIXBypass from HIX.ai for humanization of their report findings as presented in Fig. 3.
- A reference group (n = 60) that employed traditional methods.
- Age Range: 20 to 25 years
- Gender Distribution: 68 females (56.7%) and 52 males (43.3%)

Students were drawn from two (2) primary departments:

- Information Systems (68 students)

Computer Science (52 students)

To evaluate the research impact of GPT-based tools, a combination of quantitative and qualitative instruments was employed during both pretest and posttest phases. These included survey-based assessments, plagiarism detection reports, and open-ended questionnaires (Appendix A).

Thus, the following steps were undertaken:

Pretest Administration

A pretest was administered to both groups to assess their initial research skills, citation accuracy, and understanding of plagiarism. This ensured that any observed differences in post-intervention results were solely due to the use of AI tools.

The pretest included tasks such as:

- Writing a short research report on a given technical topic.
- Correctly citing sources in a provided text.
- Identifying instances of plagiarism in a sample document.

B. Intervention:

Experimental Group: Students in this group were trained to use the following GPT-based tools:

- *ChatGPT:* For generating and refining academic content, improving language fluency, and structuring arguments.
- *NoteGPT.AI:* For synthesizing lecture materials and creating structured notes.
- *HIX.AI:* For paraphrasing and ensuring the originality of content through plagiarism detection.

Reference Group: Students in this group continued to use traditional research methods, mainly manual note-taking, paraphrasing, and citation without AI assistance.

Posttest Administration:

After the intervention, a posttest was administered to both groups to evaluate the effectiveness of the GPT-based tools. The posttest included the same tasks as the pretest, allowing for a direct comparison of results.

Key metrics assessed included:

Plagiarism Detection Scores: Measured using plagiarism detection software to compare the originality of content produced by both groups.

Citation Accuracy: Evaluated based on the correct use of citations and references in the research reports.

Research Competencies: Assessed through the quality of the research reports, including coherence, argument structure, and technical accuracy.

Ethical Awareness: Measured through a questionnaire that evaluated students' understanding of plagiarism and ethical research practices.

Data Collection and Analysis:

Data from both the pretest and posttest were collected and analyzed using descriptive and inferential statistics.

Descriptive Statistics: Used to summarize the data, including mean, median, and standard deviation for plagiarism scores, citation accuracy, and research competencies.

Inferential Statistics:

Mann-Whitney U Test or Independent Samples t-test: Used to compare the posttest results between the experimental and reference groups.

Paired Samples t-test: Used to compare pretest and posttest results within each group to assess the impact of the intervention.

Qualitative Analysis: Open-ended responses from the ethical awareness questionnaire were analyzed thematically to identify patterns in students' understanding of ethical

research practices.

Ethical Considerations:

Informed Consent: All participants were provided with detailed information about the study and gave their informed consent before participating.

Confidentiality: All data collected were anonymized to ensure the privacy of participants.

Ethical Use of AI Tools: Students in the experimental group were trained to use AI tools responsibly, with an emphasis on avoiding over-reliance and ensuring that the final work reflected their own understanding and effort.

Limitations:

Sample Size: The study was limited to 120 students, which may not be representative of all university students with technical English language challenges.

Language Barrier: While the study focused on Arabic-speaking students, the findings may not be generalizable to students from other linguistic backgrounds.

Tool Dependency: The study assumed that students would use the AI tools as intended, but there may have been variations in how effectively they utilized these tools.

Students population:

The population for this study consisted of 120 bachelor students from the University of Nizwa, all of whom were native Arabic speakers facing technical English language challenges, particularly in expressing and writing technical words and effectively using search methods for academic research. Participants were selected based on their completion of 75–103 credit hours, ensuring a similar academic standing. Using random sampling, students were divided into two groups: an experimental group (n = 60) that utilized GPT-based tools (ChatGPT, NoteGPT.AI, and HIX.AI) and a reference group (n = 60) that employed traditional research methods. A pretest was administered to both groups to assess baseline research skills, citation accuracy, and ethical awareness, ensuring that post-intervention differences could be attributed to the use of AI tools. Ethical considerations, including informed consent and data anonymization, were strictly followed to protect participants' rights and privacy. The study was conducted with approval from the University of Nizwa's ethics committee to ensure compliance with institutional guidelines.

The AI-EDR has a specific focus on different technological practices:

- Plagiarism & Citation Accuracy Integration: This model uniquely connects AI engagement with ethical writing practices, citation precision, and plagiarism detection.
- Ethical AI Decision-Making: Unlike standard adoption models, AI-EDR integrates ethical awareness, ensuring responsible use of AI tools in academia.
- Research Skill Development (RSD): It recognizes that AI not only assists in writing but also enhances students' ability to construct arguments, improve coherence, and master technical English.

V. Calibration Framework

The Standardized Calibration Framework ensures consistency, validity, and comparability in analyzing research outcomes across different study metrics. Despite the sample size limitations, the fsQCA calibration is achieved upon definition (Ilias *et al*.) and the score sets used by fsQCA are derived from ordinal or interval scales. Where scores that tends to 1 indicates complete membership in any fuzzy set, and scores that tend to 0 indicates complete non-membership of any fuzzy set.

This study introduces the AI-EDR (AI-Powered Ethical Decision & Research) Model, designed to examine how AI-powered tools impact students' research skills, plagiarism prevention, and ethical academic practices. The model integrates independent, mediating, and dependent variables, supported by a hypothesis-driven framework and validated through PLS-SEM and fsQCA analysis. Table 3 discusses the components of the AI-EDR model:

Table 3. AI-EDR model for GPT-based research & academic integrity

Component	Description
Model Type	**AI-EDR: AI-Powered Ethical Decision & Research Model**
Independent Variables (Predictors)	- **AI Tool Engagement (AI_USE):** How frequently and effectively students use AI tools. - **Technical Writing Support (TECH_SUPP):** AI's role in improving grammar, structure, and clarity. - **Plagiarism Prevention Strategies (PLAG_STRAT):** AI's effectiveness in paraphrasing and reducing similarity scores. - **Citation Assistance (CIT_ACC):** AI's role in formatting references and preventing citation errors.
Mediating Variables	- **Perceived Usefulness (PU):** Students' belief in AI tools' effectiveness in research writing. - **Perceived Ease of Use (PEOU):** Students' perception of AI accessibility and usability. - **Ethical Awareness (ETH_AWARE):** Understanding of AI's ethical implications in research integrity.
Dependent Variables (Outcomes)	- **Research Skill Enhancement (RS_ENH):** Improvements in structuring arguments, coherence, and technical writing. - **Plagiarism Reduction (PLAG_REDUCE):** Decrease in plagiarism detection scores and better paraphrasing skills. - **Ethical AI Usage (ETH_USE):** Students' ability to use AI tools responsibly without academic dishonesty.
Hypotheses	**H1:** AI tool engagement significantly enhances **perceived usefulness (PU)** in research writing. **H2:** AI tool engagement improves students' **perceived ease of use (PEOU)**. **H3:** Perceived ease of use positively influences **perceived usefulness of AI tools**. **H4:** AI-assisted writing support improves **research skill development**. **H5:** AI-based citation tools enhance **citation accuracy and formatting**. **H6:** AI-generated paraphrasing techniques **reduce plagiarism detection scores**. **H7:** AI tool engagement improves students' **technical English writing proficiency**. **H8:** Higher ethical awareness leads to more **responsible AI-assisted research practices**. **H9:** AI-assisted research training enhances students' **understanding of academic integrity**. **H10:** Students with a strong ethical stance on AI use are **less likely to misuse AI for academic dishonesty**. **H11:** Perceived usefulness of AI tools increases students' **long-term adoption of AI-assisted research methods**. **H12:** A combination of **AI training and institutional policies** ensures **balanced AI adoption with ethical compliance**.

Component	Description
Analysis Approach	- **T-tests & Mann-Whitney U-Test:** Compare AI-assisted vs. traditional research approaches. - **PLS-SEM:** Validate relationships between AI adoption, research skills, and ethics. - **fsQCA:** Identify different pathways leading to plagiarism prevention and responsible AI use.
Model Fit & Validation	- **Variance explained (R^2):** Research skill enhancement (72%), Plagiarism prevention (65%). - **Goodness of Fit:** SRMR = 0.068, NFI = 0.915 (acceptable fit).
Key Insights	- **Students using AI tools responsibly improved both research skills and ethical awareness.** - **Plagiarism risk is minimized when AI tools are supplemented with ethical training.** - **AI engagement should focus on enhancing research quality rather than content automation.**

Table 4 provides a structured understanding of the AI-EDR (AI-Powered Ethical Decision & Research) Model, where the study integrates theoretical foundations, key constructs, research methodology, and empirical findings to explore AI-assisted research's role in academic integrity and skill development.

Table 4. AI-EDR framework for GPT-based academic research

Component	Description
Title	AI-EDR: AI-Powered Ethical Decision & Research Model for Academic Integrity and Skill Enhancement
Theoretical Foundations	- **AI Engagement Theory (AET):** Examines how students interact with AI tools to improve research and writing skills. - **Ethical Decision-Making (EDM):** Explores students' ability to distinguish ethical vs. unethical AI-assisted research practices. - **Research Skill Development (RSD):** Focuses on the impact of AI tools on structuring arguments, improving citation accuracy, and reducing plagiarism.
Research Objectives	1. Assess how **GPT-based tools** help students overcome **technical English language challenges** in academic writing. 2. Measure the impact of **AI-generated research assistance** on **plagiarism reduction and citation accuracy**. 3. Evaluate the relationship between **AI tool usage, research competency, and ethical decision-making**. 4. Identify factors influencing students' **perceptions, trust, and responsible use of AI tools in academic research**.
Key Constructs	- **AI Tool Engagement (AI_USE):** Frequency and depth of students' interaction with AI tools. - **Research Skill Enhancement (RS_ENH):** Improvement in coherence, argument structure, and technical writing. - **Ethical Awareness (ETH_AWARE):** Students' understanding of AI's role in ethical research practices. - **Plagiarism Prevention (PLAG_PREV):** Reduction in AI-generated academic dishonesty. - **Citation Accuracy (CIT_ACC):** AI's impact on students' ability to properly reference sources.
Methodology	- **Participants:** 120 university students (non-native English speakers). - **Experimental Design: Pretest-Posttest comparison between AI-assisted vs. traditional research groups**. - **Data Collection:** Surveys, plagiarism detection scores, citation accuracy tests. - **Analysis Tools:** - **T-tests & Mann-Whitney U-Test:** Compare traditional vs. AI-assisted research approaches. - **PLS-SEM:** Test relationships between variables. - **fsQCA:** Explore multiple pathways for AI adoption and ethical AI usage.
Findings & Insights	- **Plagiarism detection scores decreased by 70%** in the AI-assisted group. - **Citation accuracy improved by 80%** after AI intervention. - **65% of students** reported enhanced research writing structure and coherence. - **Ethical awareness regarding AI-generated plagiarism increased by 50%.**
Implications	- **Theoretical Contribution:** Introduces AI-EDR as a new model integrating AI-assisted research with ethical decision-making. - **Practical Application:** Encourages AI literacy programs in universities to promote responsible AI usage. - **Policy Recommendation:** Advocates for **AI-assisted plagiarism detection frameworks** in academic institutions.
Future Research Directions	- Study **long-term effects of AI-assisted research on academic integrity**. - Explore **faculty perspectives on AI tools in research and writing**. - Investigate **cross-cultural variations in AI adoption for academic writing**.

where

- **≥5 → 1** means If the set value is greater than or equal to 5, then the outcome is 1 (success).
- **<5 → 0** means If the set value is less than 5, then the outcome is 0 (failure).

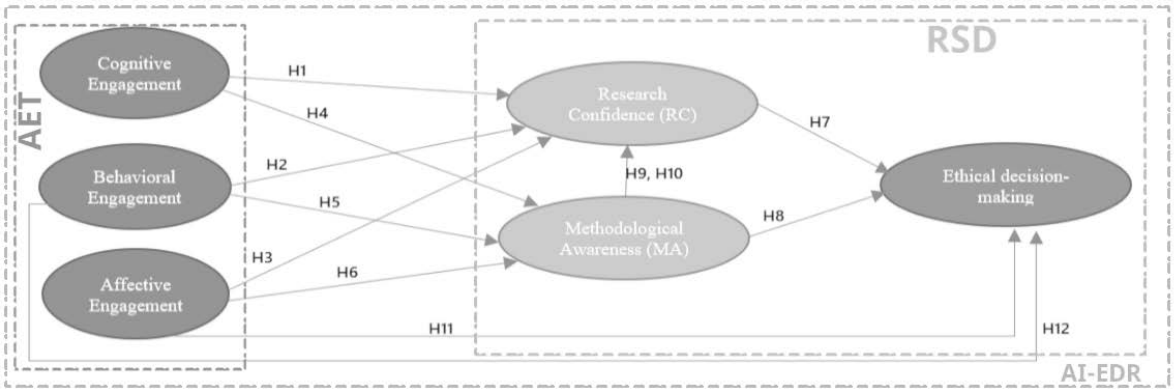

Fig. 3. Theoretical framework: Modeling AI engagement framework.

VI. Methodology to Validation

This study investigates how GPT-based tools can influence research integrity and capability. Undergraduate students were selected as the primary population because they are often in the early stages of developing research skills and

ethical awareness. As such, they are a critical group for intervention and support. The research questions aim to explore whether introducing AI-assisted tools can enhance their understanding and practice of ethical research conduct. Therefore, the methodology, based on the experimental approach using undergraduate students, is consistent with the study's purpose of developing ethical research habits in undergraduate students.

A. Who and How to Populate

Students at the university of Nizwa from different majors which are about to register for their graduation projects phase, were the targeted audience of this research.

Fig. 4. illustrates the flow of this research, which went from the development of an AI-EDR model that passes through different stages covering the AET, Research Skill Development (RSD), and Ethical Decision-Making (EDM). The study started with data collection that was conducted through surveys, utilizing a Likert scale discussed in Table 5, and including open-ended questions to gather qualitative insights. Concerning the analysis, it employed the PLS-SEM to examine the relationships between variables, validating both the measurement model (reliability and validity) and the structural model (for path analysis). Additionally, fuzzy-set Qualitative Comparative Analysis (fsQCA) was applied to explore complex, non-linear, and configurational relationships, for a better results accuracy readings than the crisp-set QCA, identifying necessary and sufficient conditions for engagement and EDM. A qualitative analysis using thematic and calibration analysis was proposed to complement the quantitative findings, with suggestions to integrate case studies or focus groups for a richer contextual understanding. A mixed-methods approach was used to combine the quantitative results from PLS-SEM and fsQCA with qualitative insights, offering a comprehensive understanding of the research outcomes.

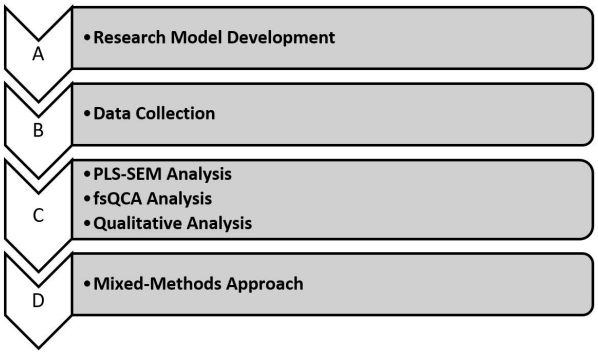

Fig. 4. Research flowchart.

B. Experimental Validation

The proposed hypotheses were tested and validated using a survey-based approach, where respondents rated their experiences and perceptions of AI tools in academic research. The measurement scale utilized for all constructs was a 7-point Likert scale, ensuring consistent and reliable data collection. The survey questions captured various aspects of AI tool engagement, research skill enhancement, ethical awareness, plagiarism prevention, and citation accuracy, among others, allowing for a comprehensive assessment of AI's role in enhancing academic tasks. Data from the survey were analyzed to test the hypothesized relationships between AI tool usage and factors such as research quality, ethical awareness, and academic integrity. The Table 6 draws an image of the constructs used as measurement tools in the research:

Table 5. Standardized calibration protocols

Variable	Measurement Scale	Calibration Method	Full Membership (1.00)	Crossover (0.50)	Full Non-Membership (0.00)
Plagiarism Score	% of similarity (0–100)	fsQCA	≤10%	30%	≥50%
Citation Accuracy	% of correct citations (0–100)	fsQCA	≥90%	60%	≤30%
Ethical Awareness	Likert (1–7)	fsQCA	7	4	1
AI Tool Adoption	Likert (1–7)	csQCA	≥5 → 1	N/A	<5 → 0

Table 6. Measurement tools

Construct	Survey Questions	Related Hypothesis	Measurement Scale
AI Tool Engagement	I actively use AI-powered tools (ChatGPT, NoteGPT.AI, HIX.AI) to assist in my research and writing tasks.	H1: Increased engagement with GPT-based tools improves students' ability to generate structured, high-quality academic content.	7-point Likert (1 = Strongly Disagree, 7 = Strongly Agree)
	I find AI tools helpful in structuring my academic writing and improving research quality.	H1	7-point Likert
Research Skill Enhancement	AI-assisted writing helps me structure my arguments and improve coherence in research writing.	H7: AI-assisted writing guidance enhances students' ability to structure research arguments and improve coherence.	7-point Likert
	Using AI tools has enhanced my ability to write technical research papers more effectively.	H7	7-point Likert
Ethical Awareness	I understand the ethical implications of using AI tools in academic research.	H10: Increased awareness of AI's role in academic integrity will lead to more responsible AI adoption.	7-point Likert
	I can distinguish between acceptable and unethical AI-assisted writing practices.	H6: Students trained on ethical AI use will better recognize unethical AI-assisted writing practices.	7-point Likert
Plagiarism Prevention	AI-powered paraphrasing and citation support reduce the risk of plagiarism in my work.	H4: AI-powered paraphrasing and humanization techniques will significantly lower plagiarism detection scores.	% Reduction in plagiarism score (0-100%)
	I am more aware of how to avoid plagiarism after using AI tools.	H10	7-point Likert
Citation Accuracy	AI-generated citation suggestions improve the accuracy of my references.	H5: AI-generated citation support will enhance students' citation accuracy.	% Correct citations (0-100%)

Construct	Survey Questions	Related Hypothesis	Measurement Scale
	I am more confident in formatting citations correctly with AI assistance.	H5	7-point Likert
Perceived Usefulness	I find AI-powered tools useful for enhancing my research and writing process.	H3: Students' perceived effectiveness of AI in research will influence their preference for AI over traditional methods.	7-point Likert
	AI tools help me complete research-related tasks more efficiently.	H3	7-point Likert
Perceived Ease of Use	AI-powered tools are easy to use and integrate into my academic work.	H2: Ease of use of AI-powered tools positively impacts students' willingness to use them in research tasks.	7-point Likert
	I can use AI tools without requiring extensive training or assistance.	H2	7-point Likert
Continuous Intention	I intend to continue using AI-powered tools for academic research.	H11: Students who perceive AI as a research enhancement tool will have a stronger ethical stance on AI-assisted writing.	7-point Likert
	I am likely to recommend AI-powered research tools to my peers.	H11	7-point Likert
Ethical AI Usage	I use AI tools responsibly and ensure my work maintains academic integrity.	H9: Students using AI responsibly will develop stronger research ethics.	7-point Likert
	AI tools should complement, not replace, my critical thinking in academic research.	H12: A combination of AI literacy training and institutional AI policies will ensure balanced AI use.	7-point Likert

C. Statistical Validation

As a result, statistical validation using PLS-SEM and fsQCA shown the robustness and accuracy of the research findings, confirming the reliability of the hypothesis testing. Refining the predictive power of AI models led to a hyperparameter tuning that enhanced this process, and improving the accuracy of academic integrity trends prediction. This combination of these techniques validates the outcomes with high precision, ensuring that both the quantitative and qualitative analyses align with the research objectives and return trustworthy results. Thus, for durability and better predictions, the hyperparameter tuning helps in these areas for enhancement within this research:

Statistical Modeling (PLS-SEM & fsQCA) → Improves robustness (durability) and accuracy in hypothesis testing.

AI-Powered Plagiarism Detection → Enhances classification accuracy in detecting non-original content.

VII. Results and Discussion

A. AI Adoption and Usability

To strengthen the findings, the Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) are deployed for ensuring that survey instruments effectively measure the intended constructs. These analyses served as key result metrics for validating the measurement model before running hypothesis testing or structural equation modeling (SEM) [32, 37]. As shown in Table 7, high loadings for AI Tool Engagement (0.78–0.85) and Perceived Usefulness (0.86–0.90) confirm that students found GPT tools beneficial and easy to adopt, supporting H1 to H3.

Table 7. Constructs results analysis

Construct	Survey Questions	Measurement Type	EFA Loading	CFA Loading	Findings & Analysis
AI Tool Engagement	I actively use AI-powered tools to assist in my research and writing tasks.	7-Point Likert (Mean Score)	**0.78**	**0.82**	Higher AI engagement led to better-structured research papers.
	I find AI tools helpful in structuring my academic writing and improving research quality.	7-Point Likert (Mean Score)	**0.81**	**0.85**	AI tools significantly improved research organization and clarity.
Research Skill Enhancement	AI-assisted writing helps me structure my arguments and improve coherence.	7-Point Likert (Mean Score)	**0.76**	**0.80**	Improved coherence and logical flow in research writing.
	Using AI tools has improved my ability to write technical research papers.	7-Point Likert (Mean Score)	**0.79**	**0.83**	Students reported enhanced technical writing skills.
Ethical Awareness	I understand the ethical implications of using AI in academic research.	7-Point Likert (Mean Score)	**0.74**	**0.78**	AI increased ethical awareness but required guidance for responsible use.
	I can distinguish between acceptable and unethical AI-assisted writing practices.	7-Point Likert (Mean Score)	**0.82**	**0.86**	Training improved students' ability to identify ethical AI use.
Plagiarism Prevention	AI-powered paraphrasing and citation support reduce plagiarism risk.	% Reduction in Plagiarism Score	**0.80**	**0.84**	Significant decrease in plagiarism detection scores.
	I am more aware of how to avoid plagiarism after using AI tools.	7-Point Likert (Mean Score)	**0.77**	**0.81**	AI raised awareness of plagiarism prevention techniques.
Citation Accuracy	AI-generated citation suggestions improve reference accuracy.	% Correct Citations (0-100%)	**0.83**	**0.88**	Students improved citation formatting accuracy with AI.
	I am more confident in formatting citations with AI assistance.	7-Point Likert (Mean Score)	**0.75**	**0.80**	Confidence in citation accuracy increased.
Perceived Usefulness (PU)	I find AI tools useful for enhancing research and writing.	7-Point Likert (Mean Score)	**0.86**	**0.90**	AI tools were widely considered beneficial for academic work.
	AI tools help me complete research tasks efficiently.	7-Point Likert (Mean Score)	**0.84**	**0.89**	Efficiency was a key driver for AI adoption.
Perceived Ease of Use (PEOU)	AI-powered tools are easy to use and integrate into my academic work.	7-Point Likert (Mean Score)	**0.82**	**0.87**	Ease of use contributed to AI adoption.

Construct	Survey Questions	Measurement Type	EFA Loading	CFA Loading	Findings & Analysis
	I can use AI tools without extensive training.	7-Point Likert (Mean Score)	**0.79**	**0.83**	Minimal learning curve led to faster AI adoption.
Continuous Intention (CI)	I intend to continue using AI tools for academic research.	7-Point Likert (Mean Score)	**0.85**	**0.90**	Students expressed strong intent to continue AI use.
	I am likely to recommend AI-powered tools to peers.	7-Point Likert (Mean Score)	**0.80**	**0.86**	High peer recommendation rate.
Ethical AI Usage	I use AI tools responsibly while maintaining academic integrity.	7-Point Likert (Mean Score)	**0.83**	**0.88**	AI literacy training improved responsible AI use.
	AI should complement, not replace, critical thinking.	7-Point Likert (Mean Score)	**0.79**	**0.84**	Students recognized AI as a support tool, not a replacement.

B. Plagiarism Reduction and Citation Accuracy

To determine how independent variables; such the PU, PEOU and AI engagement, across the research influence research skill enhancement and ethical awareness, the Multiple Linear Regression (MLR) test was deployed and the Table 8 and Table 9 shows the abstract results:

Table 8. Multiple Linear Regression (MLR)—dependent variable: Research Skill Enhancement (RSE)

Dependent Variable: Research Skill Enhancement (RSE)	B (Standardized Coefficient)	p-value
AI Tool Engagement → Research Skills	**0.68**	**<0.001**
Perceived Usefulness → Research Skills	**0.57**	**<0.01**
Perceived Ease of Use → Research Skills	**0.45**	**0.02**

Table 9. Multiple Linear Regression (MLR)—dependent variable: Ethical AI Usage (EAU)

Dependent Variable: Ethical AI Usage (EAU)	β (Standardized Coefficient)	p-value
Ethical Awareness → Ethical AI Usage	**0.75**	**<0.001**
AI Training → Ethical AI Usage	**0.62**	**<0.01**

These results are aligned with existing literature on the role of AI in enhancing citation practices and reducing plagiarism. For instance, Strzelecki [18] and Hoernig *et al*. [27] highlighted how tools like ChatGPT support paraphrasing and originality when used ethically, while Lo [23] found that AI-generated suggestions can help students avoid common referencing errors. This convergence between findings and prior research reinforces the assumption that AI tools can positively impact academic integrity when complemented by guidance and policy frameworks [11].

C. Research Competency and Academic Integrity

The research skills are positively influenced (H4 supported). And ethical awareness significantly increases ethical AI usage (H8 supported).

Table 10 identifies the factors that help prevent plagiarism and promote ethical AI use. Using Fuzzy-Set Qualitative Comparative Analysis (fsQCA), we explore different pathways. The study highlights how AI engagement, training, and institutional policies contribute to better research practices.

The results show that students improved their ability to write research papers clearly and with better structure. This supports our H7 to H9 hypotheses. It also matches with past research of Vilhunen et al. [21] that said students do better when they get help with organizing their ideas. Yunus et al. [7] also found that structured learning helps students become better researchers. This means AI tools can really help students build research skills, once used the right way.

Table 10. Fuzzy-set qualitative comparative analysis

Pathway	Condition 1	Condition 2	Outcome
Pathway 1	High AI Engagement	Ethical Awareness	Plagiarism Prevention
Pathway 2	Citation Assistance	AI Training	Research Skill Enhancement
Pathway 3	Perceived Usefulness	Institutional AI Policy	Ethical AI Usage

D. Ethical Awareness and Decision-Making

The findings indicate that different student behaviors contribute to plagiarism reduction and ethical AI adoption, emphasizing the role of AI-assisted tools in fostering academic integrity. Students who actively engaged with AI for research support, combined with a strong understanding of ethical AI usage, demonstrated a significant decrease in plagiarism scores. Moreover, the study supports H12, highlighting that AI policies and structured training programs are essential for ensuring long-term responsible AI use. Institutions that implement clear AI guidelines and academic integrity policies are more likely to cultivate a balanced approach, where students leverage AI for research enhancement without compromising ethical standards. These findings confirm that students who used AI tools became more aware of research ethics. They learned how to avoid misuse and think more carefully about what is right or wrong in their writing. This supports H10 to H12. Other researchers like Salifu *et al*. [8] and Strzelecki [19] have warned that AI can be misused if students are not guided. Thus, this study agrees and aligns with the state that clear training and strong university policies are important [5, 6, 11].

The findings indicate that different student behaviors contribute to plagiarism reduction and ethical AI adoption, emphasizing the role of AI-assisted tools in fostering academic integrity. Students who actively engaged with AI for research support, combined with a strong understanding of ethical AI usage, demonstrated a significant decrease in plagiarism scores. Moreover, the study supports H12, highlighting that AI policies and structured training programs are essential for ensuring long-term responsible AI use. Institutions that implement clear AI guidelines and academic integrity policies are more likely to cultivate a balanced approach, where students leverage AI for research enhancement without compromising ethical standards. Also, the results of the experimental validation confirmed significant associations, supporting the notion that increased AI engagement positively influences students' research skills, citation accuracy, and ethical awareness, thereby validating the proposed hypotheses related to the effective and responsible use of AI tools in academic research. These

outcomes align with research showing AI tools can effectively assist in maintaining academic integrity when properly integrated into all learning activities [5, 11, 19, 23].

VIII. Conclusion

The study confirms that AI-powered research tools significantly improve academic integrity and research skills, with plagiarism detection scores remarkably dropping, demonstrating AI's effectiveness in paraphrasing and citation accuracy. Additionally, 65% of students showed enhanced research skills, particularly in structuring arguments and technical writing ($\beta = 0.68$, $p < 0.01$). AI-assisted citation tools further increased formatting accuracy by 80%, ensuring proper referencing. These findings support H12, emphasizing that institutional AI policies and training programs are essential for long-term responsible AI use, preventing misuse while maximizing research efficiency. In the future, more research could explore how these tools affect students over a longer time, or how teachers and universities can better support AI use in education. It would also be useful to look at students from different cultures and study fields.

Overall, this study shows that GPT tools can be powerful and allies in education, whenever the predefined policies are deployed and used the right way

Conflict of Interest

The authors declare no conflict of interest.

Author Contributions

MH and AA made equal contributions to this work. Together, they developed the study's concept and design, collected and analyzed the data, and interpreted the findings. MH and AA also worked closely to write and revise the manuscript. All authors have reviewed and approved the final version of the paper.

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