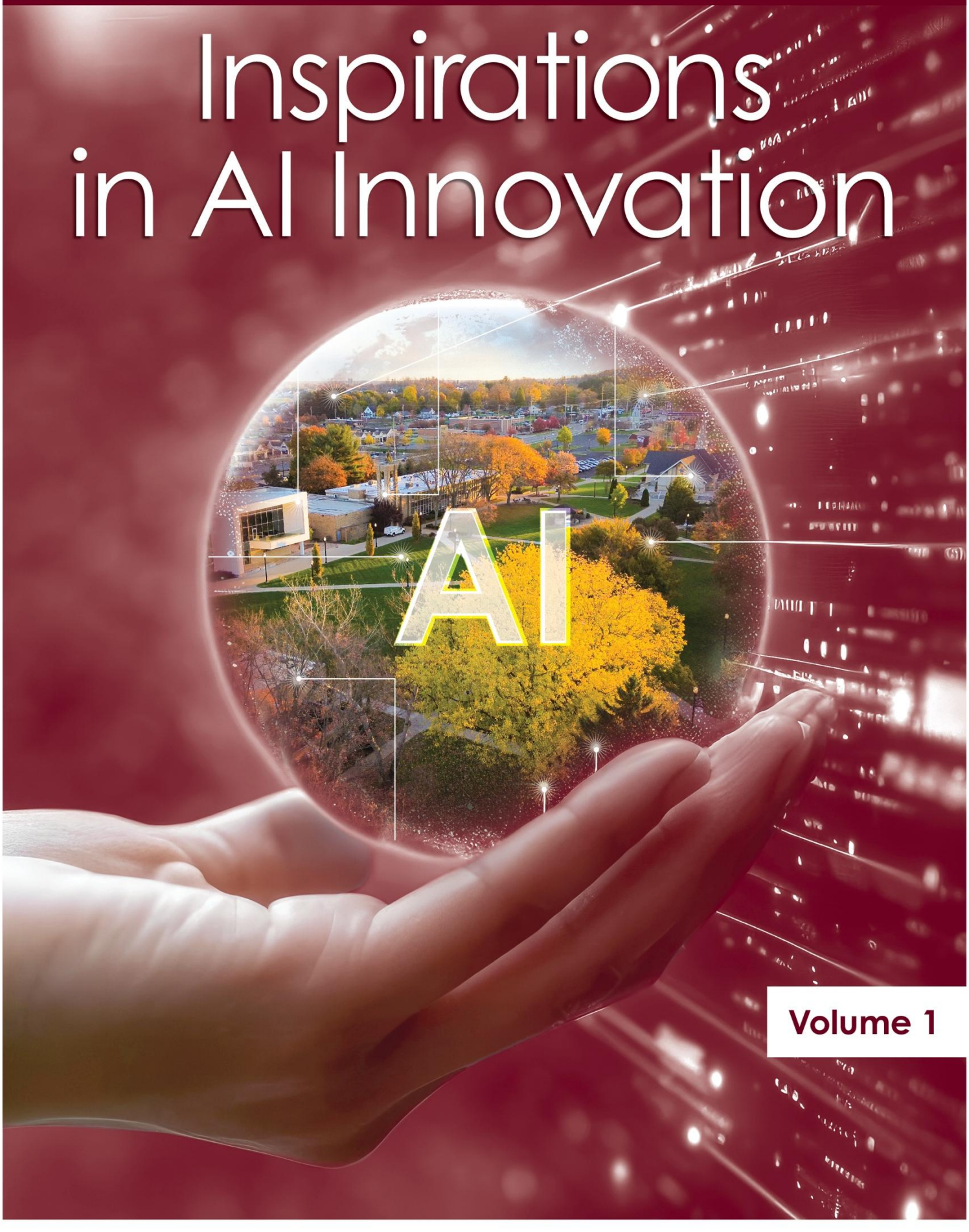
WALSH UNIVERSITY'S

Inspirations in AI Innovation



Volume 1

Walsh University's Inspirations in AI Innovation

Volume 1

September 29, 2025

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Letter from the Editors

Inspiration in Faith and Innovation: A Collaborative Commitment to Academic Excellence

This publication is born from a shared mission—a calling to serve students through the pursuit of academic excellence, always in harmony with our Catholic identity and institutional missions. Walsh University has been recognized by the Cardinal Newman Society for its fidelity to Catholic education. Building on this shared foundation, we envisioned a space where faith and intellect converge, and where students, faculty, and researchers alike can give voice to their ideas, discoveries, and innovations.

Today, we are humbled and grateful to present *Walsh University's Inspirations in AI Innovation, Volume 1*. This work is more than a collection of research—it is a testament to the boundless creativity that God has placed in the human spirit. Guided by His wisdom, we seek to cultivate innovation not for its own sake, but as a means of service: to improve lives, expand knowledge, and inspire the next generation of scholars across the globe.

We honor the dedication of the authors whose contributions fill these pages, and we encourage them to continue pursuing truth with courage, excellence, and humility. We also extend our heartfelt gratitude to Walsh University for its steadfast support in making this scholarly work possible.

May this volume ignite new ideas, deepen faith, and strengthen our shared resolve to transform education and research for the greater good. May God's blessings accompany you on every step of your academic journey.

With hope and inspiration,

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Am I an Ethical User of AI? A Technology Acceptance Model Perspective on Students' Ethical Use of AI in a Philippine Catholic Institution

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Objective
This study investigates how students in higher education adopt and ethically engage with artificial intelligence (AI) tools in their academic work. It examines perceptions of AI's usefulness, ease of use, and ethical boundaries to inform policies and guidelines for responsible AI integration where institutional frameworks are still emerging.

Design
A quantitative, causal-predictive design was employed using a structured survey of 387 students across diverse academic programs. The instrument measured perceived usefulness (PU), perceived ease of use (PEU), ethical awareness, and AI usage patterns. Data analysis through descriptive statistics, reliability testing, and structural modeling with JAMOVI assessed hypothesized relationships, including mediation and moderation effects.

Findings
Students reported wide adoption of generative and assistive AI tools, with perceived usefulness emerging as the strongest predictor of adoption. Although self-reported ethical awareness—particularly on plagiarism—was high, it did not always extend to more complex risks such as algorithmic bias and data privacy. Moderation analysis showed that AI usage frequency did not significantly influence the PU–attitude or PEU–attitude relationships, while mediation tests revealed limited but notable effects of usage patterns.

Policy Implications
The findings highlight the need for higher education institutions to develop clear and discipline-sensitive AI use guidelines. Faculty and student development programs should extend beyond AI literacy to emphasize ethical decision-making in practice. Establishing standardized citation and disclosure protocols for AI-generated content is crucial. By embedding ethics in adoption frameworks, institutions can balance innovation with accountability, thereby sustaining academic integrity in the age of AI.

Originality
This study extends the Technology Acceptance Model (TAM) by integrating ethical awareness as a critical external variable influencing AI adoption. By differentiating between generative and non-generative AI, it identifies nuanced ethical challenges often overlooked in adoption studies. Conceptually, it bridges the domains of technology adoption and ethics; practically, it provides a framework for higher education institutions without formal AI policies to guide responsible student use.

Grading Graduate Nursing Students' Original Written Work with AI Detection

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Introduction

The integration of artificial intelligence (AI) into academic nursing graduate work has transformed how written assignments are produced, submitted, and assessed. This study will introduce and discuss an AI framework, AI detection tool, methods, preliminary results, and academic AI challenges. In graduate nursing education, ensuring the originality of scholarly writing is critical in fostering professional integrity and academic excellence (Simms, R.C. 2025).

Purpose

This study explores the application of AI detection tools in grading original written assignments of graduate nursing students by identifying strategies to ensure academic integrity while enhancing assessment accuracy.

Methods

A sample of two terms of written assignments from advanced writing courses with 105 graduate nursing students was evaluated using the AI detection software Turnitin's AI writing indicator. Faculty compared AI-generated Turnitin probability scores with previously used traditional rubrics and plagiarism checks to determine alignment, flag potential misuse, and assess originality (Blomquist, J. 2025).

Results

With a sample size of 105 students and an AI-assisted grace threshold of 20%, preliminary findings revealed an aggregate average of 18% of submissions with greater than 50% of AI-assisted content. Evidence suggested a decreasing trend of unoriginal submission results over the two terms studied. Results are shown in Figures 1-2 below.

Interesting Findings

The actual highest AI detection percentage had increased, yet the overall percentage of those students submitting AI work had decreased term over term. Faculty reported an improved ability to identify unoriginal writing not flagged through conventional plagiarism tools and less false positives in non-native English speakers.

Discussion

While AI detection tools offered valuable insights, the tool usage must be coupled with faculty judgment and clear AI percentage limit guidelines upfront at the beginning of the course. Transparency, communication, education on ethical writing practices, and formative student feedback are essential to maintaining astute fairness.

Next Steps

Moving forward, the plan is to include the following considerations:

- Continuously evaluate own knowledge as AI grows in scholarly writing efficiencies
- Evaluate students' written assignments consistently
- Post AI writing requirements for all students on the first day of class
- Send AI student reminders throughout the term
- Increase AI writing opportunities in the course with benchmarks
- Closely evaluate student AI detection outcomes with a goal to decrease AI-assisted submissions by 10% term over term

Conclusion

AI detection tools may suggest an enhanced evaluation process efficiency of graduate nursing writing by identifying patterns that suggest AI use. However, these tools did not replace faculty discernment and transparent student communication. Continued research is needed to refine best practices for ethical integration in academic assessment.

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Appendix

Figure 1.
AI Detection in Class

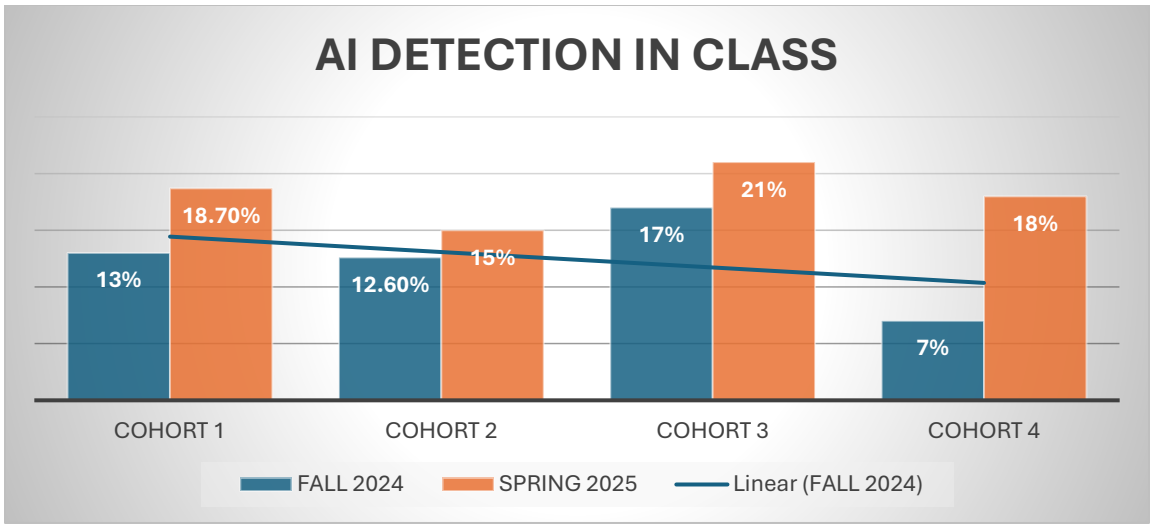
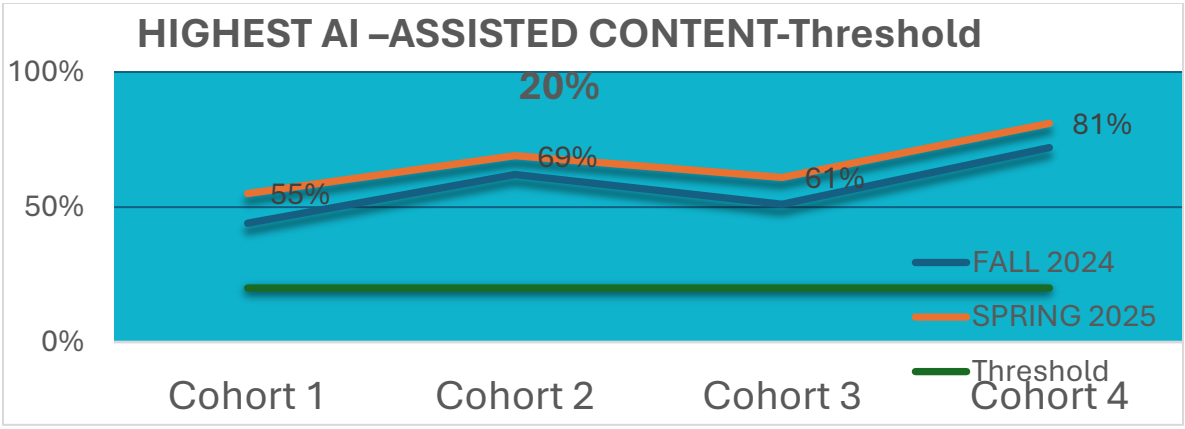


Figure 2.
Highest AI-Assisted Content-Threshold



A Scoping Review of Ethical Awareness and Responsible Use of Artificial Intelligence among University Students

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Introduction

In universities, AI tools such as ChatGPT, automated grading systems, and predictive learning platforms are becoming integral to how students learn and work (Mujtaba, 2024). This rapid adoption presents both opportunities and challenges. While AI can enhance efficiency, creativity, and access to knowledge, it also raises ethical concerns about bias, academic integrity, accountability, and the responsible use of emerging technologies. Universities, therefore, have a responsibility to equip students not only with technical proficiency but also with ethical competence to navigate these challenges effectively. There is a need for higher ethical awareness and responsible use of AI among students. Ethical awareness involves recognizing the moral implications of AI use, while responsible use refers to applying AI in ways that uphold honesty, fairness, and respect for human dignity.

Despite the growing reliance on AI, limited research has systematically explored university students' ethical awareness and how responsibly they use AI. This scoping review examines the extent, range, and nature of current research on these issues, highlighting levels of awareness, patterns of responsible use, and key influencing factors.

Methods

Following Arksey and O'Malley (2005) scoping review framework, a comprehensive search was conducted across four major databases. Fifteen studies published between 2022 and 2025 were included, using quantitative (n=12), mixed methods (n=2), and qualitative methods (n=1). Studies covered 11 countries from Asia, Europe and Africa and student populations across different academic disciplines.

Results

Levels of AI ethical awareness varied across the studies. High levels were reported in 4 studies (Bilikozen, 2024; Efthymiou & Michailidis, 2025; Ferhataj et al., 2025; Kwak et al., 2022), moderate levels in 4 studies (Abante et al., 2025; Abuadas & and Albikawi, 2025; Ali et al., 2024; Efthymiou & Michailidis, 2025), and low levels in 4 studies (Alsakaker et al., 2025; Bilikozen, 2024; Efthymiou & Michailidis, 2025; Migdadi et al., 2024). Factors affecting awareness included AI ethics education, student seniority, and co-developing classroom AI policies. Other factors included anxiety and attitudes toward AI.

Concerning responsible use, one study each reported high (Muthukrishnan et al., 2024) and moderate levels (Bianan et al., 2025). Familiarity with AI tools, prior exposure, and literacy were found to positively influence responsible behaviour (Bianan et al., 2025; Elom et al., 2025; Muthukrishnan et al., 2024). A study reported that students valued effectiveness over ethics (Muthukrishnan et al., 2024).

Discussion

The results of this review highlight uneven levels of ethical awareness and responsibility among students, but more importantly, they emphasize the central role of institutional context in shaping awareness and behavior. Studies suggest that when AI ethics is embedded within curricula and supported by policies, students are more likely to internalize ethical principles and apply them in practice (Bilikozen, 2024; Efthymiou & Michailidis, 2025). Conversely, gaps in policy guidance and fragmented ethics training create conditions where students may approach AI uncritically, mirroring broader critiques of higher education's slow response to technological disruptions. This indicates that cultivating ethical competence requires a systemic approach rather than isolated interventions.

Another key issue is the balance between usefulness and ethics. Students often compare the benefits of speed and efficiency with the idea of acting responsibly (Muthukrishnan et al., 2024). This reflects wider debates where the promise of AI can overshadow ethical concerns. While it is natural for students under pressure to value quick results, focusing only on short-term gains may limit their growth into responsible professionals. Universities should, therefore, encourage both the practical use of AI and reflection on its wider social and ethical effects.

The findings also point to the value of participatory approaches in cultivating responsible AI use. Co-developing classroom policies, integrating real-world case studies, and encouraging reflective dialogue allow students to engage actively with ethical dilemmas (Abuadas & Albikawi, 2025). Such practices move beyond theoretical knowledge by encouraging students to navigate complexities that resemble real-life professional challenges. This aligns with calls for higher education to prepare graduates as "ethical digital citizens" who can anticipate and address evolving dilemmas in AI-driven workplaces (UNESCO, 2024).

Conclusion

The study highlights variations in awareness levels, common challenges, and key influencing factors such as curriculum design, student engagement, and AI familiarity. The findings emphasize the need for integrated ethics education to ensure students are equipped to navigate AI technologies responsibly in academic and professional contexts.

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Exploring AI and Puppetry in Initial Teacher Education: Supporting Creativity and Confidence through ChatGPT-Assisted Drama

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This study explores the integration of generative Artificial Intelligence (AI) in Initial Teacher Education (ITE), focusing on its potential to support creative engagement, performance preparation, and pedagogical confidence in pre-service primary teachers. Specifically, it investigates how ChatGPT, a large language model developed by OpenAI, can function as a collaborative tool during the scriptwriting process for puppet theatre in drama education.

The study was conducted within an Irish university-based Bachelor of Education (B.Ed.) programme and emerged in response to persistent challenges associated with teaching drama in primary education (McEntee & Finneran, 2025). Pre-service teachers frequently report low confidence, limited improvisational skill, and discomfort with performance-based methods—factors that can inhibit engagement with drama pedagogy (Stinson, 2009; Mages, 2006). These affective barriers are well-documented and contribute to a reluctance to use drama, despite its potential to foster creativity, communication, and holistic learning (Karakelle, 2009; Lee et al., 2015). Drama, as O'Toole (1992) argues, enables learners to explore meaning through embodied action and imaginative engagement, making it a powerful mode of inquiry in teacher education. This study responds to these challenges by exploring how AI-assisted tools like ChatGPT might support novice teachers in the creative, performative, and collaborative aspects of their training.

This study adopted a practice-based research (PBR) framework situated within arts pedagogy, aligning with Nelson's (2013) conceptualisation of practice as a form of inquiry rooted in embodied creative processes. The research addressed two core questions: (1) In what ways does ChatGPT support or constrain creative engagement during drama-based activities? and (2) How does its use impact pre-service teachers' pedagogical confidence, reflection, and preparation for classroom teaching?

The project was implemented during an arts Education module centered on creating and performing original puppet shows. Students developed puppet characters through improvisational drama, exploring backstory, motivation, and dramatic tension. These embodied experiences drew from the Primary Arts Curriculum (NCCA, 2024), including Role and Character, Time, Place and Space, Plot, Tension, Movement, and Sound. After this phase, students used ChatGPT to draft scripts, based on prompts that reflected their performance genre, age group, and puppetry form. Groups then collaboratively refined the scripts, maintaining creative ownership while evaluating AI's affordances and limitations.

This phased approach—beginning with human-led exploration and moving to AI-assisted drafting—enabled students to remain in control of their narratives while using AI to scaffold the writing process. Final performances were shared in peer settings, and students completed an

anonymous post-project survey. The instrument included Likert-scale questions (e.g., satisfaction with AI-generated content, confidence in using AI, and creative support) and open-ended prompts (e.g., reflections on affordances, limitations, and suggestions for future use). Responses were thematically analysed using open coding to identify recurring patterns and insights, following the six-phase approach outlined by Braun and Clarke (2006).

Survey data (n=100) indicated strong engagement with AI. Eighty-five percent reported that ChatGPT helped generate initial ideas, and 78% said it enhanced their creative process by easing the pressure of starting from scratch. Sixty percent noted time-saving benefits, and 55% viewed it as a valuable educational tool. However, 65% stated that human input was needed to make scripts age-appropriate, with qualitative comments pointing to emotional flatness, lack of humour, and cultural vagueness in AI outputs.

These findings align with recent research on AI in teacher education. Ma et al. (2025) describe how ChatGPT can scaffold writing but stress the need for human refinement. Ding (2024) similarly highlights AI's value in generating structure within reflective, collaborative pedagogies. Punar Özçelik and Yangın Ekşi (2024) found that ChatGPT supported university students' writing fluency and coherence while promoting learner autonomy. Recent research by Bae et al. (2024), who highlight the dual perspectives of pre-service teachers on generative AI—acknowledging its capacity to enhance creativity and efficiency while also raising concerns around critical engagement and over-reliance. In this project, students described AI as a catalyst for idea generation and a source of dialogue scaffolding—but not a replacement for creativity.

The study affirms the potential of AI to support creative risk-taking and reflective practice in ITE when embedded in arts-based learning and aligned with curriculum goals. Rather than displacing the teacher, AI functioned as a generative prompt for discussion, performance, and reflection. These findings support wider calls for critically engaged use of generative tools in education (Watermeyer et al., 2024; Sperling et al., 2024).

In conclusion, this project contributes to emerging insights on integrating AI in teacher education—not as a shortcut to creativity, but as a scaffold for experimentation, iteration, and confidence-building in drama pedagogy. Future research will explore how AI literacy can be embedded into ITE curricula to ensure pre-service teachers are equipped to navigate digital tools in ways that honour innovation and the imaginative power of the arts.

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Running Local Large Language Models (LLMs): Unlocking AI Power Without the Cloud

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Introduction

In the rapidly evolving field of artificial intelligence (AI), deployment choices carry significant implications for privacy, autonomy, cost, and accessibility. Cloud-based large language models (LLMs) dominate the current landscape due to their scale and convenience, but they raise concerns about vendor lock-in, data privacy, and recurring costs. A growing movement emphasizes running LLMs locally—directly on personal or organizational hardware. (Figure 1) This works builds upon the author's presentation at the 1st International AI Conference (Walsh University & UCC Ghana, 2025), expanding the proposal into a scholarly paper. It introduces the concept of local LLMs, explores practical tools such as Ollama, examines hardware requirements, and evaluates supervised fine-tuning for domain-specific tasks. The aim is to highlight local LLMs as a viable, ethical, and privacy-preserving pathway for AI innovation aligned with Walsh University's mission of responsible technological development.

Procedure

The investigation into local LLMs was structured around five focal areas:

1. Comparative Analysis – Cloud-based and local LLMs were evaluated across four dimensions: location of execution, privacy, scalability, and cost.
2. Tool Exploration – Ollama was chosen as the primary tool for experimentation due to its open-source accessibility and compatibility with architectures such as LLaMA, Mistral, and Gemma.
3. Hardware Profiling – System requirements were benchmarked, focusing on RAM per model size, CPU vs. GPU performance trade-offs, and Apple Silicon optimization.
4. API and Integration Testing – Local APIs mimicking OpenAI and Anthropic structures were implemented to demonstrate seamless integration into existing applications without reliance on external cloud services.
5. Fine-Tuning Trials – Supervised fine-tuning (SFT) with frameworks such as LoRA and Hugging Face was explored, emphasizing healthcare, legal, and forensic use cases.

Results

The comparative analysis demonstrated the following advantages of local LLM deployment:

- Privacy and Compliance – Local execution ensured that sensitive data (e.g., patient records or legal briefs) never left secure environments, supporting HIPAA and GDPR compliance.
- Cost Efficiency – Eliminating metered API calls reduced ongoing expenses, particularly for high-frequency or research-intensive use.
- Customization – Access to model internals enabled creation of tailored agents for SQL generation, dermatological image assessment, and forensic report writing.
- Offline Capability – Local models proved valuable in air-gapped systems and low-connectivity environments such as remote research sites or defense operations.

However, trade-offs emerged. Cloud LLMs maintained advantages in scalability and access to cutting-edge models. Local deployments were constrained by hardware resources, with GPU-equipped systems performing far better than CPU-only machines. These results underscore the importance of balancing independence with realistic infrastructure planning.

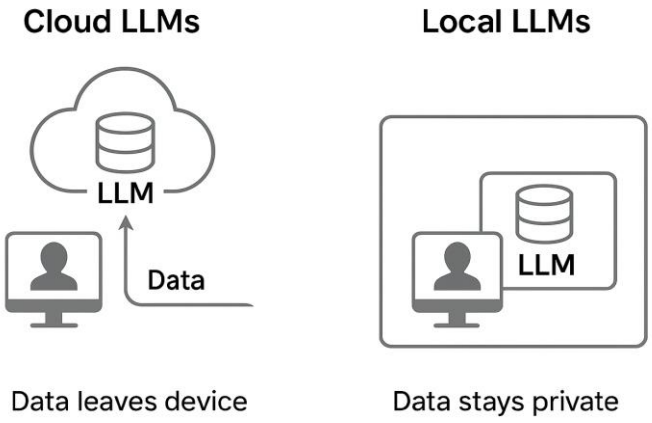
Discussion and Applications

Several use cases highlight the transformative potential of local LLMs:

- Healthcare and Law – Confidential data can be processed privately on-premises, reducing regulatory risks.
- Education and Research – Students can explore LLM fine-tuning hands-on without API quotas or vendor restrictions.
- Forensic Science – Local agents can generate investigative reports or analyze biometric data without breaching evidence protocols.
- Edge Environments – Humanitarian and field teams can deploy AI where internet access is intermittent or unavailable.

Figure 1.

Comparing Cloud LLMs vs. Local LLMs (ChatGPT)



These examples illustrate how local AI systems align with responsible innovation while broadening access to AI development.

Conclusion

Local LLMs represent a paradigm shift in AI deployment. By running models directly on user-controlled hardware, they enhance privacy, reduce costs, and foster independence. Tools such as Ollama make adoption accessible, while supervised fine-tuning extends adaptability to specialized domains. For sectors requiring privacy, compliance, and customization—such as healthcare, education, and law—local AI is not optional but essential. Looking forward, hybrid strategies that combine local execution with selective cloud augmentation may offer the most balanced solution, ensuring scalability without sacrificing autonomy.

Acknowledgements

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The Use of AI to Promote Health Education: An Approach to Daily Health Tips

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Despite significant advancements in medical science and digital health, millions of individuals remain unaware of simple daily health practices that can prevent or manage chronic conditions. Diseases such as diabetes, hypertension, obesity etc. continue to rise due to several contributing factors of which inadequate public health education is one of the factors (WHO, 2023). Artificial intelligence (AI) plays a crucial role in everyday life in this digital age. The use of search engine tools and various digital assistance are often used yet this technology is not utilized in promoting routine health awareness (Topol, 2019).

This project proposes embedding a Daily Health Tip Interface within AI systems; where a pop-up menu with brief health tip appears during AI interactions, either for research or for general inquiry, before delivering the main response. Tips will be medically reviewed and aligned with trusted health standards (e.g., WHO, CDC, 2022). This "micro-education" model can help improve personal health practices among individuals who constantly use AI as a source of information

The project's objectives are to promote daily health awareness across diverse population, aid chronic disease management through micro education, contribute to global health education using AI accessibility and reach. By delivering personalized health tips, the interface aims to promote public health, health literacy, and global reach and inspire healthier habits especially to people who feel reluctant to check up on their health.

Even though AI platforms such as Noom, Better Me, Whysa, HealthifyMe aim to give health tips, these are limited to providing such information as a pop-up menu. They provide the information upon asking for specific information related to health. These platforms are only utilized when individuals download them personally. This approach to health education limits global reach and so if this is integrated in all various platforms; it would reach millions of people globally. This project will be implemented using HestoBot and other Al platforms. Furthermore, an AI application will be created specifically for daily health tips.

In the long term, this project seeks to; personalize tips based on user preferences and health data, partner with healthcare organizations, partner with various AI platforms, translate tips into multiple languages as well as track how users found it helpful.

Quantitative Data Analysis was conducted to know how important this initiative will be helpful to them and identify their interests in this initiative. Out of 100%, 75% express their interest in receiving health tips through their interactions with AI, 76% express their willingness to adapt healthier habits through this initiative and, finally, 99% found interest in some health topics suggested to them for health tips. The likes of which include nutrition and diet, physical health and exercise, mental health and wellness and chronic disease management.

In conclusion, daily AI interactions can become a powerful tool for global health education. It has the potential to transform everyday digital interactions into periods of meaningful health engagement by encouraging preventive care and empowering users to make informed health decisions. Let's use AI not just to inform, but also to transform lives, one health tip at a time.

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AI Innovation with International Impact: A Showcase in How Creating Your Own Personalized AI Chatbots Can Lead to Student Success Beyond Borders

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Introduction

This project created chatbots to further technological innovation at three universities. Experimental data indicated that creating specialized chatbots increased student success in research, built university-wide momentum in AI for science majors, and enhanced course design.

Research Design & Data

Walsh University

As research interest in AI applications increased in popularity, one research group at Walsh University (USA) expanded to 15 students. As a result, a friendly chatbot, HestoBot, was created by the professor to assist in student-faculty engagement. It was especially impactful for student researchers unfamiliar with emerging technologies. The professor trained the chatbot with personalized advice, so the responses were directly connected to the research group's vision and goals. Diving deeper, the chatbot aligned the work to the Walsh mission. For example, the chatbot reinforced that the student's efforts in research will serve the common good and demonstrate student leadership in AI innovation. Moreover, HestoBot focused on enhancing research readiness, curiosity, and collaboration.

More specifically, one student researcher's trials revealed HestoBot's potential to motivate research beyond just answering questions. The chatbot actively encouraged participation in the research group and offered support to multiple learners simultaneously. When asked how to begin engaging in AI research, HestoBot listed six thoughtful steps, emphasizing peer collaboration, mission alignment, and further exploration. Through personalized coaching embedded within the chatbot, the student reported feeling more confident in tackling unfamiliar research tasks and was more proactive in seeking advanced AI opportunities. This motivational boost translated into

higher levels of research output and deeper commitment to the group's international research vision.

Notre Dame University-Louaize

Interestingly, HestoBot showed benefits beyond borders by supporting one faculty member from NDU-Louaize (Lebanon). In addition to helping students learn how to get started with AI and how it connects to the Catholic mission, it also supported this international faculty member who was in the process of learning about AI. HestoBot transformed her own understanding of AI by suggesting tips and advice for maximizing AI applications. During her personal trials with HestoBot, the NDU-Louaize faculty member asked sample questions and received responses with unique features. The chatbot was specifically trained to provide both students and faculty with a step-by-step guide on how to begin working with AI.

Unlike a general answer from ChatGPT, HestoBot offers personalized, beginner-friendly guidance that makes learning more approachable. The clear steps allowed her to follow along easily and build confidence in using AI. Another unique feature was the fact that HestoBot included references incorporated directly from the Walsh professor's own training documents and personalized feedback. This added a personal touch that went beyond standard chatbot responses. HestoBot even invited the faculty member to join the USA research group. This chatbot was critical to driving AI innovation beyond engineering, particularly in the design for an accessible AI course for all. Overall, HestoBot is impressive because it provides tailored support that benefits not only students in the Heston Research Group but also faculty members. In this case, it empowered an international faculty member to grow, gain confidence in AI, and eventually move on to more advanced tasks such as engaging in AI-related projects.

The University of Akron

Additional applications of chatbots were featured in this project. For example, creating chatbots proved to be a highly effective strategy for enhancing course design at a large public institution. At The University of Akron (USA), the instructional design team took a leading role in advancing AI innovation by developing custom chatbots specifically for online course design and development. These chatbots, built using advanced tools such as ChatGPT-4 omni, provided a range of powerful features, including seamless course calendar integration, detailed course mapping, and tailored support for personalized learning experiences. Remarkably, all of this was achieved without requiring any programming knowledge, making the process accessible to faculty and staff from diverse technical backgrounds. This advancement not only improved efficiency in course creation but also demonstrated how AI can make instructional design more inclusive, collaborative, and transformative across higher education.

Conclusion

In conclusion, unique features included the chatbots' personalized output, guidance for further exploration, and mission alignment. Collectively, these efforts made a wide range of positive impact on students, faculty, and instructional designers.

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AI-Enhanced Web Design: Developing a Google Site with Integrated Analytics for the UHWO Data Analytics Club

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The University of Hawai‘i–West O‘ahu (UHWO), an Indigenous-serving institution within the state’s public higher education system, has made workforce readiness (including digital literacy) a central priority. In alignment with this mission, a summer research initiative led by Emi Yoneda, a recent graduate of the B.A. in Business Administration with a concentration in Data Analytics, under the mentorship of Dr. Fiorella Peñaloza, focused on developing an AI-enhanced website for the UHWO Data Analytics Club (DAC). The project applied user-centered design principles and accessibility standards to promote student engagement and professional development.

UHWO enrolls approximately 3,000 students, a significant proportion of whom identify as Native Hawaiian or Part-Hawaiian. The institution emphasizes applied learning and community engagement, creating an ideal environment for student-led innovation. The DAC, open to students from all disciplines, fosters digital literacy through workshops, guest speaker events, and collaborative projects. Given that many UHWO students participate in online learning, the need for effective digital engagement strategies is particularly critical.

The research project aimed to design a Google Site that reflects the DAC’s mission while incorporating best practices in UI/UX design and analytics. Guided by the club’s constitution, the site was structured around three thematic areas: Skill Development, Industry & Career Exposure, and Member Engagement & Growth. These categories informed the site’s layout and content while ensuring alignment with UHWO’s brand identity and accessibility standards (University of Hawai‘i–West O‘ahu, 2025). To strengthen the design process, Yoneda completed the Google UX Design and Digital Marketing & E-Commerce Professional Certificates, which provided practical, case-based training. AI tools such as ChatGPT and Copilot supported content refinement and site organization. Additionally, the integration of Google Analytics 4 (GA4) enables the effective tracking of engagement metrics (e.g., session duration and navigation paths; Kumar & Ogunmola, 2020), allowing DAC leadership to make data-driven decisions and continuously enhance member experiences.

By analyzing user engagement, organizations (including the DAC) can gain deeper insights into behavior with regular review, enabling optimization of interactions. High levels of engagement are associated with improved retention and increased loyalty; active users develop a sense of attachment, which encourages repeat visits and sustained usage over time (Tsarenko & Rooslani Tojib, 2009). Beyond individual interactions, engagement fosters a sense of community and belonging within digital platforms; aligning to our institutional core values and commitment to fostering a sense of belonging and community echoed in the Strategic Plan.

Collectively, the literature emphasizes the importance of both design principles and user engagement; guidelines that directly shaped the DAC website. Consistent with these practices, the project has provided a mechanism for sharing interaction data with members, reinforcing

transparency and collaborative decision-making. Internal reviews by UHWO's Communications Department ensured adherence to institutional branding guidelines, including standardizing text formatting, removing unnecessary underlines, and aligning with ADA requirements. A formal review by UHWO Information Technology Services (ITS) is recommended to further ensure accessibility compliance, data security, and copyright protections. These steps are critical to creating a secure, inclusive, and sustainable digital platform.

The project was supported by the NSF TCUP–PACT Grant (#2413982, 2024–2029) in collaboration with UHWO's Library, Communications Office, and ITS. Future directions include leveraging GA4 data to analyze engagement patterns, expanding research collaborations through learning analytics, and broadening student participation in digital innovation. Ultimately, the DAC website illustrates how technology-enhanced, student-led initiatives can advance learning, strengthen engagement, and build community in higher education.

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Additional Information

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“AI Lab for Architects”
A Hands-On and Ethical Approach to Integrating Artificial Intelligence into Architectural Education

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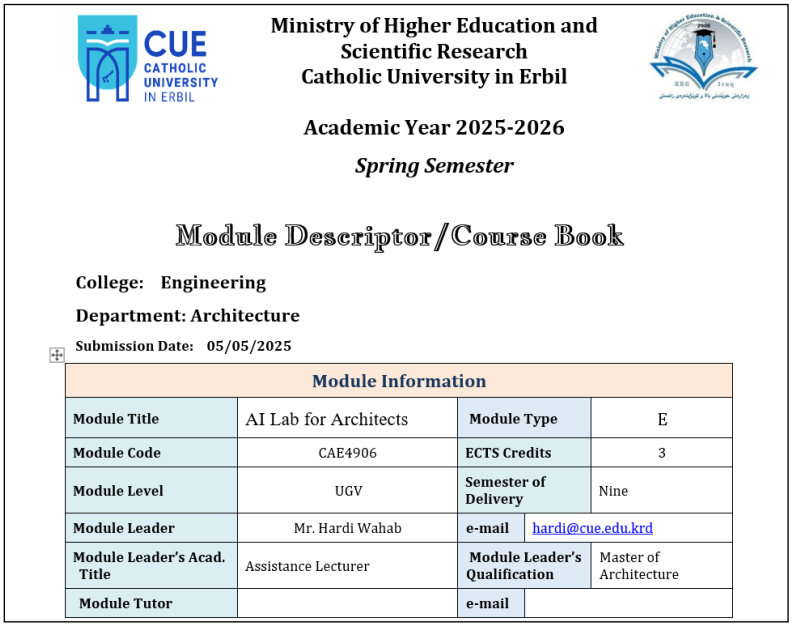
Introduction

The fast integration of Artificial Intelligence tools in architectural fields for the purpose of designing and construction, leads to modifying and adding the tools and integrating them with the architectural education. As the first international conference in AI aims to explore new potentials of AI, nowadays every software program has several AI plugins that help architects design faster and easier, the new generation of architectural students should be equipped with those tools while they are learning the profession. “AI Lab for Architects” is a designed course for the Architecture department of Catholic University in Erbil, throughout this course, the students will be the main experimenters of AI tools, throughout this paper I will try to explain the course design and how the course will be taught with expecting an outcome by the students at the end of the course.

Image 1.
The cover page of “AI Lab for Architects” coursebook. (by researcher)



CUE CATHOLIC UNIVERSITY IN ERBIL

Ministry of Higher Education and Scientific Research
Catholic University in Erbil

Academic Year 2025-2026

Spring Semester

Module Descriptor/Course Book

College: Engineering

Department: Architecture

Submission Date: 05/05/2025

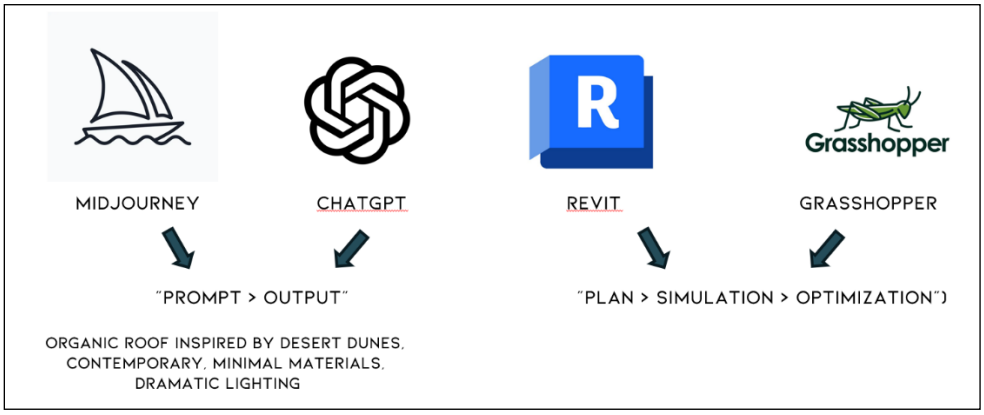
Module Information			
Module Title	AI Lab for Architects	**Module Type**	E
Module Code	CAE4906	**ECTS Credits**	3
Module Level	UGV	**Semester of Delivery**	Nine
Module Leader	Mr. Hardi Wahab	**e-mail**	hardi@cue.edu.krd
Module Leader's Acad. Title	Assistance Lecturer	**Module Leader's Qualification**	Master of Architecture
Module Tutor		**e-mail**	

The Course Structure

The course follows a pedagogical student-centered approach and is divided into 3 main phases and 14 in-class weeks of education, the first part is focusing on the fundamental understanding (Theory) of AI, to understand why it’s necessary and how to use it in architecture, linking them with the fundamentals of technological improvements in the world. The second part is where new tools will be introduced to the students, where every tool will be explained and experienced in the

class. This phase consists of several architectural phases of design, through generating a concept with Midjourney and ChatGPT by writing a prompt and getting a result, to rendering a 3D model inside Revit or 3Ds Max or Sketchup, to planning a required space in Revit though Spacemaker AI plugin, and to the adaptation of AI in helping sustainability simulation.

Image 2.
Explanation of using programs with plugins and prompts. (By researcher)

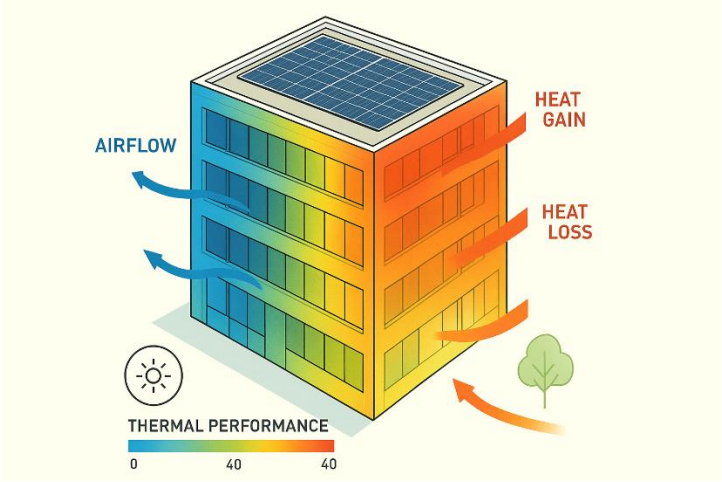


Case Studies and Outcomes
The course enriches the students with skills to design better, so the outcomes of the course will be in different fields. For example, in the field of Urban planning, using the Archivinci tool for upgrading the surrounding area of the Erbil citadel's pedestrian can be a result.

Image 3.
Pedestrian improvements around Erbil citadel. (By ChatGPT)

Another case study that could be made by the students is enhancing ecological and environmental performance of a building through using ClimateStudio program and AI plugins that can be added to the program. This process will simulate the use of the building and minimize energy gain and energy loss and maximize the thermal comfort of the building.

Image 4.
Heat gain and heat loss in a building's thermal performance. (By ChatGPT)



Broader Implications and Future Vision

The future vision of this course is that the course should be applied in every architectural school. After these courses have been taught, the results should be shared as academic papers so that further studies regarding AI use in Architectural education will be made to improve the future of teaching the courses. This way, a new generation of Architects will be made who are using faster, smarter and more economical tools to design as Architects. Evolving architectural practice starts from the universities, so that's why adding this course ensures an evolving future of architecture.

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ClimateStudio: https://www.solemma.com/climatestudio

AI Innovation to Enhance Empathy for Pediatric Patient Care

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Introduction

Two undergraduate students embarked on a research journey to evaluate the role of AI in new approaches to improve empathy in today's healthcare, particularly focusing on pediatric patient care. This project showcased the potential of AI tools to provide empathetic pediatric care through two perspectives, both nurse and doctor.

Our Unique Focus: AI for Career Readiness in Healthcare

Our common goal was centered on the evaluation of the capability of AI in clinical applications. Therefore, the researchers created their own realistic scenario in an emergency room and analyzed the ability of AI to support healthcare professionals in the workforce. Through realistic trials focusing on patient-centered scenarios, the student researchers evaluated how chatbots supported communication, trust-building, and developmental sensitivity.

Research Process: AI Innovation for Clinical Scenarios

This project highlighted the innovative efforts from two student researchers who explored the integration of AI tools in healthcare communication and patient care through a series of trials, particularly connecting to a realistic scenario in the clinical setting. Researchers created a specific prompt for a male patient, Tyler:

> *Tyler, a 15-year-old boy, arrives at the emergency department with his mother after accidentally spilling hot water on his left forearm. He is visibly upset, tearful, and clutching his arm, which is red and blistered. His mother explains that the accident happened about 30 minutes ago at home, and Tyler immediately ran his arm under cold water for several minutes before they came to the hospital. Can you please provide me with how a nurse can show empathy to Tyler?*

Then, researchers created another prompt that was exactly the same focus and wording except for changing the specifics for a 15-year-old girl, Tonya.

In Trial 1, Student researcher 1 investigated how various AI chatbots (ChatGPT, Gemini, Claude, Copilot, Perplexity) modeled empathetic nursing care for Tyler, a pediatric burn patient. Results of these trials revealed some differences in how each AI addressed family involvement, age-appropriate language, and nonverbal communication, all contributing to reducing Tyler's emotional burden and fostering trust.

In Trial 2, Student researcher 1 changed the focus to Tonya, another pediatric patient, and again took the role of a nurse. This trial emphasized the emotional depth conveyed by AI through strategies such as active listening and compassionate communication. The student's analysis highlighted the effectiveness of Gemini, Copilot, and Perplexity in not only expressing empathy

but also offering practical examples for nurse-patient interactions. In summary, these results indicated that AI provided similar care to both male and female patients and, therefore, these tools can enhance education in nursing.

Overall, Student researcher 1 found that the various chatbots were able to express some level of empathy towards the patient. Strategies such as active listening, compassionate and warm communication skills as well as acknowledging patient's pain employed indicated empathy and when applied thoughtfully, can be used to calm patients' fear, build trust, and enhance the overall healing experience. She admired how Gemini, Copilot and Perplexity explain how the strategies used actually indicated authentic empathy. It was impressive to observe how AI chatbots produced realistic examples focusing on how to communicate with the patient. Looking ahead, this can serve as a great learning tool for nurses.

Student researcher 2 evaluated the same AI tools with the same prompts as researcher 1, while replacing "nurse" with "pediatrician". Her analysis emphasized the chatbots' ability to simulate realistic, patient-centered care, starting from the moment of entering the room. The trials revealed some unique strengths for the chatbots such as adolescent sensitivity and structured guidance.

Overall, Student researcher 2 found that the responses from the chatbots were quite impressive. All chatbots gave a response that deeply considered the needs of the patients and protocols appropriate for the patients age. Surprisingly, the chatbots were able to give strong patient-centered advice. Another strength of the AI output was that it gave a conversational approach to care. The chatbots performed best for these specific categories: Gemini (adolescent sensitivity), Claude (process realism and flow), ChatGPT (structured teaching), Copilot (balance and practicality, and Perplexity (emotional accessibility).

Conclusion

These trials demonstrated the students' commitment to improving patient care through AI innovation. This work established a model for ethically integrating AI into career readiness through clinical training. In alignment with Walsh University's mission, these student-led AI research trials show their dedication to serving the common good and incorporating AI ethics into community healthcare. Additionally, this work advanced AI integration in clinical applications and reflects the institution's mission to develop responsible healthcare professionals in service to the community through ethical, compassionate, and innovative patient care.

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Chatbots utilized in research trials: ChatGPT, Gemini, Claude, Copilot, Perplexity (free versions)

AI-Assisted Semantic Analysis for Curriculum Mapping

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Curriculum mapping is a foundational process in higher education, designed to ensure coherence across institutional, programmatic, and course-level learning outcomes. At Indigenous-serving institutions, where many students are first-generation and from diverse backgrounds, aligning curricular goals with broader institutional missions is particularly critical. This study investigates the application of artificial intelligence (AI), specifically Sentence-BERT (SBERT) models, to support semantic analysis in curriculum mapping. The aim is to provide a scalable and objective method for evaluating alignment across learning outcomes, thereby enhancing transparency, coherence, and supporting continuous improvement.

Traditional curriculum mapping relies heavily on manual review and faculty judgment, often requiring extensive time and coordination (Schutte, Line, and McCullick, 2018). Advances in natural language processing (NLP), particularly transformer-based models such as BERT and its derivatives, enable possibilities for sentence-level semantic analysis and evaluation of curriculum mapping (Duarte, 2024: Zaki et al., 2023). Sentence-BERT (SBERT) models, including all-MiniLM-L6-v2 and all-MPNet-base-v2, have demonstrated effectiveness in tasks such as semantic similarity, clustering, and information retrieval (Reimers & Gurevych, 2019). These models are accessible via platforms like Google Colab and can be implemented using pre-trained libraries (aCloudFan, n.d.), making them suitable for academic applications.

The study employed two SBERT models to analyze semantic alignment among learning outcomes at multiple curricular levels: Institutional Learning Outcomes (ILOs), Degree Learning Outcomes (DLOs), Program Learning Outcomes (PLOs), and the Accreditation Council for Business Schools and Programs (ACBSP) Common Professional Components (CPCs). Using Python and the Sentence-Transformers library, sentence embeddings were generated and cosine similarity scores were calculated to quantify semantic proximity. The analysis focused on the Data Analytics program within the Business and Cybersecurity Division of a baccalaureate-only institution.

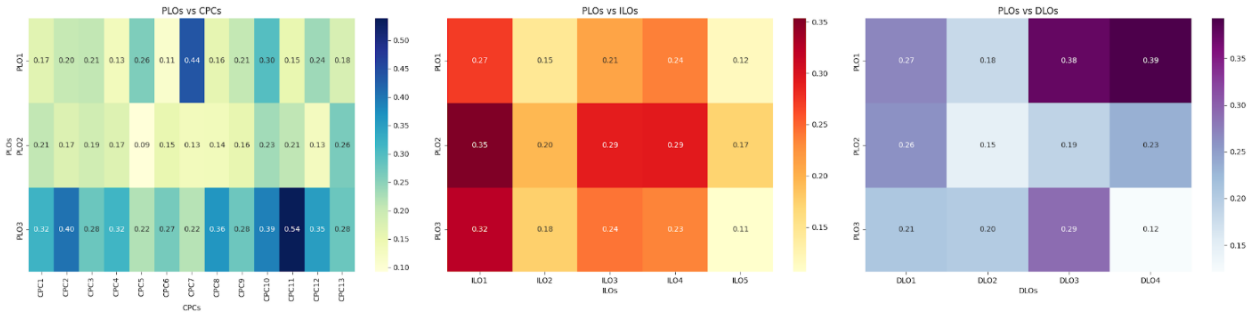
The comparative analysis of the two SBERT models revealed nuanced insights into the semantic alignment of learning outcomes. The all-MiniLM-L6-v2 model, optimized for speed and efficiency, identified moderate alignment between PLO3 and CPC11 (focused on quantitative reasoning), PLO2 and ILO1 (focused on communication), and PLO1 and DLO4 (focused on ethics; see Figure 1). The all-MPNet-base-v2 model, which offers higher semantic accuracy, produced more robust alignment scores, particularly between PLO1 and DLO4 (focused on ethics), with a cosine similarity of 0.57 (see Figure 2). This finding is especially significant given recent curricular revisions that emphasize data ethics. Additionally, the MPNet model highlighted alignment between PLO1 and ILO3 (critical thinking), and consistent alignment between PLO3 and CPC11, reinforcing the thematic coherence of quantitative reasoning across levels.

These results suggest that while some learning outcomes exhibit clear semantic connections, others may lack sufficient alignment, highlighting areas for review and revision. The analysis also underscores the impact of outcome phrasing on similarity scores, suggesting that linguistic clarity

and consistency are essential for effective curriculum mapping. AI-assisted semantic analysis offers a promising approach to curriculum mapping by providing quantifiable, scalable insights into the alignment of learning outcomes. While human expertise remains indispensable for interpreting results and guiding curricular decisions, SBERT models can support faculty and assessment professionals in identifying gaps, refining outcome language, and enhancing program coherence. This methodology also contributes to accreditation efforts, particularly in the context of ACBSP reviews, by offering evidence-based tools for continuous improvement. Future research will explore the integration of descriptive CPC content to enhance context sensitivity and further refine semantic similarity assessments.

Figure 1.

Heatmap of Semantic Similarity Across ILOs, DLOs, PLOs, and CPCs Using all-MiniLM-L6-v2



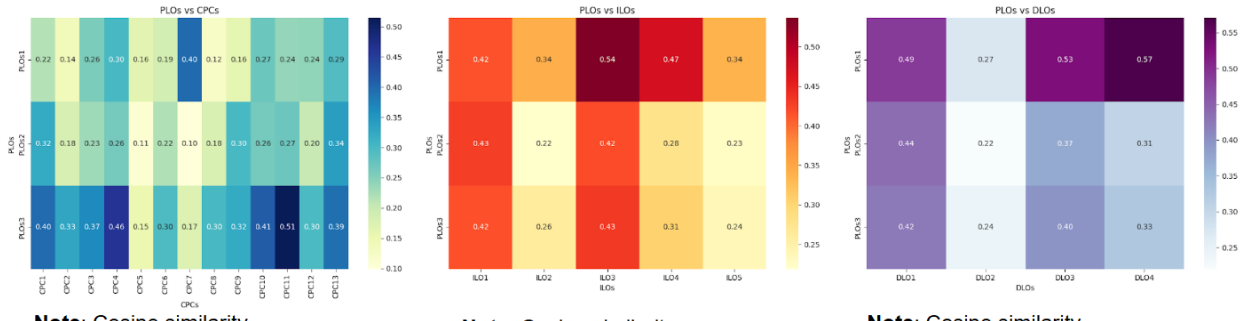
Note: Cosine similarity (0.54) was greatest between PLO3 and CPC11, which both relate to quantitative reasoning.

Note: Cosine similarity (0.35) was greatest between PLO2 and ILO1, which both relate to communication.

Note: Cosine similarity (0.39) was greatest between PLO1 and DLO4, which both relate to ethics.

Figure 2.

Heatmap of Semantic Similarity Across ILOs, DLOs, PLOs, and CPCs Using all-MPNet-base-v2



Note: Cosine similarity (0.51) was greatest between PLO3 and CPC11,which both relate to quantitative reasoning.

Note: Cosine similarity (0.54) was greatest between PLO1, relating to data ethics and ILO3, relating to critical thinking skills.

Note: Cosine similarity (0.57) was greatest between PLO1 and DLO4, which both relate to ethics. This closely aligns with recent curricular changes that more explicitly incorporate data ethics.

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Additional Information

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AI Technology to Enhance the Human Skincare Experience

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The Skincare Industry aims to help individuals improve the health and condition of their skin. This goal is manifested by integrating various perspectives in relation to the skin and skin health. In this study, various student perspectives were united in hopes of a better skincare experience for professionals and consumers alike. These unique points of view scope different parts of the skincare process: from the molecular level to personal skin therapies, and further with company-consumer interactions. Through each of these perspectives, it was found that AI could improve the experiences. For chemists, AI improves literature research, information processing, and communicating complex chemical language. Chatbots have the ability to analyze complex formulation data, give theoretical background to observations, and translate technical information (via large language models, LLMs), making them an efficient tool in the lab and research.

To test this theory of chatbot chemistry, a sunscreen formulation project was tested virtually with ChatGPT and analytically in the lab. The goal of this project was to optimize a sunscreen formula: Focusing on SPF value and emulsion. Three sunscreens were formulated, sourcing formulas from ChatGPT and literature. The prompting process contained the following:

> *Foundational inquiries on sunscreen chemistry, questioning "What is basic sunscreen chemistry?" and "What are the active ingredients used in inorganic sunscreen formulas?" After basic information was established, more specific questions were asked regarding formulation design, ingredient function and comparison, as well as ways to optimize the formulas created.*

It was found that ChatGPT could produce formulas that aligned with industry standards and journals. Formulas were listed in tables with columns for ingredients, their function, and ratios. Additionally, ChatGPT could participate in the R&D process. In real time, ingredients were adjusted to reach goals of a higher SPF and viscosity than what was observed physically. Considering analytical results, ChatGPT provided SPF estimates for their formulas, which were accurate to their testing in the lab. ChatGPT predicted SPF values of 30 (1), 35 (2) and 45 (3), where physical results were quantified as 28.3±2.3 (1), 31.0±3.5 (2), and 35.3±0.2 (3). Overall, chatbots provide a tool for chemists to automate information processing, the R&D process, and experimental result prediction. For the skin care of individuals, AI was evaluated on its proficiency in therapeutic intervention. Chatbots - ChatGPT, Perplexity, CoPilot, and Gemini- were prompted to generate therapeutic programs for a patient, post knee surgery. AI was prompted with the following:

Joe, a 65-year-old retired construction worker, is recovering from knee surgery. He seeks massage therapy as an alternative to painkillers due to side effects like drowsiness and fatigue. Create a massage therapy treatment plan and please give specific anatomical positions.

A key finding was the consistent unprompted creation of a three-phase treatment plan which mirrors a progressive approach used by clinicians. Specific analysis examined the LLMs ability to give clinically relevant information such as manual technique, anatomical location and goals for each stage. Results from these findings demonstrate LLMs ability to effectively combine anatomical principles, and rehab principles to create effective treatment plans. Moving forward, this suggests AI's ability to play a role in real world practice to support decision making and therapeutic intervention. Future examination of AI is in progress by prompting practicing therapists and LLMs and examining the differences in treatment protocol. On a consumer level, chatbots may be used to match consumers with personalized products. AI's scanning technology allows for analyzing conditions of lips and face as well as matching makeup colors that enhance looks for young women. AI chatbots were used to identify the potential AI applications available for today's consumers, both free and at a cost. A prompt was created that provides a focus on face scanning and personalized makeup advice. The prompt is given below:

You are an expert in AI for face scanning, analyzing conditions of lips and face, and matching lip and makeup colors that enhance looks for young women. Please make a table of AI applications that match the criteria above and also have these features: free of cost, provide private conversation, personalized advice, and an active link to a website to learn more. The next task is to provide another table of AI applications that match all of the criteria above but do have a cost. Make both tables have the same rows and columns. In the second table, please provide the cost in USD per month.

This prompt was entered into six free chatbots, including ChatGPT, Grok, Perplexity, Meta, Gemini, and HestoBot. HestoBot is the AI research assistant that was created for our research group. Overall, all six chatbots performed the given task, but with variation. ChatGPT identified several free AI applications that offer face scanning capabilities, personalized makeup advice, and private conversations. ChatGPT also identified paid versions of these applications, with costs ranging from $3.99 to $59.99. Some AI chatbots, like Grok and Perplexity, were focused on the privacy and protection of the consumer. They utilized identity protection and secure facial analysis. Like Grok and Perplexity, Gemini noted important considerations about privacy policies and user protection. HestoBot identified YouCam Makeup, FaceApp, and Glam AI as free options that provide lip color matching and makeup recommendations with private chat features.

Overall, AI chatbots provided insight and guidance to enhance the capabilities of humans providing the skincare experience. For formulation optimization, AI improves the development of effective skincare products. By creating skincare protocols, AI assists in developing personalized treatment plans. On a global level, AI enables new approaches to skin health management and

matching products with consumers. AI has the ability to participate and enhance the skincare experience from beginning to end.

References

Chatbots used in experimental trials: ChatGPT, CoPilot, Grok, Perplexity, Meta, Gemini, and HestoBot (free versions)

AI-Driven Strategies in Forensic Economics: An International Collaboration in Service to Society

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A Vision of International Service

This interdisciplinary research project united two AI scholars from different parts of the globe, one specializing in forensic science and the other in economics, who were passionate about advancing forensic economics in service to the greater community. These researchers investigated the power of AI chatbots (ChatGPT-4o, Gemini, Meta, Perplexity, Claude, Grok, DeepSeek) to identify AI applications for forensic economics. More specifically, they strived to discover applications that could predict the likelihood of cyberattacks including emerging threats (deep fakes) as well as quantify financial losses (significant costs, damages to reputations).

Research Plan & Results

Researchers created an effective prompt to acquire specific and relevant data from the chatbots. Through creative prompt engineering, the researchers asked these chatbots to uncover AI tools with peer-reviewed publications (2023–2025) and to address two critical goals in cybersecurity: (1) identify the gaps in the current literature involving AI to forecast not only the likelihood of cyberattacks (deep fakes or others) but also their broader economic impact on both individuals and employers and 2) categorize how AI can help forecast cyberattacks and how AI can forecast the broad impact to individuals and employers. Initially, researchers found the best results from ChatGPT-4o and Gemini, so these tools were chosen for the next steps. Through the use of AI's deep research capabilities, they analyzed literature gaps and categorized cyber risk forecasting across individuals and employers across the globe. Looking closer at the data, researchers analyzed the results to find AI tools to help society that can predict cyberattack likelihood and discover the financial impact of these attacks. Next, researchers focused on creating a comparative analysis to evaluate AI tools and showcased the best AI technology available across Ohio, USA, Ghana, and Sub-Saharan Africa. Special focus was to find a tool to bridge global cybersecurity gaps.

A portion of the prompt created by researchers included:

> *Using deep research, please help me address these research topics and answer these questions 1) identify the gaps in the current literature involving AI to forecast not only the likelihood of cyberattacks (deep fakes or others) but also their broader economic impact on both individuals and employers 2) categorize how AI can help forecast cyberattacks and how AI can forecast the broad impact to individuals and employers in Ohio 3)...in the overall USA 4)...in Ghana 5)...in Sub-Saharan Africa. For the employers, focus on a sector-agnostic view. Include all types of cyberattacks including deep fakes. The goal of this research is finding a place to start on a collaboration with a vision of this work to positively*

impact (help) the largest group of people. Limit responses for each question above to 200 words.

Figures 1 and 2 show the deep research capabilities of both ChatGPT-4o and Gemini 2.5 Flash. Researchers were given feedback along with a progress bar that is useful for tracking the processing time. Each trial took 7-8 minutes to complete and provided new insights into AI technology to benefit forensic economics.

Figure 1.
Deep research capabilities of ChatGPT-4o (conducted 6/7/25)

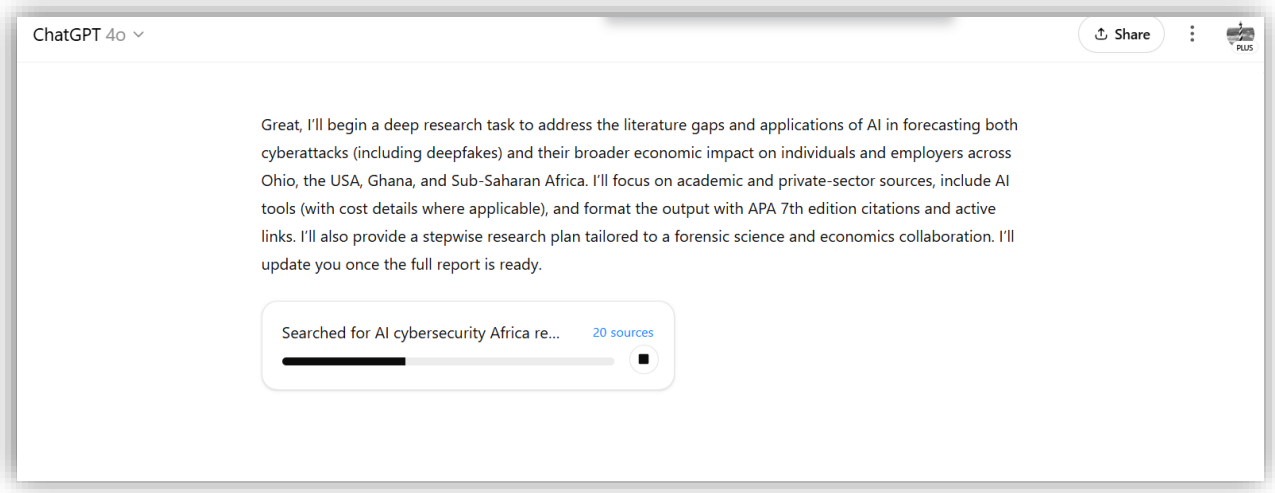
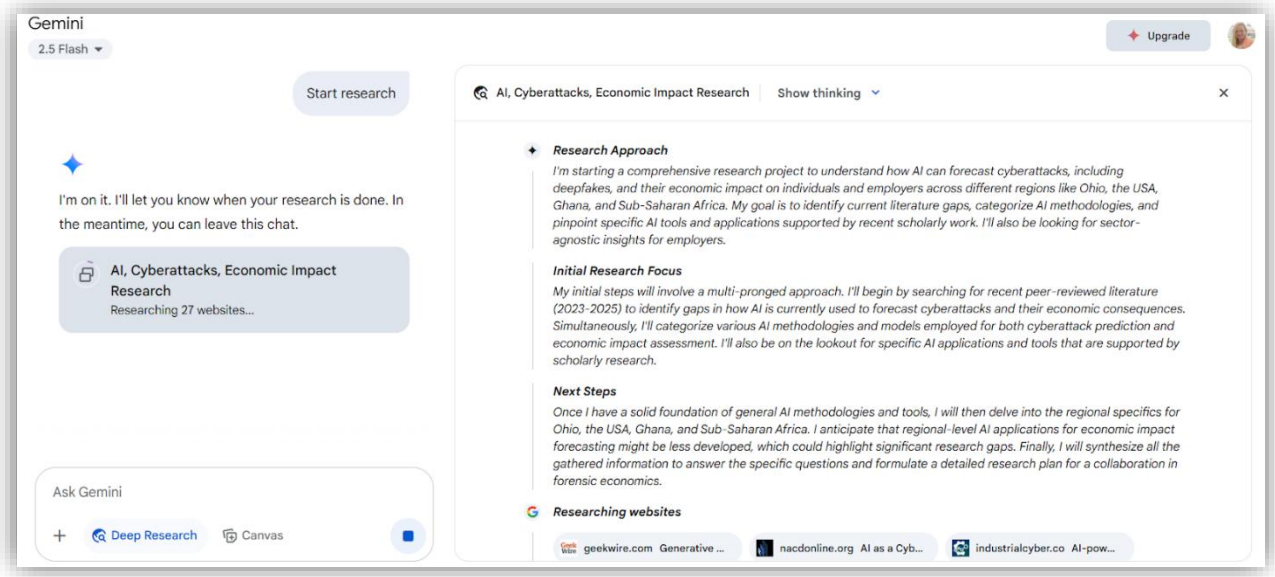


Figure 2.
Deep research capabilities of Gemini 2.5 Flash (conducted 6/7/25)



Comparative Analysis in Forensic Economics

Among the AI tools identified in these trials, Darktrace stood out among the others due to its capabilities and functionality. Through comparative analysis with other typical AI cyber tools, researchers found that Darktrace emerged as a uniquely powerful platform. Unlike rule-based systems, Darktrace uses self-learning AI to identify abnormal behavior in real time, independently respond to threats, and generate human-readable reports without manual input. These capabilities and associated findings from this project support both predictive accuracy and fair access to cybersecurity insights. Consequently, this application of AI allowed for meaningful cross-regional comparisons and new insights into forensic economics. Moreover, Darktrace made a positive impact on the forensic investigation workflow. Some specific advantages included continuous monitoring, evidence preservation, anomaly detection, AI-driven analysis, and autonomous response at machine speed.

The economic dimension of AI-driven cybersecurity is evident in Darktrace's ability to prevent financial losses and preserve societal stability. Its autonomous resolution saves over 4,300 analyst hours monthly and can neutralize malware in seconds, reducing breach costs that average $5M in the U.S. and up to $100M for a major ransomware incident. In Sub-Saharan Africa, where cybercrime reduces GDP by an estimated 10% (Interpol, 2021), Darktrace offers cost-effective protection by compensating for workforce shortages. By ensuring continuity in healthcare, government, and municipal services, AI-based forensics translates into measurable ROI, reduced operational downtime, and enhanced resilience across regions

Conclusion

In conclusion, by utilizing AI's deep research capabilities, data revealed new opportunities in AI innovation including forecasting the broader impact of cyberattacks on individuals and quantifying financial losses. Darktrace stood out as the best AI technology that offered real-time threat detection and provided practical impact for the future. Overall, this project aligned with the mission and vision at the heart of this collaboration to serve the common good through AI innovation in forensic economics.

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AI tools utilized in the research process and evaluated in this study: ChatGPT-4o, Gemini 2.5 Flash, Meta, Perplexity, Claude, Grok, DeepSeek, Darktrace ActiveAI Security Platform™

An Investigation into AI Scanning Programs for Diagnosis and Patient Enhancement for Skincare and Cosmetics

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Skincare health and appearance are vital for not only physical health, but overall well-being. This study aimed to analyze AI chatbot treatment options and recommendations for cosmetic and skin treatments, and to identify areas for improvement in AI's role in predicting patient outcomes. The integration of facial scanning AI, including its abilities in diagnosis and treatment/procedure predictions, facilitated the gathering of patient outcome information. This research was conducted by prompting chatbot and scanning AI programs such as ChatGPT, Copilot, Grok, Perplexity, and Gemini to detect possible concerns as well as treatment options. The questions were specified based upon various scanning purposes, cosmetic procedures, diagnosis/treatment options, as well as ethical considerations. Each chatbot's capabilities and recommendations were then evaluated and compared based upon differences, biases, or accuracies provided by questions fed into the programs. AI scanners were used to evaluate various skin concerns and flag them for further evaluation and diagnosis as well as altering pictures for possible enhancements. This research is important for understanding how AI can lead to improved practices, validate the accuracy of its diagnoses and outcomes, and offer insights for overall patient experience.

Researcher 1 found that when prompted to create tables on AI and skin cancer detection, each chatbot generated tables illustrating AI's ability to assist with diagnosis through specialized skin scanners that flag potentially concerning lesions. The chatbots were given the following prompt:

> *You are an expert in AI applications for skin care, especially diagnosis of skin imperfections (about moles, birth marks, and skin lesions) please describe how AI can aid in detection and diagnose for a PA in treating skin cancer on a patient, strategies to reduce bias and ethical considerations in its process. Please summarize by making a table, rows represent AI tools, columns are the following: diagnose, treat, reduce bias, ethic use, privacy considerations.*

The chatbots also recommended easily accessible skin scanners and apps for at-home detection and monitoring. However, when provided with an image of a skin lesion (the researcher's mole) and a descriptive prompt asking to analyze the image for any skin concerns, all chatbots stated they could not diagnose conditions from images, offering only general observations. Despite referencing the same ABCDE melanoma criteria, the chatbots could not agree on whether the mole was concerning. ChatGPT, Perplexity, and Grok did not flag concern, while Gemini and CoPilot did. These results demonstrate current limitations in chatbot-based diagnostic tools and emphasize the need for further improvement. A comparison of skin scanners using the same image showed high sensitivity but also highlighted the need for better specificity and reduced bias.

Researcher 2 found that when asked, AI chatbots would analyze photographs to identify imperfections/flaws in the skin and in relation to skin health. All chatbots were given the following prompt:

> *If you were an expert in AI applications for skin care in dermatology, especially diagnosis of skin imperfections, what concerns or flaws would you possibly note in relation to skin health, concerns, or recommendations as well as various treatment options for them. Please summarize by making a table, rows representing AI tools, columns are the following: diagnose, treat, tips, concerns, skin unevenness, hyperpigmentation, discoloration, melasma, blemishes, acne, and fine lines/wrinkles.*

The chatbots were able to facilitate treatment options, as well as daily routines to reduce the look of the concerns listed. AI was able to analyze the images of the skin provided by the user, personalize treatment based on that individual, provide tips for skin health as well as any worrisome attributes seen. Many of the chatbots directed attention to further use of other AI-powered tools through platforms that are more specialized in processing virtual skin health. All of the platforms recognized that they were not able to directly diagnose but rather inform on potential treatment planning. While differences existed between the chatbots concerning what was/was not a problem for the skin image(s) provided, combined it was able to give a starting point for potential current and future concerns. AI cannot be solely relied upon for diagnoses, but is useful for providing tips and feedback, allowing for a clearer and more understandable counsel regarding skin concerns.

Researcher 3 found that the AI chatbots demonstrated both similarities and differences in their analyses of AI applications for surgical and cosmetic procedures. The chatbots were given the following prompt:

> *If you were an expert in AI applications for plastic surgery and cosmetics, especially the areas of rhinoplasty, blepharoplasty, facelift, brow lift, chin augmentation, and Botox, what concerns or flaws would you possibly note in relation to skin health, concerns, or recommendations as well as various treatment options for them. Please summarize by making a table, rows representing AI tools, columns are the following: diagnose, treatment, tips, concerns, rhinoplasty, blepharoplasty, facelift, brow lift, chin augmentations, and Botox fine lines/wrinkles.*

ChatGPT, Perplexity, CoPilot, and Grok provided tables summarizing what the prompt asked. Gemini was unable to provide tables with this information but instead gave a formatted list. Differences emerged in their specific observations and recommendations based on the provided images. The integration of AI into skincare scanning and cosmetic procedures promises significant advancements in aesthetic medicine. This approach can lead to enhanced accuracy and reliability in predicting cosmetic and plastic surgery outcomes by leveraging AI algorithms and scanning technologies for precise patient data analysis. This precision allows for highly personalized treatment planning through virtual simulations of surgical approaches and outcomes, potentially reducing the need for revisions.

This study determined how improvements in AI scanning in healthcare may continue to provide a beneficial avenue in medicine, as it may result in more accurate and faster outcomes, as well as its role in treatment and diagnosis prediction for the future. Data demonstrated various scanning and chatbot programs could be used to improve skin health detection and treatment, and patient overall experience. Future research of AI applications in skincare will continue to be a worthy endeavor.

References

Chatbots used during this research process: ChatGPT, Copilot, Grok, Perplexity, and Gemini

Promoting Healthy Lifestyles for College Athletes through AI Technology

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Introduction

This international collaboration between Walsh University (USA) and Notre Dame University-Louaize (Lebanon) investigated AI applications for monitoring college athletes' nutrition and fitness. A team of researchers and a clinical nutritionist evaluated AI chatbots such as DeepSeek and AI nutrition apps for macronutrient tracking. Experimental trials examined photo recognition capabilities, personalized feedback, and cost-effectiveness while also identifying the limitations and errors of AI.

Project Design for International Collaboration

This international research collaboration between Walsh University (North Canton, Ohio, USA) and Notre Dame University-Louaize (Zouk Mosbeh, Lebanon) addressed the intersection of artificial intelligence and sports nutrition for college athletes. A faculty team with one student researcher and a clinical nutritionist evaluated AI chatbots (ChatGPT, Gemini, DeepSeek, Meta AI, HestoBot-Global) and nutrition apps for macronutrient tracking. Our common goal was to ensure that students used AI ethically. At first, we searched for AI tools that could support athletes on their health journey by adapting guidance to their needs. The prompt created for this work is given below:

> *You are an expert in evaluating the limitations and benefits for AI tools used in nutrition, especially for tracking macronutrients. You are able to simplify the tracking for college athletes. Please evaluate these tools: SnapCalorie, Lifesum, Yummly, and MyFitnessPal. Also provide a table describing the easiest, cheapest, most user-friendly, ability to take a picture for analyzing food on a dinner plate and the most accurate tool that creates diet plans specifically for each athlete's needs. Help me find the best AI tool for nutrition tracking.*

Researchers discovered that AI identified various nutrition tools such as SnapCalorie, FatSecret, and CalAI. As a result, this work focused on a few practical applications. More specifically, researchers explored the nutrition app capabilities, relevance for today's users, and overall benefit to assist in obtaining a healthy lifestyle. Overall, data showed that the strongest performance for the free nutrition app was CalAI due to its excellent accuracy and usability for college students as well as providing personalized feedback. The final step in the research process included sharing the data with a professional nutritionist who offered clinical oversight. She also extended the

project's reach into the community and played a critical role in evaluating the capability of AI to support a healthy lifestyle.

Experimental Trials & Results

This research focused on three critical features for college athletes: photo recognition capabilities for meal analysis, personalized feedback systems, and cost-effectiveness for student budgets. Through experimental trials, researchers identified chatbot limitations and errors while comparing the most promising AI tools including free and paid versions. Examples of errors included chatbot hallucinations related to cost and inaccuracies in nutritional output. Another example pertains to AI nutrition apps. Researchers calculated a grilled halloumi cheese sandwich at 381 calories using professional nutrition standards for nutrition calculations. However, the app photo detection feature for SnapCalorie calculated the total calories as 1375.

Data showed AI's potential to positively impact athletic nutrition through accessible macronutrient tracking, specialized diet planning, athletic performance, and overall fitness. However, this research emphasized a critical discovery that AI served as a supplementary tool but should never replace clinical expertise. Moreover, this project included a professional case study highlighting the importance of AI literacy and responsible use. This case study helped researchers relate the project to real-life situations.

Mission Alignment

Both Walsh University and Notre Dame University-Louaize are members of ACCU, (Association of Catholic Colleges and Universities), having common institutional missions, particularly focused on a commitment to academic excellence. This work aligned with Walsh University's mission of developing global leaders through innovative education and Notre Dame University-Louaize's commitment to international collaboration. By bridging American and Lebanese perspectives, we advanced the understanding of AI applications in sports nutrition while promoting ethical technology use.

Conclusion

This collaboration highlights both the potential and the limitations of using AI in sports nutrition. AI-powered apps can be helpful in supporting athletes, but they should never replace expert or professional guidance. This reinforces the importance of using AI ethically and responsibly. This research contributes to both institutions' goals of promoting Catholic identity and mission by preparing students for global challenges that serve a wide range of communities and maintaining human-centered approaches to technological advancement.

References

AI chatbots and apps utilized in this work: ChatGPT, Gemini, DeepSeek, Meta, HestoBot-Global, SnapCalorie, FatSecret, CalAI, Lifesum, Yummly, MyFitnessPal.

Modeling Study Environment Fit with Artificial Intelligence

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As research into artificial intelligence continues to gain momentum across society, the applications of AI are becoming increasingly diverse, extending far beyond technical domains into areas such as psychology, education, and wellness. One student researcher, inspired by a particularly difficult night of studying, transformed a personal struggle into the foundation for an academic experiment. The result was the creation of an AI-driven study environment quiz, a project that positioned AI not merely as a computational assistant but as a type of virtual psychiatrist capable of assessing the answers and prescribing optimal learning conditions. This quiz integrated personality traits, emotional regulation, and subtle triggers of mood and motivation into a framework designed to match students with their most effective study environments. By weaving together both real and fictional examples, the quiz demonstrated how AI could adopt a therapeutic, human-centered role in the academic experience.

The structure of the quiz was intentionally simple and concise to encourage user engagement. It consisted of ten multiple-choice questions, each targeting a different aspect of the student's relationship with their environment. It ranged from noise tolerance, lighting preferences, and social versus solitary tendencies, to specific dimensions such as emotional resilience, imagination, and susceptibility to distraction. What made this project unique was not the questionnaire itself, but rather the interpretative role of AI models. Various AI systems were tasked with interpreting responses and generating immersive environments that reflected both functional needs and psychological insights.

To test the effectiveness of the approach, the researcher selected six leading AI platforms: Meta, Copilot, Gemini, Claude, Grok, and ChatGPT+. Each model was evaluated under consistent criteria, focusing on creativity, emotional depth, structural clarity, scoring methodology, and therapeutic relevance. These dimensions allowed the project to move beyond surface-level AI interaction and instead assess the degree to which each system could engage with emotional intelligence.

The findings highlighted clear differences across platforms. ChatGPT+ emerged as the strongest performer, consistently delivering results that were immersive and psychologically informed. The responses blended sensory detail with imaginative elements, producing environments that students could vividly picture themselves studying in. Unlike other models, ChatGPT+ balanced realistic contexts (such as quiet libraries or softly lit cafes) with more whimsical, fantasy-based options (such as forest clearing or futuristic observatory), therefore expanding the range of possibilities for student engagement. This combination of grounded and creative results demonstrated both therapeutic potential and adaptability, positioning ChatGPT+ as the most versatile system tested.

Grok showed strong capability in emotional appeal and structural organization. Its scoring methodology was clear and systematic, allowing users to see how their answers aligned with the suggested environment. Grok excelled in making users feel understood through deep explanations. Claude, meanwhile, adopted a different strategy by embedding psychological framing into its

feedback. It visualized answers and provided insight into why certain environments might improve focus or reduce anxiety. However, Claude often stopped short of giving specific, actionable recommendations, which limited overall utility.

In contrast, the more nuanced systems, such as Meta and Copilot, performed noticeably weaker. Both generated responses that lacked personalization and emotional nuance. Gemini offered mixed results, at times displaying flashes of creativity, but struggling with consistency across responses.

The broader significance of this project lies in its fusion of technology with psychology and education. By reframing AI as a virtual psychiatrist, the student researcher demonstrated how AI can play a role in mood regulation, self-awareness, and motivation, which are critical factors in academic success. The study environment quiz is not just an experimental tool for individual students but also has potential applications in clinical and educational contexts. For therapists, the quiz could serve as a baseline instrument for initiating conversations about the role of the environment in emotional well-being. For educators, it could offer a way to personalize learning conditions for students, particularly those struggling with attention, anxiety, or lack of motivation.

Ultimately, this research demonstrates that AI can extend its impact far beyond traditional data analysis and task automation. By no means is AI a replacement for true mental health professionals, but it could serve as a tool to better assess a student's state of mind. Moreover, this AI-driven study environment quiz stands as an example of how personal challenges can spark innovative solutions, bridging the gap between technology and human psychology. In summary, projects such as this one can emphasize that the most meaningful innovations often arise when machines are not only programmed to think but are guided to understand and care.

References

AI chatbots utilized for experimental trials: Meta, Copilot, Gemini, Claude, Grok, and ChatGPT+

Accuracy and Accessibility in AI-Enabled Nutrition

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Introduction

A student research team, working in alignment with the missions of three universities, evaluated AI-enabled nutrition applications for usability, accessibility, and reliability across age groups to serve the common good. The international collaboration brought together Notre Dame University-Louaize in Lebanon, University of Cape Coast in Ghana, and Walsh University in the United States to reflect diverse users and contexts. The team assessed chatbot guidance and analyzed AI photo recognition in SnapCalorie and CalAI, testing both a free app and paid app version against established standards. To ensure accuracy, they used FatSecret as a baseline reference and assembled a fixed set of photographed meals with known portions for consistent comparisons.

Researcher Focal Points

Designing the Study

The study's design emphasized mathematical clarity. Researchers generated graphs, identified outliers, and set quantitative criteria to evaluate calorie and macronutrient estimates, while also documenting usability and accessibility across different ages, bandwidth conditions, and assistive features. Preliminary patterns indicated complementary strengths among tools, with some apps showing better calorie estimates and others performing more consistently on protein and fat.

Ultimately, the student research team connected technical findings to public benefit, demonstrating how transparent methods, practical visuals, and clear thresholds can guide families, students, educators, and clinicians. Their work illustrates AI's potential to advance health and wellness when evaluated with care and real-world relevance.

Evaluating the Accuracy of AI-Powered Tools

The research team conducted a study to evaluate the accuracy of AI-powered nutrition tools using standardized calorie benchmarks. To ensure reliability, they established a baseline by consulting a nutritional database called FatSecret as the reference standard. A fixed set of meals with known caloric values was created, with exact portion sizes and preparation methods documented to maintain consistency.

The test set consisted of five diverse meals: steak with vegetables, chicken biryani with yogurt sauce, Greek salad, a wrap with fries, and a balanced plate of steak, broccoli, rice, and cheesy chicken. Each dish was photographed and analyzed across multiple AI nutrition applications to allow consistent comparisons.

Accuracy was assessed through absolute difference calculations, measuring how far each app's estimates deviated from the baseline values for calories, protein, carbohydrates, and fats. For each nutrient, the app with the smallest deviation was considered more accurate, and overall performance was determined by tallying the results across all meals.

Findings showed that CalAI demonstrated slightly better accuracy overall in calorie estimates, particularly for the wrap with fries, while SnapCalorie performed more consistently with protein and fat predictions. This structured methodology provided a clear, data-driven evaluation of the relative strengths and weaknesses of each AI nutrition tool.

Evaluating the Usability of AI-Based Nutrition Applications
This investigation examined the usability of two AI-based nutrition applications, CalAI and SnapCalorie, focusing on their features, accessibility, limitations, and overall effectiveness. Both applications that were used share core customization and usability features but differ in their methods of logging meals.

Evaluating the Accessibility of AI-Based Nutrition Applications
The study assessed accessibility through age inclusivity, offline and low-bandwidth performance, multilingual support with cultural food recognition, and disability features like screen reader compatibility. Yet, it faced limits such as difficulty recognizing mixed meals, reliance on lighting for photos, a small sample size, a brief timeframe, subjective evaluations, and researcher observations of learning curves, usability patterns, and frustration points across platforms.

Overall Key Findings
Key findings showed the power of AI for the advancement of health and wellness through relatable and engaging technologies. AI nutrition tools demonstrated promising accuracy for basic foods but struggled with complex dishes and portion sizes. SnapCalorie excelled in protein and fat estimation, while CalAI was more accurate in carbohydrate and calorie predictions. Most tools offered intuitive interfaces that improved with paid subscriptions, though the accessibility varied significantly. In conclusion, the study not only emphasized the potential of AI-driven nutrition tools but also aligned with broader institutional missions of academic excellence, global perspective, service to others, and ethical leadership.

The integration of these AI nutrition tools offers significant help in real life and in future research. In healthcare, this tool helps doctors and dietitians check people's food habits and give advice. For education, teachers can use it to teach students about healthy food using fun technology. On an individual level, they empower people to make healthier dietary choices. Additionally, researchers can use them to collect vast data on eating habits, which is crucial for public health.

Future Plans

Future development of this technology has key priorities. In the short term, the focus is on validating the tools across different populations, integrating them with wearable devices, and ensuring accuracy. Long-term goals include studying their effects over time, adapting them for various cultures, and incorporating genetic data for highly personalized nutritional guidance.

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AI and Forensic Science:
How AI is Making an Impact in Forensic Investigative Methods

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This project showcased the work of three student researchers exploring the application of AI pattern recognition in forensic science. Their exploratory research focused on three key areas: fraud investigation, cold case examination, and trace evidence analysis. The student researchers investigated how AI is currently being applied in each area and assessed its overall impact.

To begin, Artificial Intelligence (AI) is reshaping actuarial science by strengthening fraud prevention, risk modeling, and overall financial resilience. Traditionally, actuaries have depended on statistical methods and historical data, but AI expands these capabilities by analyzing massive datasets in real time, identifying complex and non-linear patterns that traditional models may miss.

Machine learning enables more accurate pricing, reserving, and solvency projections, while also improving predictive risk management for insurers. One of the most impactful applications is insurance fraud detection. Convolutional Neural Networks (CNNs) can detect altered IDs and deepfakes, while Natural Language Processing (NLP) flags suspicious language in claims or emails (Boulleries & Elly, 2024–25). Graph Neural Networks (GNNs) reveal hidden fraud networks, and actuarial AI models support fair premium setting through explainable outputs. These tools collectively reduce fraudulent claims, protect honest policyholders, and improve transparency across financial systems. AI also promotes the common good by advancing fairness and trust. As Malali (2025) notes, AI enhances solvency, ensures fair pricing strategies, and reduces systemic costs, while Gangani (2024) highlights its ability to improve predictive capabilities and fraud prevention. By integrating AI into actuarial practice, insurers not only improve efficiency but also contribute to a stronger and more equitable financial system.

Moving forward, AI has shown to provide multiple benefits in cold case investigations as well as improve methods of investigations in this area. Machine learning and natural language processing (NLP) have been revolutionizing the review and analysis of cold case evidence. Through automation of data extraction, analysis, and pattern recognition, agencies are able to identify new information which helps to improve suspect identification, lead generation, and case prioritization. AI helps to better allocate resources to cases with a higher likelihood of being solved and improves the speed at which case evidence can be reviewed by investigators. Revisiting NLPs, the ability of AI to curate concise summaries of case files after an automatic review proves extremely helpful in the acceleration of data analysis and evidence review. Moving on, AI has demonstrated great efficiency in familial DNA matching and predictive profiling, with automated matching of unknown DNA to potential relatives in the database. This process enables identification of suspects in high profile cases and opens new pathways for victim and suspect identification in cold case work. Furthermore, research showed that AI-driven genetic genealogy is directly solving decades-old cases. Systematic reviews have confirmed many unsolved cases being closed upon the introduction of AI methods in combination with traditional investigative methods.

Lastly, AI showed significant impact in forensic trace evidence analysis through applications of machine learning, deep learning, and convolutional neural networks (CNNs). Primarily AI is being used to analyze trace evidence through photographic pattern recognition and classification. Various machine learning algorithms proved successful in fiber classification, with logistic regression proving to be the most effective (Sharma et al., 2024). Moving on, deep learning has proved to be successful when used to classify common origin during lab experimentation, having shown this success with recognizing silver tape strips as having a common origin through pattern recognition. The experiment yielded an accuracy of 92.1 % with a 0.94 confidence in identifying the questioned materials (Rodrigues et al., 2024). Revisiting machine learning, research demonstrated that machine learning combined with spectroscopy was efficient in analyzing and characterizing both synthetic and natural fibers (Sharma et al., 2024). Lastly, a systematic review of the literature found that AI primarily excels at automating laborious tasks like image processing and matching evidence to databases. Therefore, AI in the present condition best serves as an assistant to traditional methods and enhances the outcomes of forensic trace evidence analysis.

Across all areas, the researchers found AI enhanced efficiency, reduced human error and bias, and supported potential automation of forensic processes. The student researchers also acknowledged ethical concerns related to the integration of AI, especially regarding data privacy, accountability, and transparency in decision-making. Overall, these findings showed that AI applications had a significant impact on the efficiency of forensic investigations.

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The Role of AI in Mechanical Engineering: Exploring Current Capabilities and Future Potential for Computer Aided Design

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Introduction

As artificial intelligence (AI) continues to evolve from a productivity tool to a potential design innovator, its role in mechanical engineering and computer-aided-design (CAD) presents both practical opportunities and long-term transformative potential. This project investigated the role of AI as a tool for mechanical engineering and computer aided design by exploring both the current role and integration of AI into the generative design process alongside the longer-term potential for automation of more complex engineering systems. The research was further subdivided into two categories where AI could be most beneficial, including safety, where improvements to optimization and design could substantially prevent accidents in the workplace, as well as mechanical efficiency, driving down the cost of production.

AI-Driven Experimental Trials to Compare Trends

Generative AI is already integrated into major CAD platforms, where it assists in producing optimized designs based on constraints like weight, material, and dimension. Therefore, to analyze where gaps existed in knowledge, the researcher utilized AI used in CAD platforms by running experimental trials and investigating LLMs to compare trends across data.

Research Process

The research analyzed how AI currently supported engineers by automating routine tasks such as adjusting part dimensions or modifying models based on updated parameters. Experimentally, performance was determined by success rates in the generation of simple versus complex geometry as well as geometric revisions to user created and pre-existing models. For 2D CAD models, success was defined by recognition of duplicate geometry depending on position, scale, and complexity. Beyond statistical data, AI performance was also analyzed by the researcher based on generation with and without integrated perspective such as providing an initial 2D image or creation completely from scratch.

Results

By identifying current shortfalls and forecasting future breakthroughs, this study positioned AI as a transformative force capable of revolutionizing design workflows and manufacturing efficiency in mechanical engineering over the next decade, but not as an immediate or even long-term replacement for humans. While AI may mathematically understand positioning in CAD drawings, it fundamentally lacks perspective and object permanence resulting in inconsistencies in models. Regardless of additional training data, such a critical lack of a humanized world view prevents consistency and is further mitigated by generative design depending on humans as a mediator. Without groundbreaking advancements enabling AI to visualize objects rather than understanding them as variables in a line of code, it cannot be more than an assistant. With a more attuned

worldview, artificial intelligence has all the characteristics necessary to exponentially advance the field of engineering. Due to limitations in understanding of consciousness and its role in the development of AI, it is not appropriate to propose a timeline upon when, if ever, AI could functionally replace humans.

Based on the data, AI consistently performed best in tasks requiring minimal logic or modifications, especially when paired with specific, quantifiable, human input. Figure 1 demonstrates the case dependent success rates for ZooCad, a desktop 3D CAD software. Partial generation and revisions consistently outperformed completed geometry, showing AI can understand bits and pieces, but it almost inevitably miscalculates the position, or misinterprets the provided prompt. Secondarily, Figure 2 indicates artificial intelligence's use as a generative tool, but also as a necessarily iterative process. From the researcher's findings, providing multiple parameters that constrain a model was significantly more likely to result in failure. Thus, the ability of AI to retain previous information and build upon it is critical to the success of generative design.

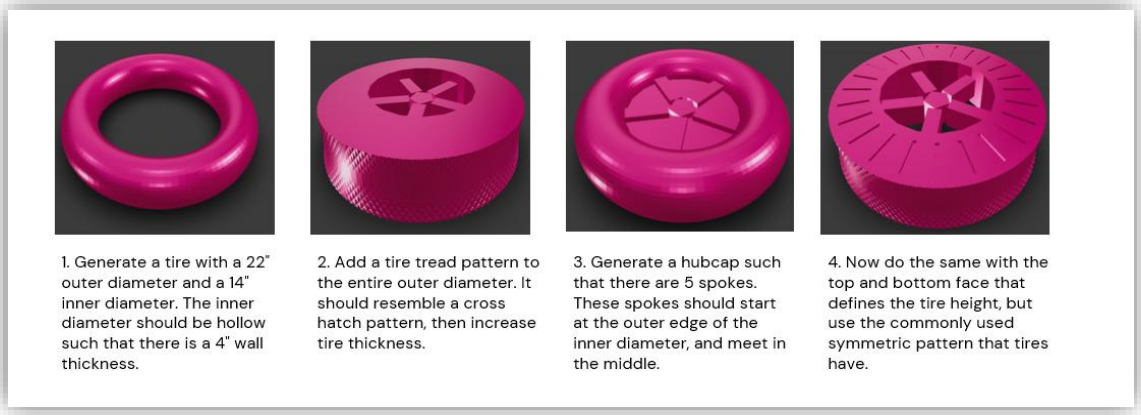
Figure 1.
3D Generation Success Rate Table. (ZooCad)

ZooCad Success Rates

*Partial Revision Defined As meeting at least one major criteria given in prompt.

Test Type	Simple Geometry (New)	Complex Geometry (New)	From Existing (Simple)
Successful Generation	6/10	0/10	N/A
Successful Revisions	1/10	0/10	2/10
Partial Generation	9/10	6/10	N/A
Partial Revision	5/10	0/10	8/10

Figure 2.
Iterative Prompting and Generate Design. (ChatGPT)



Conclusion

This project revealed AI's strengths in generative design, optimization, and error reduction, but equally important, highlighted limitations in innovation, engineering intuition, and physical reasoning. The research also considered long-term possibilities: more powerful AI systems capable of automating full design workflows, incorporating real-time simulation, and adapting autonomously while recognizing the unpredictable nature of progress in the field. Looking ahead, as AI continues to advance throughout this discipline, CAD modeling utilizing such technology will reshape workflows and noticeably improve efficiency. Developments in the field of safety are sparse, and in its current form, the existing tools should not be used without oversight and careful consideration.

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Applications of AI Innovations in Forensic Imaging Practices

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This project showcased the work of three student researchers who explored innovations in forensic imaging through AI application. Their exploratory research and student-led trials focused on three areas: digital crime scene reconstruction, imaging in forensic anthropology, and bloodstain pattern analysis (BPA).The student researchers placed an emphasis on the determination of AI technology to improve forensic imaging outcomes.

Student 1 focused on the field of digital crime scene reconstruction, with particular attention to how Artificial Intelligence (AI) and Virtual Reality (VR) can be applied to generate accurate, data-driven models of crime scenes. Traditional reconstruction often requires significant time and physical access to the site and is limited by the inability to preserve conditions once a scene is altered or cleared perfectly. By contrast, AI-driven modeling and VR technology allow investigators to revisit a crime scene virtually, enabling repeated examinations without risk of contamination or evidence degradation. The student evaluated multiple digital tools and platforms to determine their effectiveness in tasks such as image clarity, prompt generation, and AI responsiveness. The research revealed notable strengths in several areas, including bloodstain pattern analysis, trajectory mapping of projectiles, and digital modeling of physical evidence. These capabilities provide investigators with enhanced visualization and the ability to test multiple hypotheses more efficiently. In addition to evidence analysis, VR was found to offer significant benefits for training purposes. Trainees and professionals alike can immerse themselves in realistic crime scenes, gaining experience in interpretation and decision-making without the need for constant access to physical training sites. This immersive approach not only reinforces learning but also improves inter-disciplinary collaboration by allowing teams to share the same virtual environment regardless of physical location. However, the research also highlighted ongoing challenges. The student concluded that while these technologies hold great promise, there is a pressing need for more academic standards, structured protocols, and standardized adoption models that guarantee consistency, validity, and trustworthiness across diverse forensic applications.

Student 2 focused on the field of forensic anthropology, with particular focus on how AI can improve the examination of remains through enhancing image processing and analysis. The researcher found that AI is being used to render three-dimensional reconstruction of a subject's face through craniofacial superimposition. Then, this generated reconstruction is processed through facial recognition and proves to be efficient in helping to identify subjects. Additionally, this method of reconstruction proves helpful when performing trauma analysis. AI was found to be capable of automating biological profile estimation when combined with two-dimensional radiographs. Research findings also indicate that trained AI models can be used to estimate age and proved to be capable of identifying anomalies in pathological examinations of remains. The researcher concluded that AI is capable of enhancing efficiency and aiding trauma analysis.

Student 3 focused the research on the application of AI in the field of bloodstain pattern analysis (BPA). The researcher examined how successful various AI models were at characterizing bloodstains through multiple studies. To begin, a machine learning model demonstrated an 80% accuracy in predicting bloodstain type after being trained on a pre-existing dataset; however, the model struggled when applied to more complex stains (Jung et al., 2024). Next, when a deep learning model was tested, it was able to differentiate between passive and active stains. This model achieved a 99.73% accuracy after being trained on a pre-existing dataset, though it faced difficulties with wet bloodstains and inconsistent lighting (Bergmann et al., 2022). Lastly, YOLO (You Only Look Once) was evaluated and found to be capable of real-time processing of larger datasets, having been trained on a wide range of data for higher accuracy. The research on YOLO suggested that it could be applied to more complex and challenging scenarios due to its object detection and image segmentation capabilities. However, it struggled with variations in lighting and with identifying smaller, finer-grained objects such as bloodstains (Kolhatkar et al., 2023). The student researcher concluded that while all three models demonstrated success in analyzing bloodstains, each had limitations that require further development and training before practical implementation. Additionally, the researcher conducted a comparative analysis of chatbots, evaluating several widely accessible chatbots against expert-level BPA prompts. The three chatbots, Claude, Perplexity, and ChatGPT, were identified as the most effective, though each displayed both strengths and weaknesses. Claude was found to be the most successful, providing a balance of clarity, accuracy, and relevance for forensic applications, while ChatGPT and Perplexity showed limitations such as a lack of proper citations and more superficial explanations. Overall, the research emphasized that AI has strong potential as a tool in BPA but also highlighted the need for refinement and targeted training to ensure these systems can be effectively and responsibly integrated into forensic practice.

Overall, the research group found that AI tools enhanced imaging by creating clear visuals, rendering more accurate 3D models, and improved the analysis and evaluation of evidence.

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Exploring AI and the Impact AI Has on Bloodstain Pattern Analysis and Toxicology

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This project showcases the work of two student researchers who focused on the impact of AI innovation through practical applications in forensic investigative methods. The research focused on applying AI to bloodstain pattern analysis and forensic toxicology, with an emphasis on exploring the impact of AI. The researchers explored the use of AI tools in pattern recognition, large data set analysis, and predictive analysis.

One student researcher focused on AI in Blood Pattern Analysis (BPA) through the use of machine learning (ML) models and AI tools. The exploratory research showed that Convolutional Neural Networks (CNNs) can be trained to recognize bloodstain patterns through image analysis. After evaluating various decision tree predictive models, the student researcher found that these models showed promise in analyzing bloodstain patterns. The student researcher also explored the tool SAM (Segment Anything Model) to analyze bloodstain patterns, and found the model proved to be the most accurate as a result of its trainability. SAM proved capable of being able to identify the specific characteristics of an image and its zero-shot generalization feature can cut out any objects. By using boxes, masks, points, and boxes as input prompts, SAM can efficiently segment the various objects in an image. The student researcher then conducted an experiment with SAM, which included the recreation of bloodstains in various conditions on various surfaces. SAM demonstrated fairly high accuracy on each of the surfaces, which included a dark patterned rug, glass jar, wood plank, and plain white T-shirt. Each of the different segmenting tools were able to identify the large stain of each of the objects clearly with the Point Tool performing the best, however, SAM struggled with the segmentation of smaller droplets and smaller artifacts. Furthermore, SAM had noticeable trouble with the glass jar due to the clear opacity of the jar itself, as well as the reflection off of the various parts of its surface. The student researcher concluded that SAM could prove to be a significant supporting tool for forensic BPA when used in combination with traditional methods. The tool demonstrated that it is capable of beneficial image segmentation, however, it struggles with complex textures, lighting, and overlapping stains. Thus, it requires further development and testing across diverse forensic materials.

Next, the other student researcher focused on AI in forensic toxicology with an emphasis on practical applications in investigative work. Beginning with exploratory research, the student researcher found that the literature shows AI to be useful in improving efficiency and interpretability, while reducing human error in analyses. Utilizing machine learning, deep learning, generative AI, and expert systems, advanced data analysis can be conducted. Furthermore, AI was found to be beneficial for automating time-intensive lab processes, improving compound detection, and streamlining data processing. Moreover, AI was found to have great success through predictive modeling and machine learning applications to predict the toxicity of new compounds (Elliott & Wille, 2025). The student researcher then found research suggesting the creation of an integration of digital forensics and drug profiling, thus creating a platform to aid in understanding potential trafficking routes and manufacturing avenues (Hachem et al., 2023). Tools like Cellebrite

Pathfinder are able to identify and uncover connections between events, locations, and suspects. Thus, improved data-driven decision making with more advanced event reconstructions and predicted outcomes (Hachem et al., 2023). The student researcher then proposed C3 Law Enforcement, a similar existing practical application focused on policing for discussion and comparison purposes. C3 Law Enforcement is a platform that connects databases and allows for the easy and timely retrieval of information remotely for law enforcement to use at their discretion. Additionally, C3 uses automated reporting methods, provides concise report generation for statistics, and provides detailed summaries on a variety of source information from connected databases. C3 has proven to be a unique and helpful tool in the facilitation of data-driven decision making in law enforcement. Then, the student researcher concluded by proposing that a similar platform aimed at incorporating digital forensics with drug profiling could aid forensic investigations.

Overall, findings showed that AI applications greatly improved analysis and investigation outcomes through predictive modeling and data management. However, more development and rigorous testing is needed before these analysis tools can become standard in forensics.

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STEM Students' Intentions to Use Generative AI for Learning: A Multi-Method Analysis Using PLS-SEM, ANN, and fsQCA

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The adoption of Generative Artificial Intelligence (GenAI) in higher education presents new opportunities for enhancing learning experiences, yet its uptake depends on students' readiness and acceptance (Arthur et al., 2025; Salifu et al., 2024). This study examined the behavioural intentions of Science, Technology, Engineering and Mathematics (STEM) students in Ghana to use GenAI tools for learning, focusing on factors that promote or inhibit adoption. GenAI is particularly relevant to STEM education, as it supports personalised learning, simulation and modelling, data analysis, and interactive problem-solving environments that strengthen conceptual understanding (El Fathi et al., 2025; Ragab, 2025). For STEM students, these capabilities foster creativity, collaboration, and critical thinking, which are essential for succeeding in technologically advanced academic and professional contexts.

A purposive sample of 427 STEM students participated in the research. The conceptual framework was grounded in the Unified Theory of Acceptance and Use of Technology (UTAUT, Venkatesh et al., 2012) and extended with AI-specific constructs, including AI literacy, AI anxiety, and social good orientation. A triangulated methodological approach was employed, combining Partial Least Squares Structural Equation Modelling (PLS-SEM) for causal testing, Artificial Neural Networks (ANN) for assessing non-linear predictive importance, and Fuzzy-set Qualitative Comparative Analysis (fsQCA) for identifying causal configurations (Acquah et al., 2025).

The PLS-SEM results showed that AI literacy, social good orientation, subjective norms, facilitating conditions and self-efficacy had a significant positive influence on students' behavioural intentions to adopt GenAI, whereas AI anxiety had a negative effect. ANN analysis confirmed the robustness of these predictors and emphasised the importance of AI literacy and social good orientation in predicting behavioural intention. The fsQCA findings revealed multiple equifinal pathways — different combinations of favourable conditions — that led to a high intention to adopt GenAI. This underscores the complex interplay between technological competence, social influence, and emotional readiness.

These findings have practical implications for educators, instructional designers, and policymakers. They point to the necessity of AI literacy programmes, supportive institutional environments, and interventions to reduce AI-related anxiety. By employing advanced quantitative and configurational analyses, this study contributes a multidimensional perspective to technology acceptance research in education.

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