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Teaching with Generative AI: Ethics and Analytical Confidence in Undergraduate IS Education

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Abstract

This teaching tip presents a scalable model for integrating Generative AI (GenAI) and ethical reasoning into WPC 300 (Problem Solving & Actionable Analytics), a required core course taken by all undergraduate business students at Arizona State University. By embedding responsible GenAI use within established course modules, the intervention aims to strengthen students' analytical confidence, deepen their understanding of ethical issues in data analysis, and prepare them for real-world business challenges. The model also supports instructors in delivering relevant, industry-aligned skills.

The course redesign introduced GenAI tools, including OpenAI's ChatGPT and Google Notebook, alongside core analytical methods such as regression analysis and data visualization. These tools were selected for their user-friendly interfaces and their ability to extend analytical capabilities beyond traditional Excel-based methods, supporting exploratory analysis, pattern recognition, and interpretation. Ethical considerations were scaffolded through a dedicated "Mindful AI" module emphasizing fairness, accountability, and societal implications. A mixed-methods evaluation, combining paired t-tests with sentiment and thematic analysis of student reflections, demonstrated statistically significant gains in students' analytical confidence and understanding of ethical issues. Qualitative feedback further indicated increased appreciation for AI-assisted learning and ethical reflection.

This model serves as a practical guide for educators aiming to modernize analytics instruction while maintaining core learning objectives. It provides students with a pathway to greater analytical confidence and ethical awareness and supports instructors by enabling the staged introduction of AI tools within existing course materials, reinforced by concrete applied examples.

Keywords: GenAI, Business Analytics, Teaching Innovation, AI Ethics, Undergraduate Education, Excel, Data Analytics

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Teaching with Generative AI: Ethics and Analytical Confidence in Undergraduate IS Education

Asish Satpathy and Jayaram Balachander

1. INTRODUCTION

The growing demand for analytical competencies in business underscores the urgent need for educational innovation that aligns with the evolving workforce driven by artificial intelligence (AI). In response, the W. P. Carey School of Business at Arizona State University (ASU) developed an undergraduate course, Problem Solving & Actionable Analytics (WPC 300), an introductory analytics course uniquely positioned as a foundational element for undergraduate business students across diverse disciplines (Darcy & Satpathy, 2023). Initially implemented to meet broad industry requirements, WPC 300 emphasizes developing problem-solving and analytical skills within a hybrid, online learning model that integrates synchronous and asynchronous teaching methodologies. The course uniquely combines practical applications, rigorous assessments based on Bloom's taxonomy, and analytical frameworks inspired by the modified CRISP-DM (Cross Industry Standard Process for Data Mining) model to maximize student engagement and learning outcomes.

The importance of analytical skills in business education has been extensively documented, highlighting a growing gap between industry demands and workforce preparedness (Deloitte & Quinnipiac University, 2025). Despite its robust framework, traditional analytics education, which relies predominantly on Excel and established methods, faces significant limitations, including reduced student engagement and difficulty in connecting theoretical skills with real-world applications (Frost et al., 2021). Recent studies emphasize that traditional teaching methods may inadequately prepare students for emerging analytical challenges in an AI-driven economy (Weng et al., 2024).

Furthermore, the integration of Generative AI (GenAI) tools has been increasingly recognized for its transformative potential in education, particularly in analytics courses (Gastineau, 2024; Sekli et al., 2024; Wahba et al., 2024; Satpathy & Balachander, 2025). These AI tools extend analytical capabilities beyond traditional methods, offering new opportunities for predictive analytics, pattern recognition, and deeper insights. However, their widespread adoption also introduces ethical complexities that must be addressed within educational contexts (Cotton et al., 2023; Garcia-Lopez and Trujillo-Linan, 2025; Sywelem et al., 2024). The literature emphasizes the importance of integrating ethical discussions into AI-driven curricula to ensure students develop a comprehensive understanding of responsible AI practices, encompassing fairness, accountability, and transparency (Britchenko, 2025; Luckin & Holmes, 2016; Shirzad & Darazi, 2025).

To address these gaps, this teaching tip outlines how to integrate GenAI tools and ethical frameworks into the WPC 300 course. The goal is to bridge traditional analytics methods with innovative AI-driven techniques, thereby supporting reflective learning and enhancing practical competencies, and preparing students ethically and technically for the AI-driven workforce. Specifically, we illustrate the approach of blending traditional analytical tools with beginner-friendly AI platforms, such as ChatGPT and Google Notebook, alongside structured ethical discussions. By detailing practical implementation methods and sharing insights from pre- and post-implementation assessments, we offer a scalable model for educators to replicate and adapt across similar analytics courses.

This teaching tip contributes to the growing literature on AI in education by offering a scalable and discipline-agnostic model that aligns with evolving workforce demands. We provide a detailed account of the course implementation, assessment methods, and student learning outcomes, both quantitative and qualitative, to support adoption in similar instructional contexts.

2. ASSIGNMENT & COURSE IMPLEMENTATION

Each module in the WPC 300 course is designed to build progressively, beginning with foundational problem identification and disaggregation (Modules 1–3), analytical execution (Modules 4–5), data storytelling (Module 6), and culminating in ethical reflection and synthesis (Module 7). This modular structure

provided a natural scaffold for integrating Generative AI and ethics into the curriculum, particularly in Modules 5 through 7, where regression analysis, visualization, and ethical reasoning align closely with emerging AI applications. The table (Appendix A: Table 1) summarizes the course flow and highlights where GenAI and ethics enhancements were embedded.

The integration of GenAI and ethical considerations in the WPC 300 course followed a structured, phased approach to ensure a seamless educational experience for students. This began with an initial pre-implementation survey, strategically administered immediately following the due date for Module 4 assignments. This survey was designed to establish baseline data on student engagement levels, technical competencies, and ethical awareness, and remained open for student responses for over one week.

Following the initial survey, new instructional content was introduced in Module 5, extending foundational analytics to include Generative AI–supported interpretation and evaluation. Students first performed correlation, ANOVA, and regression analysis using standard analytical procedures, and then used GenAI tools to generate explanations of their results and propose business insights. They were required to critically evaluate these AI-generated outputs by comparing them with their own analyses, assessing accuracy, identifying unsupported conclusions, and recognizing missing assumptions. This two-stage approach emphasized interpretation and analytical judgment while preserving core statistical skills. In addition, students explored core AI concepts and practical applications through guided videos and assignments, including the assisted visualizations for data storytelling. These activities accounted for 3% of the course grade.

Module 6 further strengthened visual analytics skills through focused instruction on data storytelling. Module 7 introduced the concept of Mindful AI, emphasizing accountability, fairness, transparency, and bias mitigation in AI-supported analytics. In this module, students examined GenAI outputs through these lenses and discussed how data, model design, and prompt choices can introduce or reduce harm. A representative activity asked students to analyze a short business case (e.g., AI-assisted customer prioritization), generate an AI-based recommendation, and then respond to guided questions about who benefits or is disadvantaged, where bias might arise, and what transparency and accountability measures would be needed. This module contributed 2% to the course grade. A post-implementation survey was conducted to assess changes in engagement, technical skills, and ethical awareness, mirroring the initial survey. To accommodate varying participation levels, a supplementary assignment offered 3% extra credit to students who were unable to participate in the experiment; it involved a business case study that required students to interpret data visualizations through a 10-question quiz on the Canvas LMS.

3. METHODS

Before conducting statistical analysis, all survey response data were cleaned and preprocessed to ensure consistency and accuracy. After all cleaning and preprocessing steps, a total of 178 student responses were selected for further analysis.

Survey Instruments and Data Sample

Two matched surveys, administered pre- and post-intervention, captured data on student confidence, tool familiarity, engagement, and ethical awareness. Each survey included ten Likert-scale questions and five open-ended reflection questions. All closed-ended questions used a 4-point Likert scale (1 = strongly disagree to 4 = strongly agree) without a neutral midpoint. This format was chosen to reduce central tendency bias, simplify response demands for a large introductory cohort, and provide sufficient sensitivity to detect pre–post changes in broad constructs such as confidence and ethical awareness. After data cleaning and removing incomplete entries, 178 paired responses (same student pre-post) out of 230 were retained for analysis. Students represented a broad mix of business majors (marketing, finance, supply chain, etc.). Before the GenAI and ethics integration, most students reported low familiarity with AI tools and only slight to moderate confidence in using Excel and data analysis techniques. Engagement levels were modest, though students widely recognized the relevance of ethics in analytics. Comfort with and willingness to use AI tools varied, indicating uncertainty and limited prior exposure. These responses underscored the need for structured AI training and ethical framing in the later course modules.

Quantitative Analysis

To evaluate changes in key learning outcomes, we conducted paired-sample t-tests on matched pre- and post-course responses. Because responses were paired for the same students before and after the intervention, the paired t-test was appropriate for evaluating within-subject changes. Assumptions of normality were assessed using Q-Q plots. Survey items used a standardized four-point Likert scale to support valid comparison. The internal consistency of the Likert-scale items was acceptable (Cronbach's $\alpha = 0.64$), supporting the instrument's reliability (Cohen et al., 2002). The Cronbach's alpha is appropriate given that the items were intentionally designed to span multiple domains, such as engagement, ethics, familiarity, and confidence, so a somewhat lower coefficient is expected for this multi-dimensional construct. The t-tests examined changes in confidence levels regarding data analysis skills, familiarity with Excel, engagement in course activities, understanding of ethical concerns in data analysis, and comfort in using generative AI tools. Statistically significant improvements were observed (Appendix A: Table 2 & Appendix B: Figure 1) in students' confidence in applying data analysis skills and their understanding of ethical concerns, as indicated by p-values below 0.05. Other test items did not show significant changes.

Qualitative Analysis

Open-ended responses were analyzed thematically and supplemented by sentiment analysis. Sentiment polarity was calculated using VADER, a rule-based model optimized for short social text, to measure shifts in student tone before and after the intervention (Hutto & Gilbert, 2014).

This comprehensive approach provided both depth and breadth in assessing the pedagogical impact of GenAI and the integration of ethics, allowing triangulation of student performance, perceptions, and engagement.

4. EVIDENCE OF EFFECTIVENESS

To evaluate the effectiveness of integrating AI and ethics in WPC 300, we designed a mixed-methods assessment framework centered on pre- and post-intervention surveys (Kilinc, S., 2024). These surveys measured changes in student engagement, analytical confidence, familiarity with AI and Excel-based tools, and ethical understanding. The pre-intervention survey, launched at the end of Module 4, consisted of ten multiple-choice questions and five open-ended questions. It established baseline metrics for student familiarity with data analytics tools, frequency of use of advanced Excel features, engagement in analytics coursework, exposure to AI tools, and understanding of ethical issues, including bias and data privacy. Students were also asked to reflect on their learning expectations, anticipated challenges with AI tools, and how ethics and AI could enhance their understanding of business analytics.

The post-intervention survey, deployed after the completion of Module 7, mirrored the structure of the initial study, focusing on changes observed during the intervention. It captured students' reflections on the perceived usefulness of GenAI tools, their confidence in applying statistical analysis, their comfort with AI technologies, and the impact of ethics discussions on their critical thinking. The open-ended questions encouraged students to articulate how their perspectives on AI evolved, the benefits of ethical training, and suggestions for improving future iterations of the course. By comparing the two surveys, we gathered both qualitative and quantitative evidence to assess the pedagogical impact of incorporating GenAI and ethics into a foundational analytics course.

5. RESULTS

The paired t-test results reveal statistically significant improvements in students' understanding of ethical concerns in data analysis and a statistically significant, though nuanced, change in confidence in applying data analysis skills following the intervention (Figure 1). Although Figure 1 shows a modest decline in self-reported confidence among some students immediately after the intervention, this may reflect recalibration rather than an actual reduction in skill. As students moved from procedural, Excel-based work to judgment-intensive, AI-assisted analysis that foregrounded uncertainty and ethical risk, they were exposed to the limits of their prior understanding. This pattern is consistent with research on self-efficacy calibration and related work on the Dunning–Kruger effect, which suggests that deeper exposure to complex tasks can temporarily reduce perceived competence as learners develop more realistic self-assessments (Dunning, 2011; Jansen et al., 2021). Accordingly, the observed dip is interpreted as a possible indicator of more accurate self-evaluation, not necessarily diminished learning. Instructors can view this short-term decline in confidence as a healthy learning signal instead of a setback.

Other measured outcomes, including familiarity with Excel, engagement in course activities, and comfort using generative AI, did not show statistically significant changes (Wang &Guo, 2025). This stability is consistent with students' relatively high baseline familiarity and engagement, the short duration of the intervention, and the modest grading weight assigned to the GenAI activities. Overall, these results suggest that the observed gains were concentrated in learning outcomes most directly and intensively targeted by the AI- and ethics-focused instructional components. To provide deeper context for these findings, we next examine qualitative student reflections to understand how perceptions and attitudes evolved during the intervention.

Qualitative Analysis of Student Reflections

To complement and contextualize the quantitative findings, we conducted a qualitative analysis of student reflections collected before and after the intervention. Text responses were analyzed for sentiment and topic frequency to identify shifts in student attitudes and conceptual focus.

Pre-intervention reflections often expressed skepticism or uncertainty about using AI tools, highlighting concerns about data accuracy, potential misuse, and a lack of familiarity with them. The sentiment analysis of these reflections indicated a predominantly neutral to slightly negative tone, emphasizing difference (Lāma & Lastovska, 2025).

Post-intervention reflections showed a clear shift toward more positive sentiment and deeper understanding. As shown in Appendix B: Figure 3, the proportion of positive responses increased across all categories, particularly in students' comfort with AI tools and their perceptions of ethics in analytics. This shift is further supported by the thematic patterns observed in student reflections, where more specific and action-oriented language, such as "insights," "real-world," "explained," and "projects", replaced earlier vague or uncertain expressions (Appendix B: Figure 2). While word clouds provide a high-level visualization of frequently occurring terms, they are used here as a supplementary tool; the primary insights are derived from thematic coding of student responses. Students consistently highlighted the value of GenAI tools for data analysis and visualization, as well as awareness of ethical considerations in AI use. This overall shift in sentiment and thematic depth, also reflected in Appendix B: Figure 4, suggests not only improved technical confidence but also stronger ethical awareness, reinforcing the impact of the integrated instructional approach (Balart et al., 2026).

Appendix A: Table 3 summarizes qualitative findings from open-ended student responses reflecting on their experiences with generative AI tools and ethics instruction in the course. Each row presents the overall sentiment polarity, key themes, and representative quotes for specific prompts.

The analysis reveals a predominantly positive perception of integrating AI and ethics, with students appreciating AI as a learning aid, recognizing the importance of ethical thinking, and valuing the combined use of AI and Excel. Some challenges were noted, particularly around prompt formulation and the reliability of AI outputs. The strongest positive sentiment was expressed in student suggestions for improving future courses, emphasizing the value of practical, ethically grounded examples.

6. DISCUSSION

The integration of Generative AI and ethical reasoning into WPC 300 produced pedagogical benefits, addressing key limitations of traditional analytics instruction. Students entered the course with limited exposure to real-world data tools and minimal understanding of how GenAI intersects with business decision-making. While Excel has served as a valuable foundation for teaching, it often fails to inspire broader conceptual thinking or address the nuanced demands of modern data literacy. By embedding GenAI tools and ethical frameworks into key modules, the course strengthened students' analytical confidence and supported more reflective, ethically informed approaches to real-world data analysis. Students reported increased appreciation for data interpretation, visualization, and the ethical implications of technology use, consistent with AACSB learning goals related to responsible and analytical thinking.

Several factors contributed to this model's success. First, its placement within the existing modular framework of WPC 300 allowed for seamless curricular integration. We infused AI into core analytical practices, such as regression analysis, visualization, and statistical interpretation, making its relevance immediately apparent. Second, the phased introduction of GenAI and ethics ensured that students had time to build foundational skills before applying them through AI-enhanced tools. This scaffolded

approach reduced cognitive overload and eased students into unfamiliar territory.

However, implementation was not without challenges. Some students initially expressed resistance to using GenAI tools, citing concerns about reliability, complexity, and academic integrity. To mitigate these concerns, the instructional team emphasized transparency around tool capabilities and limitations and positioned AI as a thinking partner, not a replacement, for critical thinking. Technological issues, such as occasional limitations in access to specific platforms (e.g., Google Notebook), were addressed through alternative resources and on-demand support. The ethical modules encouraged students to articulate these concerns and constructively reflect on them.

The observed gains in ethical awareness, supported by qualitative indicators of reflective engagement, underscore the value of explicitly incorporating GenAI into analytics education, but perhaps more importantly, doing so through a lens of responsibility and critical inquiry. The qualitative and quantitative evidence demonstrate that this model is not only pedagogically sound but also scalable and adaptable. Other business analytics courses, especially those with applied focuses, can draw on this framework to integrate emerging technologies without compromising core learning objectives. Future iterations could benefit from even more interactive AI assignments, integration with industry datasets, and reflective exercises that require students to confront ethical dilemmas using real-world business contexts.

Ultimately, this teaching innovation points to a broader shift in how we prepare students for an AI-mediated future. By weaving technical fluency with ethical literacy, we create better analysts and more thoughtful, socially responsible professionals.

This study has several limitations. First, it was conducted at a single U.S. university and focused on business majors, so the results may not generalize to other institutions or disciplines. Second, participation in the pre- and post-surveys was voluntary, which may introduce response bias if more motivated students were more likely to respond. Third, the course relied on access to specific online tools that may not be available in all settings. Even with these constraints, the overall approach, adding new analytical activities and ethics discussions into existing modules, can be adapted in non-business or non-U.S. programs by using locally available tools and tailoring the cases and examples to their own students and contexts.

7. ACTIONABLE TIPS

The statistically significant gains in analytical confidence and ethical awareness, supported by strong qualitative feedback, affirm the value of integrating Generative AI tools into data analytics education. To further enhance effectiveness and scalability, we recommend the following instructional strategies:

- Start with guided AI prompting tutorials to build foundational prompting skills and reduce initial confusion.
- Use real-world, imperfect datasets to encourage critical evaluation of AI-generated outputs and deepen ethical reasoning.
- Retain structured analytical workflows (e.g., regression in spreadsheets) before introducing AI-assisted interpretation to preserve foundational skills.
- Design two-stage assignments in which students first perform analysis independently and then compare their results with AI-generated interpretations.
- Incorporate case-based activities that require students to evaluate AI recommendations in terms of fairness, bias, and stakeholder impact.
- Embed short reflection prompts that ask students to assess when AI is helpful, when it fails, and how it should be used responsibly.
- Gradually shift from AI-assisted support toward critical evaluation, where students are expected to question and validate AI outputs.
- Provide clear rubrics that reward reasoning, interpretation, and critique of AI outputs, not just correct answers.
- Use low-stakes activities early in the course to reduce student anxiety and build confidence in using AI tools.
- Offer example prompts and model responses to establish expectations for both analytical quality and ethical reasoning.

The model is designed to be resource-light. Most activities are embedded into existing modules and require roughly 1–2 extra hours of preparation per week during the first implementation. It relies on widely available GenAI tools (or free/educational tiers), the LMS, and Excel, but instructors should align their use with institutional AI and academic integrity policies. To mitigate

access inequities, we recommend providing lab or shared-device access and offering instructor-generated AI outputs as an alternative when students cannot use specific platforms outside class.

8. CONCLUSION

As artificial intelligence continues to transform the business landscape, analytics education must evolve to equip students not only with technical proficiency but also with ethical discernment. The WPC 300 course redesign demonstrates a practical and scalable model for integrating Generative AI and ethics into an undergraduate business curriculum. By embedding AI tools and ethical reasoning within existing analytical modules, the intervention maintained instructional continuity while enhancing student engagement, confidence, and critical thinking.

One of the strengths of this approach lies in its replicability. The modular integration strategy, use of accessible AI platforms like ChatGPT, and alignment with standard learning outcomes make it feasible for instructors at other institutions to adopt or adapt this model without requiring major curricular overhauls. Additionally, the inclusion of guided tutorials, real-world datasets, and structured reflection offers a flexible blueprint that can be tailored to various course formats, learning levels, or delivery modes.

Looking ahead, AI will play an increasingly central role in shaping analytics education. As technologies advance, teaching methods must evolve to help students use AI effectively while critically interpreting and applying it. Embedding AI literacy and ethical reasoning into core courses prepares students to become thoughtful, capable professionals ready to lead in an AI-driven world.

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APPENDIX A

Module	Title	Core Focus	GenAI Integration	Ethics Integration
1	Introduction to Problem Solving	Problem-solving frameworks, Excel basics	None	None
2	Define the Problem	Refining problem statements, Pivot Tables	None	None
3	Disaggregation & Prioritization	Logic trees, EDA, probability	None	None
4	Conduct Analysis	T-tests, ANOVA, root cause analysis	Pre-implementation survey administered	None
5	Additional Analysis	Regression, model building	AI for regression, EDA using ChatGPT & Google Notebook	Introduced a reflection on AI usage
6	Data Visualization & Storytelling	Dashboarding, storytelling, and advanced Excel visuals	AI-generated insights & visualizations	None
7	Mindful AI & Responsible Use	Bias, fairness, transparency, and ethics frameworks	AI + ethics reflections Post-implementation survey administered	Core ethical discussion module

Table 1: Course Module Overview with GenAI and Ethics Integration

Test Question	t-Statistic	p-Value	Statistical Significance (p-value < 0.05)
Confidence in applying data analysis skills to real-world problems	-2.1095	0.0363	Yes
Familiarity with Excel	0.0767	0.9389	No
Engagement in course activities	-0.3068	0.7598	No
Confidence in understanding ethical concerns in data analysis	6.3261	0	Yes
Comfort level in using generative AI	0.6382	0.5248	No

Table 2: Paired t-Test results on student learning outcomes before and after GenAI and Ethics instruction

Question	Overall Sentiment	Mean Polarity	Key Themes	Representative Quote
Q11: Perspective on using Generative AI tools after course completion	Positive	0.214	Appreciation of AI tools; Awareness of limitations; Importance of prompt engineering	"I believe that it is even more relevant than I initially thought, but it needs careful guidance."
Q12: Challenges faced while using Generative AI tools	Neutral to slightly negative	0.064	Inaccuracy of AI outputs; Prompt framing difficulties; Instructor-AI mismatch; Data privacy concerns	"The AI tools did not understand the expectations clearly, which led to wrong outputs."
Q13: Benefits from learning and applying ethical principles	Positive	0.214	Awareness of responsible data use; Critical thinking on AI bias; Ethics as core to analytics	"Learning and applying ethical principles helped me see how real-world analytics can go wrong."
Q14: Impact of combining Generative AI and Excel on understanding	Positive	0.171	AI for flexible learning; Excel for structured problem-solving; Complementary methods	"Using both AI tools and Excel helped me understand the concepts in different ways."
Q15: Suggestions for improving future courses	Most positive	0.229	Desire for practical case studies; Early exposure; Better prompts; Clearer ethical frameworks	"I would give more realistic examples of data scenarios to apply AI ethically."

Table 3: Qualitative sentiment analysis of student reflections on Generative AI and Ethics integration

APPENDIX B

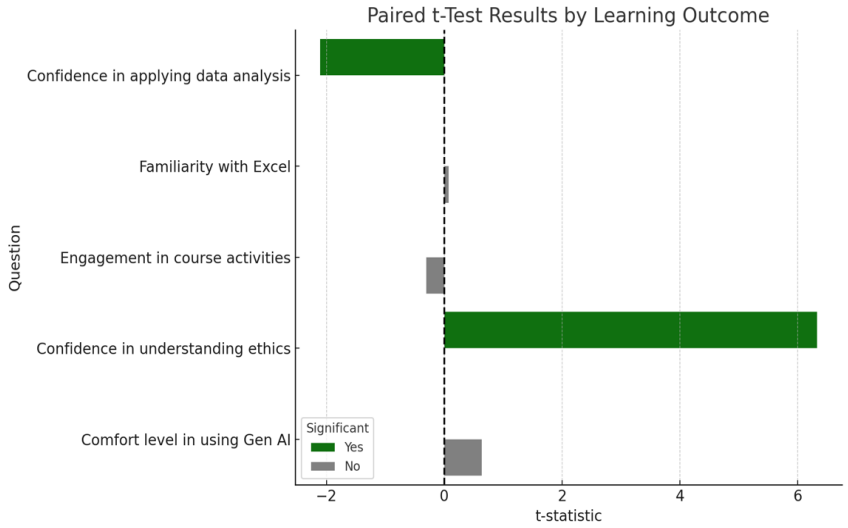


Fig 1: t-Test evaluation of changes in student confidence and skills before and after the introduction of GenAI and Ethics modules in the curriculum.



Figure 2: Thematic word clouds from student reflections, Post-GenAI integration in business analytics

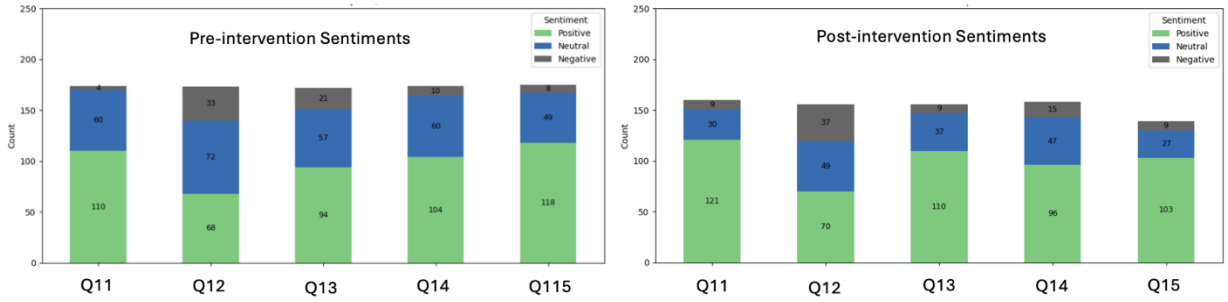


Figure 3: Shift in student sentiment before (left) and after (right) GenAI and Ethics integration to the curriculum.

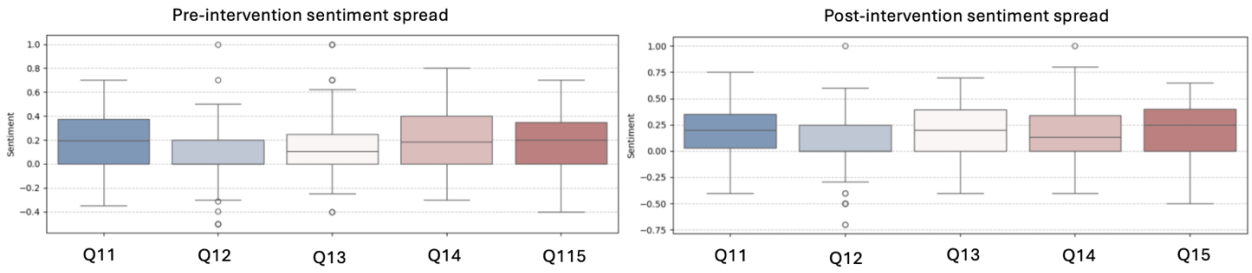


Figure 4: Sentiment distribution shift in student reflections: Pre (left) vs. Post-GenAI-Ethics (right) intervention.