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ChatGPT-based generative AI scaffolding, experiential learning styles, and technical writing skills among industrial technology students

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Abstract

This study examined the relationships among ChatGPT-based generative AI scaffolding, experiential learning styles, and technical writing skills of Industrial Technology students at the University of Camarines Norte, providing the basis for a proposed English language program. A quantitative, descriptive-correlational design was employed, with a sample of 450 respondents determined using the Raosoft Sample Size Calculator at a 95% confidence level and a 5% margin of error, allocated through proportionate stratified random sampling across the College of Engineering (CoEng), College of Computing and Multimedia Studies (CCMS), and College of Technology (CoTT). Findings revealed that most respondents were male students enrolled in the College of Engineering and were almost evenly distributed across the four-year levels. Students agreed that they use ChatGPT-based generative AI as a scaffolding tool, with familiarity rated highest and frequency of use rated lowest. However, they strongly agreed on their experiential learning styles, with the reflector learning style rated highest and the activist learning style rated lowest, and agreed on their technical writing skills, with objectivity rated highest and functionality rated lowest. Meanwhile, ChatGPT-based generative AI scaffolding varied significantly by sex, college, and year level; experiential learning styles varied only by sex and college; and technical writing skills varied only by year level. The three major variables were highly and positively correlated, with experiential learning styles most closely associated with technical writing skills, while ChatGPT-based generative AI scaffolding was associated with better technical writing skills as a supporting mechanism. These findings formed the basis for a proposed program, E-CRAFT (Experiential and ChatGPT-Responsive Approach to Functional Technical Writing), that addresses underutilized ChatGPT scaffolding, underdeveloped active and practical learning-style experiences, and identified gaps in functionality, clarity, and precision in technical writing.

Keywords: ChatGPT, English language program, English technical writing skills, experiential learning styles, scaffolding

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1. Introduction

English proficiency remains essential in academic and professional settings, particularly in Industrial Technology programs where students prepare technical reports, manuals, specifications, and digital documentation. Developing technical writing skills is especially important for students who use English as a second language. Sustainable Development Goal 4 and national education policies emphasize literacy and communication as foundations for higher education and employment readiness (Philippine Republic Act No. 12028, 2024). Artificial intelligence has introduced new opportunities to support language learning and writing. ChatGPT, a large language model developed by OpenAI, generates contextually relevant responses and supports a range of natural language processing tasks (Bhattacharya et al., 2024; De Angelis et al., 2023). Students use it to generate ideas, correct grammar, organize content, and receive immediate feedback. Research suggests that generative AI can strengthen learners' confidence, motivation, and performance in language and writing activities, supporting its potential application in technical writing instruction (Klimova et al., 2024; Deng et al., 2024; Yu et al., 2025).

ChatGPT-based generative AI scaffolding provides temporary, responsive assistance to help students complete writing tasks through guidance, feedback, and structure. This support aligns with Vygotsky's zone of proximal development by assisting learners with tasks they cannot yet accomplish independently (Kasneci et al., 2023; Ren et al., 2025). In English-as-a-foreign-language contexts, ChatGPT can support prewriting, drafting, and revision while improving coherence and clarity. However, scaffolding should gradually decrease as learners develop independent writing competence (Xiao et al., 2025). Experiential learning orientations may influence how students engage with writing activities and AI-generated feedback. Honey and Mumford's model identifies Activists, Reflectors, Theorists, and Pragmatists, representing preferences for direct participation, observation, conceptual understanding, and practical application (Lang, 2023). Morris (2020) describes experiential learning through contextually rich experience, critical reflection, context-specific conceptualization, and pragmatic experimentation. Studies associate experiential learning environments and learning preferences with academic performance, communication, critical thinking, and self-regulation, providing a basis for examining these orientations in technical writing instruction (Maya et al., 2021; Wijnen Meijer et al., 2022; Duchatelet et al., 2024).

Technical writing involves producing clear, accurate, objective, and organized information for a specific audience and purpose (Markel and Selber, 2021; Garcia and Bondoc, 2024). These competencies can be developed through instruction and assessed through students' reports and technical documentation (Wu et al., 2022). Swales' (1990) Genre Theory, supported by Flowerdew (2022), explains that effective writing requires understanding a discourse community's communicative purposes, structural conventions, and linguistic expectations. Together, Kolb's Experiential Learning Theory and Vygotsky's Sociocultural Theory provide a framework for examining how experience and guided assistance support writing development (Wu et al., 2022; Selwyn and Renaud Assemat, 2020).

Despite increasing research on AI-supported learning, limited attention has been given to the relationships among ChatGPT scaffolding, experiential learning orientations, and technical writing skills among Industrial Technology students in Philippine higher education. Existing studies commonly emphasize general AI use, perceptions, or writing in broader educational contexts (Aljohani, 2025). Research in Bicol indicates that tertiary and senior high school students already use AI for academic tasks, establishing the relevance of investigating its application in specialized programs (Solano et al., 2025; Brigola, 2025). The reported functional literacy rate of 63.7% in Camarines Norte further highlights the broader need to strengthen literacy, although this provincial figure does not directly measure university students' technical writing competence (Philippine Statistics Authority, 2025).

At the University of Camarines Norte, the study seeks to address the limited local evidence on AI-assisted technical writing and the reported absence of institutional guidelines for the use of generative AI. Differences in instructors' and students' views reinforce the need for evidence to guide classroom practice. Discussions of academic integrity include institutional discretion over acceptable similarity thresholds, as reported by Villanueva (2025), while CHED Memorandum Order No. 21, Series of 2026, is cited as emphasizing the responsible integration of AI. These considerations support an examination of both the instructional value of ChatGPT and the conditions necessary for its appropriate academic use.

The study aims to determine students' use of ChatGPT as a generative AI scaffolding tool, their experiential learning orientations, their technical writing skills, and the significant relationships among these variables. Its findings will inform E-CRAFT, or the Experiential and ChatGPT-Responsive Approach to Functional Technical Writing, a proposed evidence-based intervention. The results may help teachers, program coordinators, English for Specific Purposes practitioners, and curriculum developers strengthen industry-relevant communication instruction, develop institutional guidance, and design approaches responsive to Industrial Technology students' learning needs.

Objectives of the study - The purpose of this study is to examine the relationship between ChatGPT-based generative AI scaffolding, experiential learning styles and technical writing skills among industrial technology students at the University of Camarines Norte as a basis for an enhancement program for English technical writing. Specifically, this study determined the students' use of ChatGPT-Based Generative AI as a scaffolding tool in terms of: attitudes, familiarity, frequency of use; and benefits/ usefulness; identified the students' experiential learning styles as to: activist learning style, reflector learning style, theorist learning style, and pragmatist learning style; identified the students' level of technical writing skills in terms of: clarity and precision, structured format, objectivity, and functionality; explored the significant relationship between ChatGPT-Based Generative AI scaffolding, experiential learning styles, and technical writing skills; and finally, proposed an English program for industrial technology students to improve their technical writing skills.

2. Methods

The study employed a descriptive-correlational research design to examine the relationships among ChatGPT-based generative AI scaffolding, experiential learning styles, and technical writing skills among Industrial Technology students at the University of Camarines Norte. This design describes variables and determines their relationships without manipulating existing conditions (Putri et al., 2025). The descriptive component assessed students' AI use, learning orientations, and technical writing skills, while the correlational component examined associations among these variables. Findings were interpreted as relationships rather than evidence of cause and effect.

The target population consisted of 2,531 undergraduate students from the College of Engineering (1,300), College of Computing and Multimedia Studies (787), and College of Trades and Technology (444). The proposed sample comprised 450 respondents, proportionately allocated as 231, 140, and 79 students, respectively, with simple random selection within each college. Eligible participants were first- to fourth-year students enrolled during the research year who used ChatGPT for technical writing and provided informed consent. Students from other colleges, pilot-test participants, those on official leave, those who had dropped or were cross-enrolled, and those with incomplete responses were excluded.

A four-part survey questionnaire gathered demographic information and assessed ChatGPT scaffolding, experiential learning styles, and self-reported technical writing skills using a four-point agreement scale. AI-use items were adapted from Ho (2024) and Lariosa et al. (2025), while the learning-style section was adapted from Honey and Mumford's questionnaire via Yean et al. (2024), reduced to 25 items covering activist, reflector, theorist, and pragmatist orientations. Technical writing items were adapted from Wu et al. (2022) and covered clarity and precision, structured format, objectivity, and functionality (Bagul, 2025). The instrument drew on Vygotsky (1978),

Ren et al. (2025), Honey and Mumford (1992), Morris (2020), Swales (1990), and Flowerdew (2022). Following expert validation and a pilot test involving 30 CCMS students, Cronbach's alpha coefficients ranged from .813 to .954, indicating good to excellent internal consistency under George and Mallery's (2003) guidelines.

Data collection began with the research adviser's review and content validation by three language experts, whose recommendations guided revisions to the questionnaire. Permission was obtained to conduct pilot testing, after which the responses were analyzed for internal consistency. For the main survey, institutional authorization was obtained from the university president, and faculty members assisted in distributing the validated questionnaire through Google Forms across the three colleges. Respondents received information about the study's purpose, voluntary participation, and confidentiality before providing informed consent. Collected responses were prepared for tabulation and statistical analysis.

Data analysis included frequencies and percentages for demographic characteristics and weighted means for the questionnaire indicators. Mean scores were interpreted as strongly agree (3.26–4.00), agree (2.51–3.25), disagree (1.76–2.50), and strongly disagree (1.00–1.75). One-way ANOVA was specified for group comparisons when its assumptions were satisfied, followed by Scheffé post hoc testing when significant differences occurred. Spearman's rank-order correlation assessed the direction, strength, and significance of relationships between AI scaffolding, experiential learning orientations, and technical writing skills. Statistical significance was evaluated at the .05 level, with correlation strength interpreted separately from statistical significance.

Ethical safeguards included securing clearance through the LPU-Batangas ethics review process, obtaining informed consent, and protecting participants' privacy and confidentiality. Names were not required, participation was voluntary, and respondents were informed of their right to decline or withdraw. Information was intended solely for academic purposes and handled in accordance with the Data Privacy Act of 2012, or Republic Act No. 10173. Consistent with Resnik (2020), the study emphasized truthful reporting, error minimization, and the prevention of data falsification. The manuscript indicated that the ethical clearance certificate was included in the appendix.

3. Results and discussion

Table 1

Summary Table on ChatGPT-Based Generative AI Scaffolding

Variables	Weighted Mean	Verbal Interpretation	Rank
Attitudes Towards Using ChatGPT	3.05	*Agree*	2
Familiarity With ChatGPT	3.06	*Agree*	1
Frequency of Use	2.88	*Agree*	4
Benefits/ Usefulness	3.01	*Agree*	3
Overall Mean	3.00	Agree	

Legend: 1.0 to 1.75 (Strongly Disagree), 1.76 to 2.50 (Disagree), 2.51 to 3.25 (Agree), 3.26 to 4.00 (Strongly Agree)

Table 1 presents students' assessment of ChatGPT-Based Generative AI Scaffolding, with an overall mean of 3.00, interpreted as "Agree." Familiarity With ChatGPT ranked highest (3.06), followed by Attitudes Toward Using ChatGPT (3.05), Benefits/Usefulness (3.01), and Frequency of Use (2.88). The closely grouped scores indicate generally favorable assessments across all four dimensions. This pattern is consistent with Strzelecki (2024), who described students' acceptance of ChatGPT as involving interconnected perceptions of effort, performance, and attitude. Familiarity and positive attitudes emerged as the strongest dimensions, suggesting that Industrial Technology students at the University of Camarines Norte know how to access ChatGPT and consider it helpful for technical writing. However, their familiarity appears stronger in basic access than in effective prompting, understanding broader functions, and navigating advanced features. Students' favorable attitudes likewise stemmed more from perceived usefulness than enjoyment or encouragement to improve, suggesting a practical orientation toward the tool.

Benefits/Usefulness received a mean of 3.01, indicating that students recognize ChatGPT's support for grammar, organization, and clarity but perceive fewer gains in confidence, independence, efficiency, and

understanding report structure. This finding parallels Shahsavar et al. (2024), who reported improvements in writing content, organization, and mechanics but limited effects on independence and confidence. Meanwhile, Frequency of Use ranked lowest (2.88), with students turning to ChatGPT mainly for explanations and difficult concepts rather than consistently using it for brainstorming, feedback, and revision.

Overall, students demonstrate familiarity, favorable attitudes, and perceived benefits, as well as selective use of ChatGPT in technical writing. Selective use does not necessarily indicate a weakness; the more relevant concern is whether students use the tool effectively as they develop independent competence. Accordingly, the proposed intervention should prioritize purposeful integration across appropriate stages of writing, effective prompting, critical evaluation of responses, and gradual withdrawal of support to strengthen confidence and understanding of the structure of technical reports.

Table 2

Summary Table on Experiential Learning Styles

Variables	Weighted Mean	Verbal Interpretation	Rank
Activist Learning Style	3.21	Agree	4
Reflector Learning Style	3.35	Strongly Agree	1
Theorist Learning Style	3.31	Strongly Agree	2
Pragmatist Learning Style	3.29	Strongly Agree	3
Overall Mean	3.29	Strongly Agree	

Legend: 1.0 to 1.75 (Strongly Disagree), 1.76 to 2.50 (Disagree), 2.51 to 3.25 (Agree), 3.26 to 4.00 (Strongly Agree)

Table 2 presents the four Experiential Learning Styles, with an overall mean of 3.29, interpreted as "Strongly Agree." Reflector ranked highest (3.35), followed by Theorist (3.31), Pragmatist (3.29), and Activist (3.21). The closely grouped scores suggest that Industrial Technology students at the University of Camarines Norte endorse multiple learning orientations rather than one exclusive style. This finding aligns with Masnia et al. (2025), who reported mixed learning styles among technology students. The strongest orientations, Reflector and Theorist, suggest that students prefer opportunities to review, analyze, and revise their writing alongside clear rules and models. Reflector responses emphasized the need for time to reflect and revise, although reviewing previous outputs was less strongly endorsed. Theorist responses favored explicit grammar rules and examples over tasks requiring critical analysis and logical reasoning. Falardeau et al. (2024) similarly found that explicit instruction incorporating models and clear rules improved writing self-efficacy and performance. These preferences support combining guided examples with deliberate revision opportunities.

Pragmatist and Activist received comparatively lower ratings, although both were still assessed positively. Pragmatist responses reflected preferences for clear goals and practical applications, with less endorsement of open-ended technical communication problems. Activist responses favored practical vocabulary and classroom participation, while experimentation, immediate problem-solving, and group work received lower ratings. These patterns suggest greater comfort with structured activities than with tasks requiring spontaneous responses or navigating ambiguity; they do not, by themselves, establish weaknesses in students' abilities. Overall, the findings support the design of technical writing activities that connect experience, reflection, conceptual understanding, and application. Instruction may build on students' preferences for reflection and clear frameworks while progressively introducing collaborative writing, language experimentation, and open-ended workplace communication tasks. The proposed program's second KRA may therefore emphasize guided experiential activities that broaden students' engagement across learning orientations while retaining opportunities for analysis, feedback, and revision.

Table 3 presents students' self-assessed technical writing skills, with an overall mean of 3.07, interpreted as "Agree." Objectivity ranked highest (3.14), followed by Structured Format (3.08), Clarity and Precision (3.04), and Functionality (3.02). The closely grouped means indicate generally favorable perceptions across all dimensions, with relative strengths in objectivity and structure. However, these self-reported ratings do not establish actual proficiency or rule out substantial weaknesses in students' written outputs. Objectivity responses reflected greater confidence in distinguishing facts from opinions, verifying information, and making evidence-

based recommendations than in analyzing data and using it to support conclusions. Students therefore appeared more confident evaluating information than developing interpretations from it. Kim and Howes (2023) similarly identified interpreting experimental data as a challenging aspect of technical writing. In Structured Format, students rated citation, conclusions, and compliance with report requirements more highly than transitions, logical organization, and abstract writing, suggesting greater confidence in prescribed components than in integrating an entire report.

Table 3

Summary Table on Technical Writing Skills

Variables	Weighted Mean	Verbal Interpretation	Rank
Clarity and Precision	3.04	*Agree*	3
Structured Format	3.08	*Agree*	2
Objectivity	3.14	*Agree*	1
Functionality	3.02	*Agree*	4
Overall Mean	3.07	Agree	

Legend: 1.0 to 1.75 (Strongly Disagree), 1.76 to 2.50 (Disagree), 2.51 to 3.25 (Agree), 3.26 to 4.00 (Strongly Agree)

Clarity, Precision, and Functionality received the lowest ratings, indicating priorities for further assessment and instruction. Students expressed greater confidence in correcting errors, applying grammar, and explaining tables than in maintaining professional tone, using technical terminology, and following standard conventions. They also favored established tasks, such as writing instructions and constructing tables, over adapting documents for different audiences and converting verbal information into visual forms. Luo et al. (2024) emphasized that technical documents vary with their readers, thereby supporting explicit instruction in audience-sensitive communication. Overall, the findings suggest a relatively balanced self-perceived writing profile, with targeted support needed in professional register, disciplinary terminology, audience adaptation, and verbal–visual communication. The proposed program's third KRA may address these areas through workplace-based writing tasks, dual-purpose data presentations, and guided revision. Assessment of actual writing samples should accompany these activities to determine whether students' reported strengths in grammar, citation, conclusions, and table construction translate into accurate and effective technical communication.

Table 4

Relationship between ChatGPT-Based Generative AI Scaffolding and Experiential Learning Styles

Profile Variables	*Spearman-rho*	p-Value	Interpretation
Attitudes Towards Using ChatGPT			
Activist Learning Style	.260**	0.000	Highly Significant
Reflector Learning Style	.214**	0.000	Highly Significant
Theorist Learning Style	.179**	0.000	Highly Significant
Pragmatist Learning Style	.179**	0.000	Highly Significant
Experiential Learning Styles	.239**	0.000	Highly Significant
Familiarity With ChatGPT			
Activist Learning Style	.375**	0.000	Highly Significant
Reflector Learning Style	.251**	0.000	Highly Significant
Theorist Learning Style	.263**	0.000	Highly Significant
Pragmatist Learning Style	.305**	0.000	Highly Significant
Experiential Learning Styles	.337**	0.000	Highly Significant
Frequency of Use			
Activist Learning Style	.281**	0.000	Highly Significant
Reflector Learning Style	.191**	0.000	Highly Significant
Theorist Learning Style	.174**	0.000	Highly Significant
Pragmatist Learning Style	.196**	0.000	Highly Significant
Experiential Learning Styles	.242**	0.000	Highly Significant
Benefits/ Usefulness			
Activist Learning Style	.275**	0.000	Highly Significant
Reflector Learning Style	.205**	0.000	Highly Significant
Theorist Learning Style	.228**	0.000	Highly Significant
Pragmatist Learning Style	.207**	0.000	Highly Significant
Experiential Learning Styles	.267**	0.000	Highly Significant

ChatGPT-Based Generative AI Scaffolding			
Activist Learning Style	.333**	0.000	Highly Significant
Reflector Learning Style	.243**	0.000	Highly Significant
Theorist Learning Style	.234**	0.000	Highly Significant
Pragmatist Learning Style	.247**	0.000	Highly Significant
Experiential Learning Styles	.306**	0.000	Highly Significant

Legend: Highly Significant at p-value < 0.01

Table 4 shows that all 25 relationships between ChatGPT-Based Generative AI Scaffolding and Experiential Learning Styles were positive and statistically significant ($p < .001$). The composite scaffolding score correlated most strongly with the Activist style ($\rho = .333$), followed by Pragmatist ($\rho = .247$), Reflector ($\rho = .243$), and Theorist ($\rho = .234$), while its correlation with overall experiential learning styles was .306. These associations indicate that higher scaffolding scores tend to accompany stronger endorsement of experiential learning orientations, particularly active exploration, though they do not establish causation. Familiarity with ChatGPT consistently showed the strongest associations across the scaffolding dimensions. Its highest correlation was with the Activist style ($\rho = .375$), followed by overall experiential learning styles ($\rho = .337$), Pragmatist ($\rho = .305$), Theorist ($\rho = .263$), and Reflector ($\rho = .251$). This pattern suggests that students who report greater familiarity also tend to endorse experimentation and hands-on engagement more strongly. Jeilani and Abubakar (2025) similarly associated technology self-efficacy with curiosity, independent problem-solving, and willingness to explore.

Frequency of Use produced the weakest associations, ranging from .174 for Theorist to .281 for Activist, despite remaining statistically significant. Frequent use, therefore, appears less closely associated with learning orientations than with familiarity, and it should not be treated as evidence of meaningful engagement. Benefits/Usefulness correlated most strongly with Activist ($\rho = .275$) and Theorist ($\rho = .228$), suggesting links with both exploration and conceptual analysis. Deroncele-Acosta et al. (2026) likewise distinguished purposeful practices, including verification and reformulation, from uncritical dependence, emphasizing the importance of students' use of ChatGPT. Overall, the findings suggest that instruction in CoEng, CCMS, and CoTT should emphasize purposeful familiarity with ChatGPT through guided prompting, response evaluation, reflection, and revision. Activities may connect hands-on exploration with theoretical understanding and practical application while preserving students' responsibility for their writing. Because the observed relationships were generally weak to moderate, ChatGPT scaffolding should be considered a factor associated with experiential learning orientations; the results do not demonstrate that increasing familiarity or use improves learning.

Table 5

Relationship between ChatGPT-Based Generative AI Scaffolding and Technical Writing Skills

Profile Variables	*Spearman-rho*	p-Value	Interpretation
Attitudes Towards Using ChatGPT			
Clarity and Precision	.246**	0.000	Highly Significant
Structured Format	.230**	0.000	Highly Significant
Objectivity	.233**	0.000	Highly Significant
Functionality	.275**	0.000	Highly Significant
Technical Writing Skills	0.272	0.000	Highly Significant
Familiarity With ChatGPT			
Clarity and Precision	.378**	0.000	Highly Significant
Structured Format	.328**	0.000	Highly Significant
Objectivity	.281**	0.000	Highly Significant
Functionality	.338**	0.000	Highly Significant
Technical Writing Skills	0.364	0.000	Highly Significant
Frequency of Use			
Clarity and Precision	.229**	0.000	Highly Significant
Structured Format	.243**	0.000	Highly Significant
Objectivity	.167**	0.000	Highly Significant
Functionality	.271**	0.000	Highly Significant
Technical Writing Skills	0.269	0.000	Highly Significant

Benefits/ Usefulness			
Clarity and Precision	.214**	0.000	Highly Significant
Structured Format	.174**	0.000	Highly Significant
Objectivity	.179**	0.000	Highly Significant
Functionality	.261**	0.000	Highly Significant
Technical Writing Skills	0.219	0.000	Highly Significant
ChatGPT-Based Generative AI Scaffolding			
Clarity and Precision	.295**	0.000	Highly Significant
Structured Format	.265**	0.000	Highly Significant
Objectivity	.243**	0.000	Highly Significant
Functionality	.316**	0.000	Highly Significant
Technical Writing Skills	0.313	0.000	Highly Significant

Legend: Highly Significant at p-value < 0.01

Table 5 shows positive and statistically significant relationships between ChatGPT-Based Generative AI Scaffolding and students' self-reported technical writing skills across all 25 correlations ($p < .001$). Coefficients ranged from .167 to .378, indicating weak to moderate associations. Overall scaffolding correlated most strongly with Functionality ($\rho = .316$), followed by Clarity and Precision ($\rho = .295$), Structured Format ($\rho = .265$), and Objectivity ($\rho = .243$), with an overall technical writing correlation of .313. These results indicate associations rather than causal effects or demonstrated improvements in writing. Familiarity with ChatGPT showed the strongest correlations across all technical writing dimensions, particularly Clarity and Precision ($\rho = .378$), overall skills ($\rho = .364$), and Functionality ($\rho = .338$). Students reporting greater familiarity therefore also tended to report stronger abilities in producing clear language and adapting documents to practical purposes. Wehlie et al. (2026) similarly associated familiarity with ChatGPT with self-rated writing skills and recommended guided practice for evaluating and revising text. However, familiarity's weaker association with Objectivity ($\rho = .281$) suggests that operational knowledge and critical evaluation should be assessed separately.

Attitudes, Frequency of Use, and Benefits/Usefulness correlated most strongly with Functionality, with coefficients of .275, .271, and .261, respectively. This pattern suggests that favorable perceptions and greater use accompany stronger perceived ability to adapt technical documents for different readers and purposes. The weakest relationship was between Frequency of Use and Objectivity ($\rho = .167$); this small positive association does not establish that frequent use weakens independent thinking. Woo et al. (2025) found that active editing of AI-generated text improved writing outcomes, supporting instruction that requires students to revise and evaluate responses rather than accept them automatically. Overall, the findings support prioritizing purposeful familiarity with ChatGPT alongside explicit instruction in source verification, evidence interpretation, and unbiased reporting. Faculty in CoEng, CCMS, and CoTT may use guided prompting, audience-adaptation exercises, and comparisons of AI drafts with student revisions to develop these practices. Because the measures reflect students' perceptions, assessment of actual technical writing outputs is necessary to determine whether reported clarity, functionality, structure, and objectivity correspond to demonstrated competence.

Table 6

Relationship between Experiential Learning Styles and Technical Writing Skills

Profile Variables	*Spearman-rho*	p-Value	Interpretation
Activist Learning Style			
Clarity and Precision	.437**	0.000	Highly Significant
Structured Format	.470**	0.000	Highly Significant
Objectivity	.460**	0.000	Highly Significant
Functionality	.375**	0.000	Highly Significant
Technical Writing Skills	0.476	0.000	Highly Significant
Reflector Learning Style			
Clarity and Precision	.255**	0.000	Highly Significant
Structured Format	.329**	0.000	Highly Significant
Objectivity	.394**	0.000	Highly Significant
Functionality	.232**	0.000	Highly Significant
Technical Writing Skills	0.331	0.000	Highly Significant

Theorist Learning Style			
Clarity and Precision	.353**	0.000	Highly Significant
Structured Format	.371**	0.000	Highly Significant
Objectivity	.435**	0.000	Highly Significant
Functionality	.311**	0.000	Highly Significant
Technical Writing Skills	0.415	0.000	Highly Significant
Pragmatist Learning Style			
Clarity and Precision	.375**	0.000	Highly Significant
Structured Format	.382**	0.000	Highly Significant
Objectivity	.441**	0.000	Highly Significant
Functionality	.297**	0.000	Highly Significant
Technical Writing Skills	0.407	0.000	Highly Significant
Experiential Learning Styles			
Clarity and Precision	.388**	0.000	Highly Significant
Structured Format	.445**	0.000	Highly Significant
Objectivity	.498**	0.000	Highly Significant
Functionality	.347**	0.000	Highly Significant
Technical Writing Skills	0.457	0.000	Highly Significant

Legend: Highly Significant at p-value < 0.01

Table 6 shows positive and statistically significant relationships between experiential learning styles and students' self-reported technical writing skills across all 25 correlations ($p < .001$), with coefficients ranging from .232 to .498. Overall experiential learning styles correlated most strongly with Objectivity ($\rho = .498$), followed by Structured Format ($\rho = .445$), Clarity and Precision ($\rho = .388$), and Functionality ($\rho = .347$). The correlation with overall technical writing skills was .457, indicating that stronger endorsement of experiential learning orientations was associated with higher perceived writing competence. The Activist style showed the strongest association with overall technical writing skills among the four orientations ($\rho = .476$). Its highest dimensional correlation was with Structured Format ($\rho = .470$), followed by Objectivity ($\rho = .460$), Clarity and Precision ($\rho = .437$), and Functionality ($\rho = .375$). This pattern suggests that students who favor active participation also report greater confidence in applying report conventions and organizing technical documents. Baima et al. (2024) similarly emphasized the value of hands-on learning organized around clear stages, thereby supporting structured drafting, revision, and feedback activities.

Objectivity was the strongest correlate of Reflector ($\rho = .394$), Theorist ($\rho = .435$), and Pragmatist ($\rho = .441$) orientations. These associations suggest that reflection, systematic reasoning, and practical verification accompany stronger perceived ability to evaluate evidence and report information objectively. Functionality consistently showed the weakest correlations, indicating that learning preferences alone do not adequately explain audience adaptation and practical communication. Staley and Bairaktarova (2022) likewise highlighted the need to develop perspective-taking for communication across different audiences. Overall, experiential learning styles had a larger correlation with technical writing skills ($\rho = .457$) than ChatGPT scaffolding did ($\rho = .313$), although this numerical difference does not establish a statistically significant difference or greater causal influence. Instruction in CoEng, CCMS, and CoTT may therefore combine active writing, reflection, conceptual guidance, and practical application while explicitly teaching audience adaptation. Tasks requiring students to present the same findings in a technical report, client summary, and supervisor update could address Functionality, using actual writing assessments to verify gains beyond self-reported competence.

Proposed English Program to Improve the Technical Writing Skills of Industrial Technology Students.

The proposed English program to help Industrial Technology students enhance their technical writing skills is titled E-CRAFT (Experiential and ChatGPT-Responsive Approach to Functional Technical Writing). It goes beyond grammar, encouraging students to use generative AI as a writing aid, learn through hands-on practice, and tailor documents to real audiences and purposes. The program directly addresses assessment results that highlight inconsistent and infrequent use of ChatGPT for technical writing support, underdeveloped active and practical learning skills relative to students' strong reflective and theoretical abilities, and, most importantly, students' weak self-assessed technical writing skills. This includes difficulties in adapting documents for various audiences and maintaining a formal, precise tone, which were the lowest-rated areas among the target group.

The E-CRAFT program provides a comprehensive, scaffolded curriculum designed to cultivate purposeful AI-assisted writing practices, active learning, and practical technical writing skills through targeted instructional methods. To promote consistent and confident use of ChatGPT throughout the writing process, students document a brief AI touchpoint at three key stages of each major assignment: planning, drafting, and revising. They are also required to complete a ChatGPT feedback step as part of their weekly formal revision checklist. Instructors reinforce this practice by demonstrating multi-stage AI consultation in class using sample reports. In addition, students submit a ChatGPT-supported outline before beginning each major report, using a reusable prompt template introduced in a brief workshop. Students also track the time they spend working with and without ChatGPT to illustrate the tool's practical benefits.

The program further strengthens students' active, hands-on engagement with technical communication. Each term, students work in role-based teams of four or five to complete 15- to 20-minute technical problem-solving challenges before progressing to larger group projects. This structure ensures that every member holds a meaningful technical role rather than a peripheral one. Students also complete timed, 20- to 30-minute writing simulations in which they document a decision made under realistic, time-pressured conditions, such as responding to a laboratory equipment malfunction. These simulations are followed by a structured debrief with peers and the instructor, focusing on the clarity and timeliness of students' reasoning.

To develop practical, workplace-ready skills, students engage in a progressive sequence of problem-based writing tasks. They start with well-structured, single-answer problems and gradually move to more open-ended technical communication tasks, supported by a simple problem-solving framework and early peer mentorship. Once each term, students also create a short operation manual or procedural guide based on a hands-on "build day," during which they physically test a device or process before writing instructions. Additionally, one major assignment each term is tailored around an authentic workplace scenario, developed in collaboration with industry partners, and concludes with a brief reflection linking the task to real professional contexts. The activities presented in E-CRAFT can be adapted into a large-scale semestral activity for intercollegiate and College Day festivities, or into Open-House Events for all industrial technology programs. Each main point of the program can be transformed into a forum or conference on AI prompting techniques, the creation of manuals and technical reports, or competitions to present technical writing outputs, with invited industry partners serving as guests or adjudicators. This way, every student will have a fair share of opportunities to see their technical writing skills not just in action, but in a more active, enjoyable, and practical manner.

The program strengthens technical writing skills through structured exercises focused on conversion, audience adaptation, and register. Students regularly convert technical descriptions into diagrams or flowcharts and rewrite a single technical topic for three distinct audiences, with their work assessed through peer reviews conducted in a role-play format. To enhance tone and accuracy, students conduct weekly tone audits by revising one paragraph of their drafts to align with a professional register. In addition, they maintain a technical vocabulary glossary to support their coursework and use a self-assessment checklist of common conventions and errors before submitting major assignments. E-CRAFT brings together faculty in English and technical writing, instructors from CoEng, CCMS, and CoTT, laboratory staff, program coordinators, and industry liaison officers to help students become confident and effective technical writers. The program begins with structured, closely guided activities and gradually progresses to open-ended, real-world technical writing tasks. Ultimately, students should be able to use ChatGPT effectively as a writing tool, engage actively with technical communication, and produce clear, accurate documents tailored to real audiences and workplace needs.

4. Conclusions and recommendations

Conclusions - Respondents moderately agreed on all four dimensions of ChatGPT-based generative AI scaffolding in technical writing, with familiarity with ChatGPT rated highest and attitudes close behind; benefits/usefulness and frequency of use were the lowest-rated dimensions, with frequency of use the lowest. The Respondents strongly agreed on their experiential learning styles, with the reflector and theorist styles rated highest,

while the pragmatist and activist styles were rated lowest. Respondents agreed on their technical writing skills, with objectivity and structured format rated highest, while clarity, precision, and functionality were the lowest-rated dimensions. Significant positive relationships were found across all variable pairs: between ChatGPT-based AI scaffolding and experiential learning styles, between ChatGPT-based generative AI scaffolding and technical writing, and between experiential learning styles and technical writing skills. The strongest relationship was between experiential learning styles and technical writing skills, particularly the Activist Learning Style. Among the scaffolding dimensions, familiarity with ChatGPT showed the strongest relationships with both experiential learning styles and technical writing skills. Objectivity, however, was least related to ChatGPT scaffolding, and Functionality was least related to experiential learning styles. Based on the gaps identified in the study's findings, a program to enhance ChatGPT-based generative AI scaffolding, experiential learning, and technical writing skills was proposed.

Recommendations - School administrators may support the program's successful deployment by providing funding, offering substantial benchmarking support, and promoting industry-related linkages to address profile-related variations in ChatGPT-based AI scaffolding, experiential learning approaches, and technical writing abilities within CoEng, CCMS, and CoTT. The curriculum committee may incorporate the proposed program's structured AI-integration strategies, hands-on learning activities, and function-based writing benchmarks into the technical writing curriculum, especially to develop clarity, precision, and functionality in technical writing in three colleges. The college deans and department chairs of CoEng, CCMS, and CoTT may assume responsibility for implementing the proposed program within their colleges and assessing its effectiveness afterward, especially considering the notable differences in experiential learning styles across colleges.

English language and technical writing faculty may use the strategies outlined in the program to promote more deliberate and uniform use of ChatGPT as a writing aid. This approach aims to boost students' active engagement and practical learning while enhancing their technical writing abilities, especially in functionality, clarity, and precision, through strategies that would instill to the students the responsible and judicial use of AI. Students may actively engage in learning activities and writing opportunities that use ChatGPT as a scaffold, while taking advantage of experiential learning strategies in technical writing. This will help them develop more intentional habits in using ChatGPT, foster a proactive, hands-on approach to technical writing, and boost their confidence and skills in creating clear, functional technical documents, while adhering to responsible AI use, valuing independent thinking, and developing the ability to evaluate and reexamine AI-generated suggestions. Future researchers may conduct longitudinal, experimental, mixed-methods, or regression studies to explore the relationships and predictive relationships among ChatGPT-based generative AI scaffolding, experiential learning styles, and technical writing skills among industrial technology students across various higher education settings.

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