Humanistic Perspectives on Educational Modalities: A Comparative Humanities-Based Study of Offline and Online Learning in Engineering EAP Courses

Yanqing Xia*
Ningbo Tech University Qianhu South Road, Yinzhou District, Ningbo City, Zhejiang Province, China
xyq520@pukyong.ac.kr

Xiaoxiao Zhang
Pukyong National University, 45 Yongso-ro, Nam-gu, Busan, South Korea

Shuqian Shi
Luoyang Institute of Science and Technology, 90 Wangcheng Avenue, Luolong District, Luoyang, Henan Province, China

Chunyu Hou
Pukyong National University, 45 Yongso-ro, Nam-gu, Busan, South Korea

Yunxi Feng
Pukyong National University, 45 Yongso-ro, Nam-gu, Busan, South Korea

Abstract: Objective: Guided by a humanities-based perspective, this study aimed to compare engineering students' perceptions of offline and online English for Academic Purposes (EAP) learning environments. It also examined the influence of gender, academic year, and self-assessed proficiency on these perceptions, emphasizing the importance of students' individual experiences. Method: A mixed-methods approach was adopted. Quantitative data were obtained from 347 students through questionnaires and analyzed using t-tests and mixed-design repeated measures ANOVA. To gain deeper interpretive insights, qualitative data were collected via interviews with eight students and examined using NVivo 12 Plus. Results: Overall, students perceived online learning environments as more supportive and effective, citing their flexibility, accessibility, and abundant resources. Still, offline modalities were valued for their hands-on activities and opportunities for direct interaction. While no significant group-level differences emerged for gender, academic year, or self-proficiency, subtle variations were noted. Female students slightly favored the supportive nature of online learning; third-year students appreciated online flexibility during internships, while fourth-year students required more direct offline assistance. Lower-proficiency learners preferred the structured guidance of offline settings, and higher-proficiency learners gravitated toward the autonomy of online environments. Conclusion: From a humanities-oriented standpoint, these findings highlight the need for pedagogical strategies that acknowledge diverse learner profiles, ultimately informing more inclusive and contextually responsive EAP instruction.

Keywords: ItemCF, Perceptions, Offline Learning Environments, Online Learning Environments, EAP

1. INTRODUCTION

With globalization, English has emerged as the dominant lingua franca, facilitating international collaboration and access to global opportunities. To enhance students' English proficiency and prepare them for the demands of a globalized world, universities worldwide have increasingly adopted English-Academic Purposes (EAP). Particularly in non-native English-speaking countries, EAP has seen rapid growth, driven by institutional and national efforts to attract international students, improve university rankings, and align with global educational standards (Athirah, 2024). EAP courses play a critical role in equipping students with the linguistic and academic skills necessary. EAP courses bridge language learning, helping students navigate the complex demands of academic English. EAP courses aim to address non-linguistic factors such as engagement, motivation, and satisfaction, which significantly influence academic success (Samarakou et al., 2015). In approaching these issues from a humanities-based perspective, the focus extends beyond linguistic proficiency to the lived experiences, cultural backgrounds, and personal identities that shape how students perceive their learning environments. However, the rise of digital learning technologies has introduced new dimensions to how EAP courses are delivered, shifting from traditional offline settings to online or hybrid environments. While online and offline learning offer different advantages, students' perceptions of the learning environments and their impact on learning outcomes remain underexplored, particularly in EAP courses (Rienties et al., 2018). A humanities-informed analysis acknowledges that perceptions are not merely cognitive evaluations of learning tools, but also reflections of students' values, social contexts, and sense of belonging within diverse educational landscapes. Effective learning environments provide the resources and interactivity needed to foster learning (Cloete, 2015). Despite increasing interest in EAP, limited research has compared how students perceive offline and online learning environments in EAP courses. This comparison is particularly important for engineering students, who often face challenges. Based on these, the research questions are formulated as followings: What are the differences in engineering students' perceptions of offline and online learning environments? How do gender, academic year, and self-proficiency affect the differences in students' perceptions of

offline and online learning environments? From a humanities perspective, these questions probe not only the cognitive and practical differences between modalities but also how students' identities and social backgrounds shape their educational experiences.

2. LITERATURE REVIEW

2.1 Learning Environments in EAP Courses

Learning environments play a crucial role in engineering students' perceptions in EAP courses. Both online and offline environments possess unique strengths in terms of flexibility, interactivity, and resource availability. Pack et al. highlighted that while students generally enjoy Virtual Learning Environments (VLEs), their perceptions of usefulness vary, reflecting a gap between technological potential and actual learning experiences (Pack et al., 2020). Virtual reality enhances perceptions of teaching presence and classroom equipment (Kharroubi & ElMediouni, 2024). Interactive tools like videos, audios, and instant messaging in online learning foster enjoyment and strengthen engagement (Miranda et al., 2021). Similarly, Arnó-Macià and Rueda-Ramos demonstrated the effectiveness of interdisciplinary online platforms in EAP courses (Arnó-Macià & Rueda-Ramos, 2011). From a humanities-informed viewpoint, these digital platforms can be seen as cultural and social spaces, where learners bring their personal histories, linguistic repertoires, and emotional responses into the learning process. However, offline learning offers specific benefits, particularly in fostering face-to-face interactions and immediate feedback. Cloete emphasized the pedagogical richness of offline interactions and suggested that combining the strengths of environments can enhance their education (Cloete, 2015). In humanistic terms, offline settings provide opportunities for embodied communication, empathy, and collective meaning-making, where nonverbal cues and interpersonal dynamics enrich students' interpretive engagement. Offline and online learning environments also differ in the effectiveness. Online learning has shown significant advantages. Rienties et al. discussed communicative forum activities require online connection, while reading material or videos can be downloaded for later use (Rienties et al., 2018). Kohnke found that students perceived GenAI tools to be more comprehensive and authoritative, as they provide detailed explanations and contextual insights that enhance language proficiency (Kohnke, 2024). However, they also noted concerns about overreliance, data privacy and equitable access to

premium features. Such concerns highlight that students' perceptions are not only about convenience or efficiency but also about ethical and social considerations, personal autonomy, and trust—elements central to a humanities-based understanding. Park and Park found that online students outperformed offline students in writing performance, with statistically significant results observed in short and long-term contexts (Park & Park, 2018). Pei and Wu further argued that there is no evidence to suggest offline learning is superior (Pei & Wu, 2019). Instead, online learning has clear benefits in enhancing undergraduates' knowledge and skills. However, offline environments retain advantages in fostering social interaction. Soltani and Tran described physical spaces as dynamic settings that facilitate collaboration and interaction, with elements such as silence shaping individual and group behavior (Soltani & Tran, 2023). When paired with digital tools like VRLEs and AI-driven platforms, physical spaces can strike a balance between personalization and collaboration. For example, Zou and Wang illustrated how platforms like EAP Talk promote autonomous language practice, while thoughtfully designed physical spaces encourage peer discussions and social engagement. Blended modalities have also been explored. Yen, Lo, Lee, and Enriquez reported no significant differences in engagement levels between online and offline project-based learning (PBL) (Yen et al., 2018). However, online PBL demonstrated slightly lower outcomes in specific course learning goals, except in areas such as oral and written communication and affective skills. Despite these variations, students performed equally well in exams, research papers, and overall grades across offline, online, and blended modalities, highlighting the comparable effectiveness of these methods. A humanities-based analysis values these findings not just for their cognitive outcomes, but for the quality of interpersonal relationships, cultural understanding, and affective responses they engender in learners. Offline and online learning environments hold the potential to significantly enhance engagement, motivation, and skill development in EAP courses. However, challenges such as technical difficulties and insufficient teacher training must be addressed to fully harness the benefits. From a humanistic standpoint, addressing these challenges involves recognizing that effective learning environments are co-constructed spaces where learners' backgrounds, emotions, and ethical considerations interact with pedagogical strategies and technological affordances. Moving forward, integrating innovative technologies such as VRLEs with thoughtfully designed learning spaces tailored to EAP students' specific needs is essential for creating effective and inclusive learning (Du & Alm, 2024).

2.2 Engineering Students' Perceptions of Learning Environments

Studies have emphasized the importance of personalized and student-centered learning environments in engineering education. Hadgraft and Kolmos highlighted the curriculum models that allow students to document their learning and career trajectories, fostering lifelong learning strategies (Hadgraft & Kolmos, 2020). Similarly, Martínez Cartas suggested incorporating virtual environments with tools such as conceptual maps and diverse activities tailored to different learning styles to create meaningful learning experiences for engineering students (Martínez Cartas, 2012). Lin and Tsai underscored the value of environments that are student-centered, peer-interactive, and teacher-facilitated, enabling engineering students to develop deeper conceptions of their field (Lin & Tsai, 2009). Kolari et al. noted that students' chosen learning approaches are influenced by personal factors and the learning environment, reinforcing the interplay between individual traits and educational settings (Kolari et al., 2008). From a humanities perspective, this interplay can be understood as a dynamic negotiation of identity, motivation, and cultural capital, where learning outcomes are intertwined with students' sense of self and social belonging. However, Dinsmore et al. (2008) observed that engineering students' personal interest in their domain may remain stable over a semester, and role-related interests do not necessarily correlate with knowledge acquisition. The design and evaluation of learning environments also play a critical role in engineering education. Samarakou et al. advocated for continuous, unobtrusive, and personalized monitoring to maximize the effectiveness of learning processes (Samarakou et al., 2015). Trenor et al. identified strong institutional and peer support within diverse environments but also note that perceived barriers to achieving educational goals may vary by ethnicity and parental education levels (Trenor et al., 2008). Miranda et al. illustrated how educational program designs incorporate tailored components through case studies in engineering education, demonstrating the need for adaptable and inclusive strategies (Miranda et al., 2021). In a humanities-informed framework, these strategies are not just pedagogical adjustments, but ethical commitments to equity, representation, and the recognition of diverse cultural narratives and learner identities.

2.3 Factors Affecting Perceptions of Learning Environments

Research highlights several critical factors influencing students' perceptions of learning environments. Wu, Lu, and Yuan observed significant gender differences, where females exhibited higher engagement

and motivation compared to males (Wu et al., 2024). In contrast, Nguyen and Habók argued that gender did not significantly influence the implementation of autonomous language learning, suggesting that gender effects may vary depending on the learning context (Nguyen & Habók, 2022). Zhang and Hu found that gender differences tend to diminish in EMI university settings and English proficiency should be assessed effectively. In examining these findings through a humanities lens, the focus shifts to understanding how gender is culturally constructed within the learning context, influencing interactions, self-expression, and learner identity formation. Additionally, students' academic performance and year of study play a role in their perceptions, with more experienced students focusing on long-term benefits (Ahmed et al., 2018). English proficiency also impacts students' learning perceptions differently across disciplines. For engineering students, Yuksel et al. identified self-regulation and English proficiency as crucial for academic success, while in social sciences, English proficiency alone played a decisive role. Athirah further noted that varying levels of English proficiency complicate classroom dynamics, as students prioritize different language skills depending on their proficiency (Athirah, 2024). From a humanities-based view, these factors intertwine with learners' cultural backgrounds, personal aspirations, and emotional investments, shaping their perceptions of what counts as meaningful and attainable learning. Cultural and socioeconomic factors further contribute to the complexity of learning environments. Ramburuth and Tani found statistically significant differences in students' learning perceptions based on cultural influences (Ramburuth & Tani, 2009), while Cranfield et al. emphasized the role of socioeconomic and digital disparities in engagement and education quality (Cranfield et al., 2021). Landrum revealed that students' confidence to engage with online learning was the most significant factor positively influencing their perception of the usefulness of online classes (Landrum, 2020). Recognizing these factors underscores that learning experiences are not isolated cognitive events, but culturally and ethically informed human endeavors, shaped by power relations, resource distribution, and the interplay of individual and community values. The factors can provide valuable insights for improving evaluations and designing more inclusive learning spaces. Incorporating a humanities-based perspective encourages educators and researchers to foreground students' voices and stories, ensuring that educational modalities are not only effective but also just, empathetic, and culturally responsive.

3. METHODOLOGY

3.1 Participants

The study involved 380 students from the Mechanical and Engineering Department of a Chinese university, recruited via emails, phones, and messages. Data collection was conducted between December 18 and December 22, 2023. Of the 380 distributed questionnaires, 347 valid responses were included in the analysis, resulting in a 91.3% response rate. All participants were native Chinese speakers to control for potential confounding variables. By acknowledging these participants as individuals situated in specific cultural and linguistic contexts, this approach ensures that the analysis remains sensitive to their lived experiences and sociocultural backgrounds. Table 1 summarizes the demographic information of the participants.

Table 1: Participant Demographics for Questionnaires

Factor	Category	N	Percent (%)
Gender	Male	239	68.9
	Female	108	31.1
Major	Mechanical Design & Automation	90	25.9
	Vehicle Engineering	82	23.6
	Mechanical & Electronic Engineering	104	30.0
	Intelligent Manufacturing Engineering	71	20.5
Academic Year	Freshman	77	22.2
	Sophomore	86	24.8
	Junior	113	32.6
	Senior	71	20.5
Self-proficiency	Low	57	16.4
	Mid	216	62.2
	High	74	21.3

For the qualitative part, interviews were conducted with eight students (PS1-PS8) selected to ensure a range of gender, academic year, major, prior EAP experience, and self-proficiency levels (see Table 2). This purposive sampling strategy acknowledges the diverse cultural and personal narratives that shape each participant's perceptions, foregrounding their unique backgrounds and identities. Interviews were transcribed in Chinese and then translated into English, with translations verified twice for accuracy. Such careful attention to linguistic integrity ensures that the interpretive process respects participants' voices, maintaining the authenticity of their experiences within a humanistic framework.

Table 2: Description for Interviewees (Students)

Code	Gender	Major	Year	EAP classes	Self-proficiency
PS1	F	Mechanical Design & Automation	4	3	High
PS2	F	Intelligent Manufacturing Eng.	1	0	low
PS3	M	Mechanical Design & Automation	2	1	low
PS4	F	Vehicle Engineering	3	2	mid
PS5	M	Vehicle Engineering	4	3	mid
PS6	M	Mechanical & Electronic Eng.	3	1	low
PS7	M	Intelligent Manufacturing Eng.	1	0	mid
PS8	M	Mechanical & Electronic Eng.	2	1	mid

3.2 Instruments, Data Collection, and Data Analysis

To ensure ethical compliance, a formal letter requesting approval was submitted to the department before data collection. This step reflects an ethical commitment to respecting participants' autonomy and well-being, values central to a humanities-informed approach. Two questionnaires, adapted from the Constructivist Learning Environment Survey (CLES) (Pei & Wu, 2019), were used to assess participants' perceptions of offline and online learning environments. Each questionnaire consisted of 24 five-point Likert-scale questions (see Appendices A and B), alongside four demographic questions. By centering on participants' subjective evaluations and backgrounds, the chosen instruments acknowledge that their perceptions arise from lived experiences and cultural contexts. Principal Component Analysis (PCA) with varimax rotation and Kaiser normalization was conducted to validate the questionnaires' structure. Both questionnaires demonstrated high reliability, as shown in Table 3. Cronbach's alphas ranged from .820 to .916, indicating strong internal consistency. The KMO and Bartlett's tests of sphericity confirmed the suitability of the data for factor analysis ($p < .001$). Such rigorous statistical validation, interpreted through a humanities lens, ensures that the instruments meaningfully capture the complexities and nuances of learner experiences rather than reducing them to mere data points. For quantitative analysis, *t*-tests and mixed-design repeated-measures ANOVA were performed using SPSS 26.0. Post-hoc Scheffé comparisons identified significant differences across the four factors. These analytical choices allow for a nuanced exploration of how distinct facets of the learning environment resonate differently with diverse learners, underlining the importance of understanding educational experiences as multifaceted, human-centered phenomena.

Table 3: Validity and Reliability of the Questionnaires

Questionnaire	Factor	Item	α	KMO	Bartlett's Test of Sphericity		
					χ^2	df	*p*
Online LEN	LS	5	.869	.917	4952.311	253	.000
	LE	6	.916				
	LA	7	.914				
	LAC	6	.905				
Offline LEN	LS	5	.820	.920	4770.841	276	.000
	LE	6	.912				
	LA	7	.902				
	LAC	6	.897				

Note: LEN = Learning Environment, LS = Learning Support, LEF = Learning Effectiveness, LA = Learning Atmosphere, LAC = Learning Accessibility. Bartlett's Test of Sphericity results are significant at $p < .001$.

For the qualitative part, semi-structured interviews (see Appendix C) were conducted from December 18 to December 30, 2023. Each interview lasted 30-40 minutes. Interviews were transcribed, coded, and analyzed using NVivo 12 Plus. A bottom-up coding approach, informed by humanistic values, was used to recognize and honor the complexity of participants' individual experiences, conceptualizing and categorizing the data in a manner that preserves their unique perspectives. A bottom-up coding approach was applied to conceptualize and categorize the data. For reliability, the coding process was repeated three times and verified by consensus among researchers, ensuring that interpretive decisions emerged from a reflective, collaborative dialogue rather than a single authoritative viewpoint.

4. RESULTS

4.1 The Descriptive Results

Table 4 provides descriptive statistics for the four factors measured in the study. While these statistical indicators offer a quantified overview of participants' perceptions, their significance also lies in the collective human experiences they represent. The results indicate generally positive perceptions across the factors, with relatively consistent distributions. Interpreted through a humanities-informed lens, such consistency suggests underlying cultural, social, and experiential commonalities that shape students' views. The Skewness and Kurtosis values suggest that the data approximately meet the criteria for normal distribution (Kline, 2023). providing a stable quantitative foundation for further interpretive, context-sensitive analysis.

Table 4: The Descriptive Results

	F	M	SD	Skewness	Kurtosis
Offline LEN	LS	3.16	.932	-.05	-.781
	LEF	3.15	.978	.125	-1.094
	LA	3.28	.937	.104	-1.012
	LAC	3.29	.913	-.13	-.846
Online LEN	LS	3.86	.776	-.317	-.728
	LEF	3.79	.890	-.344	-1.157
	LA	3.76	.868	-.414	-.975
	LAC	3.68	.850	-.105	-1.093

4.2 The Differences in Engineering Students' Perceptions of Offline and Online Learning Environments

Table 5 presents the paired *t*-test results for engineering students' perceptions of offline and online learning environments among LS, LEF, LA, and LAC, revealing significant differences between offline and online learning environments among the four dimensions.

Table 5: Paired *t*-Test Results for Offline and Online Learning Environment

Factor	*t*	*df*	*p*
LS	10.729	346	.000
LE	9.230	346	.000
LA	6.781	346	.000
LAC	5.945	346	.000

$^{***}p < .001$

According to the means and paired *t*-test results, students' perceptions of online learning environments are higher than those of offline environments across the four factors, reflecting not only practical advantages but also the ways learners' individual and cultural contexts shape their preferences and comfort levels. Supported by interview insights. For LS, students valued the flexibility of online resources like recorded lectures. PS2 noted, "In online classes, I can revisit lecture recordings when I don't understand something." This ability to pause, reflect, and revisit material aligns with a humanistic understanding of learning as a personal journey of meaning-making. However, offline settings were preferred for immediate and personalized instructor interactions. Regarding LEF, online learning was praised for time management and diverse resources. PS5 shared, "Online platforms give me access to more study materials and allow me to study at my own pace." Offline environments, however, were seen as better for hands-on and collaborative activities. In terms of LA, online settings were described as relaxed, reducing participation anxiety. PS1 remarked, "I feel less pressure

when participating in discussions online." Still, offline classes were valued for their motivating and collaborative energy, with one student noting, "Seeing my classmates work hard pushes me to do the same." For LAC, online environments offered convenience, especially by eliminating commuting. PS6 said, "Online classes are easier to attend." Nonetheless, technical issues like poor internet connectivity remained a significant challenge, as PS8 stated, "When the network is unstable, I miss important parts of the lecture." In humanistic terms, these technological obstacles remind us that educational equity depends on reliable access and infrastructural support, ensuring that all learners can participate fully and meaningfully.

4.3 The differences in students' perceptions offline and online learning environments by gender

Table 6 reveals that students generally perceive online learning environments more positively than offline environments across the four factors. Notably, females tended to rate the online environment slightly higher than males in LS and LEF, while offline perceptions showed no gender differences. The findings suggest that online learning may provide unique advantages in terms of support and flexibility.

Table 6: Descriptive Results of Students' Perceptions of Learning Environment by Gender

Major	Time	Gender	N	Mean	SD
LS	Offline	Male	239	3.17	.892
		Female	108	3.12	1.019
	Online	Male	239	3.85	.795
		Female	108	3.97	.737
LEF	Offline	Male	239	3.14	.972
		Female	108	3.17	.997
	Online	Male	239	3.77	.905
		Female	108	3.84	.891
LA	Offline	Male	239	3.24	.933
		Female	108	3.39	.940
	Online	Male	239	3.76	.881
		Female	108	3.78	.844
LAC	Offline	Male	239	3.24	.927
		Female	108	3.38	.877
	Online	Male	239	3.69	.853
		Female	108	3.67	.847

Table 7 shows significant main effects of learning environment on students' perceptions. However, neither gender ($p > .05$) nor the

interaction between LE and gender ($p > .05$) had significant effects on any factor. The results indicate that students' perceptions are primarily influenced by LEN, with no differences based on gender (Airey, 2016).

Table 7: Repeated Measures ANOVA: Effects of Gender on Learning Environment

Source	Factor	Type III Sum of Squares	df	Mean Square	F	*p*	η^2 partial
LEN	LS	76.073	1	76.073	102.006	.000	.228
	LE	62.209	1	62.209	74.309	.000	.177
	LA	30.897	1	30.897	35.452	.000	.093
	LAC	19.675	1	19.675	25.798	.000	.070
Gender	LS	.035	1	.035	.048	.826	.000
	LE	.328	1	.328	.352	.554	.001
	LA	1.168	1	.168	1.539	.216	.004
	LAC	.526	1	.526	.663	.416	.002
LE* Gender	LS	.163	1	.163	.218	.641	.001
	LE	.043	1	.043	.051	.822	.000
	LA	.638	1	.638	.732	.393	.002
	LAC	.982	1	.982	1.288	.257	.004

$^{***}p < .001$

The interview results also indicate that students perceive online learning environments more positively than offline ones. As PS1, female, emphasized the flexibility and convenience of online learning, noting, "Online classes let me revisit materials and manage my time better," while PS7, male, shared, "Support systems like forums and recordings make a big difference." Both male and female students consistently prioritized the quality of the learning environment, echoing the quantitative findings that perceptions are primarily affected by the learning environment, regardless of gender.

4.4 The Differences in Students' Perceptions Offline and Online Learning Environments by Academic Year

In Table 8, online learning environments were consistently rated higher than offline learning environments across four academic year, particularly for LS and LE. Students in the third year tended to online environments most favorably, while students in Academic Year 4 showed slightly lower for online and offline learning environments, potentially reflecting their unique needs as they approach graduation. The findings highlight the importance of tailoring EAP course design to meet the varying needs of students at different academic stages.

Table 8: Descriptive Results of Students' Learning Environment by Academic Year

Factor	Learning Environment	Academic Year	N	Mean	SD
LS	Offline	1	77	3.26	.963
		2	86	3.01	.914
		3	113	3.04	.932
		4	71	3.40	.872
	Online	1	77	3.83	.774
		2	86	3.87	.755
		3	113	3.99	.737
		4	71	3.68	.840
LEF	Offline	1	77	3.13	.996
		2	86	3.11	.938
		3	113	3.15	.991
		4	71	3.24	1.000
	Online	1	77	3.90	.846
		2	86	3.65	.882
		3	113	3.89	.899
		4	71	3.69	.962
LA	Offline	1	77	3.31	.906
		2	86	3.41	.960
		3	113	3.25	.982
		4	71	3.15	.860
	Online	1	77	3.86	.835
		2	86	3.57	.931
		3	113	3.86	.855
		4	71	3.74	.822
LAC	Offline	1	77	3.33	.881
		2	86	3.35	.846
		3	113	3.20	.971
		4	71	3.30	.938
	Online	1	77	3.57	.794
		2	86	3.56	.872
		3	113	3.83	.844
		4	71	3.70	.869

Table 9 shows that significant main effects of learning environment on students' perceptions. However, no significant main effects of academic year were found with *p* values over .05, indicating that students' perceptions of the learning environment are consistent across different academic years. A significant interaction effect between learning environment and academic year was observed for LS, suggesting that students' perceptions of learning support in online and offline learning environment vary by academic year. For the other factors, the interaction effects were not significant.

Table 9: Repeated Measures ANOVA: Effects of Academic Year on LEN

Source	Factor	Type III Sum of Squares	df	Mean Square	F	*p*	η^2 partial
LEN	LS	73.583	1	73.583	102.657	.000	.230
	LE	66.242	1	66.242	79.493	.000	.188
	LA	38.235	1	38.235	44.419	.000	.115
	LAC	23.293	1	23.293	30.891	.000	.083
Year	LS	1.227	3	.409	.560	.642	.005
	LE	2.082	3	.694	.744	.527	.006
	LA	1.856	3	.619	.813	.488	.007
	LAC	.628	3	.209	.262	.852	.002
LEN* Year	LS	11.597	3	3.866	5.393	.001	.045
	LE	3.040	3	1.013	1.216	.304	.011
	LA	6.060	3	2.020	2.347	.073	.020
	LAC	5.453	3	1.818	2.410	.067	.021

$^{***}p < .001$

The findings suggest that while online learning environments are generally higher than offline ones, students' perceptions of LS vary by learning environments. Interview data supports this, with third-year students expressing a strong preference for online environments due to their flexibility. PS4 noted, "In online classes, I can access materials anytime, which helps me balance coursework with my internship search." Conversely, fourth-year students highlighted a greater need for face-to-face interactions as they prepare for graduation, with PS1 stating, "I need more direct support in my final year for thesis and job preparation." The insights emphasize the importance of tailoring EAP courses to meet the evolving needs of students at different academic stages. For other factors like LEF, LA, and LAC, interview data revealed consistent preferences across academic years. Students consistently valued clear delivery of materials, motivating environments, and accessible resources, regardless of their academic stage. For instance, PS4 commented, "Good accessibility is important at every stage, and online classes make it easier for everyone to stay updated."

4.5 Differences in Students' Perceptions Offline and Online Learning Environments by Self-proficiency

Table 10 demonstrates the descriptive results of differences in students' perceptions of offline and online learning environments based on self-proficiency levels. Students with three proficiency levels rated online environments higher than offline environments, with low proficiency students the highest. Specifically, low proficiency students rated offline

learning atmosphere and accessibility significantly higher than mid and high proficiency students. Conversely, high proficiency students showed a preference for online environments, with learning effectiveness receiving the highest rating. The findings suggest that learning environments should be adapted to address the differing needs and preferences of students based on their self-proficiency levels (Park & Park, 2018).

Table 10: Descriptive Results of Students' Perceptions of LEN by Self-proficiency

Factor	LEN	Self-proficiency	N	Mean	SD
LS	Offline	Low	57	3.1754	.94874
		Mid	216	3.1602	.95191
		High	74	3.1270	.87120
	Online	Low	57	3.9474	.73827
		Mid	216	3.8472	.79217
		High	74	3.8216	.76252
LEF	Offline	Low	57	3.3070	1.01222
		Mid	216	3.1003	.97486
		High	74	3.1914	.96028
	Online	Low	57	3.7953	.91342
		Mid	216	3.7855	.89242
		High	74	3.8176	.92165
LA	Offline	Low	57	3.5890	.91874
		Mid	216	3.2381	.97145
		High	74	3.1834	.80066
	Online	Low	57	3.7970	.94566
		Mid	216	3.7718	.84633
		High	74	3.7181	.88030
LAC	Offline	Low	57	3.4444	.86622
		Mid	216	3.2670	.92509
		High	74	3.2185	.91034
	Online	Low	57	3.5292	.89316
		Mid	216	3.7238	.84210
		High	74	3.6689	.83698

Table 11 shows that significant main effects of learning environment on students' perceptions among the four factors. However, no significant main effects of self-proficiency were observed with p values over .05, with a marginal effect for LA. Additionally, no significant interaction effects between learning environment and self-proficiency were found for any factor. The findings suggest that while learning environment has a strong impact on students' perceptions, the effects are consistent across self-proficiency levels.

Table 11: Repeated Measures ANOVA: Effects of Self-proficiency on LEN

Source	Factor	Type III Sum of Squares	df	Mean Square	F	*p*	η^2 partial
LEN	LS	64.979	1	64.979	86.879	.000	.202
	LE	45.375	1	45.375	54.202	.000	.136
	LA	22.830	1	22.830	26.285	.000	.071
	LAC	13.788	1	13.788	18.186	.000	.050
Self-proficiency	LS	.500	2	.250	.342	.710	.002
	LE	1.234	2	.617	.661	.517	.004
	LA	4.205	2	2.103	2.795	.063	.016
	LAC	.296	2	.148	.186	.830	.001
LEN* Self-proficiency	LS	.166	2	.083	.111	.895	.001
	LE	.883	2	.442	.528	.590	.003
	LA	2.531	2	1.265	1.457	.234	.008
	LAC	3.269	2	1.634	2.155	.117	.012

$^{***}p < .001$

Learning environments affect students' perceptions, regardless of self-proficiency. Interview data provides further insights. PS2 with low-proficiency students expressed a preference for offline Learning Atmosphere and Accessibility, noting, "Offline classes help me feel more connected to classmates and the teacher, making me more comfortable asking questions." Mid-proficiency students appreciated the balance between online and offline environments, as PS5 shared, "Online classes let me review at my own pace, but offline sessions are better for clarifying complex topics." PS1 with high-proficiency, on the other hand, preferred the flexibility and independence of online learning, stating, "Online environments allow me to focus on the material without distractions." This confirms that the learning environment affect students' perceptions regardless of students' self-proficiency.

5. DISCUSSIONS

This study compared engineering students' perceptions of offline and online learning environments across LS, LEF, LA, and LAC and explored the influence of gender, academic year and self-proficiency. Interpreted through a humanities-based lens, these perceptions emerge from students' individual narratives and cultural contexts, blending cognitive evaluations with personal meaning-making. Online learning environments were consistently higher than offline environments, particularly for LS and LEF. This result aligns with constructivist principles, which emphasize learners' active role in constructing knowledge through self-directed exploration and

the utilization of diverse resources (Hadgraft & Kolmos, 2020). Online environments, characterized by flexibility and accessibility, provide opportunities for personalized learning and independence, enabling students to select and organize resources based on their individual needs (Nix et al., 2005). From a humanities perspective, these digital spaces also represent evolving cultural landscapes where learners negotiate identity, autonomy, and access to shared knowledge—potentially supporting educational fairness. Online environments can provide a wide range of learning resources to cultivate educational fairness. However, offline environments were preferred for hands-on activities, face-to-face interaction, and collaborative tasks, reflecting the constructivist emphasis on social learning and authentic contexts. In these embodied, interpersonal encounters, learning is enriched by nonverbal cues, empathic communication, and collective meaning-making, underscoring the humanistic value of community and presence. Meaningful learning often occurs through interaction with peers and instructors, where immediate feedback and real-time problem-solving play crucial roles (Soltani & Tran, 2023). For example, low-proficiency students in this study valued offline settings for their supportive atmosphere, which facilitated active participation and reduced anxiety, confirming the importance of scaffolding in fostering confidence and engagement. These findings illustrate how learning environments, whether virtual or physical, are imbued with emotional resonance and social significance. This confirm offline and online learning environments have different benefits (Landrum, 2020). Although gender differences were not statistically significant, females rated online environments slightly higher for LS and LEF. This may reflect gender preferences for learning support and accessibility, which align with the constructivist perspective that effective learning environments should accommodate diverse learner needs and backgrounds. A humanities-based view further recognizes that these preferences are shaped by social constructs of gender and the cultural narratives that inform identity and interaction. However, the mixed-repeated measures ANOVA suggests that learning environment plays a more critical role in perceptions. This finding aligns with Nguyen and Habók' findings, further confirming that gender did not significantly influence the EAP courses, suggesting that gender effects may vary depending on the learning context (Nguyen & Habók, 2022). There were no statistically significance differences based on academic year, but qualitative data indicated evolving preferences. Third-year students favored online environments due to their flexibility, which facilitated balancing

coursework with internships and other responsibilities. Conversely, fourth-year students preferred offline interactions for thesis preparation and career planning, emphasizing the importance of direct support. In humanistic terms, these transitions reflect how learners' educational journeys unfold over time, influenced by personal aspirations, shifting priorities, and social milestones. This aligns with research suggesting that students' needs evolve as they progress academically (Kohnke, 2024). It highlights the importance of tailoring course designs to meet the unique requirements of different academic stages, such as incorporating more personalized mentoring for senior students. Students' perceptions of learning environments are not influenced by their self-proficiency levels. However, qualitative insights reveal that low-proficiency students favored offline environments for their supportive atmosphere and accessibility, which fostered comfort and active participation. Mid-proficiency students appreciated the flexibility of online platforms for self-paced review but relied on offline settings for clarifying complex concepts. High-proficiency students preferred online environments for their independence and ability to focus without distractions (Cranfield et al., 2021). Viewed through a humanities-based framework, these differentiated preferences reflect learners' evolving identities, varied emotional landscapes, and the interplay of personal agency and communal support. Despite the differences, all students emphasized the importance of clear resources, structured activities, and accessible tools. The results underscore the need for tailored learning approaches and offline environments can provide additional support for low-proficiency students, while online platforms can cater to the autonomy of high-proficiency learners (Maheshwari, 2021).

6. CONCLUSIONS

This study examined engineering students' perceptions of offline and online learning environments. Beyond measuring attitudes, it illuminates the human dimensions of education, recognizing how cultural background, emotional well-being, and personal identity inform students' interactions with learning modalities. The findings indicate that students generally perceive online learning environments more positively, particularly for LS and LE, due to their flexibility and accessibility. Gender, academic year, and self-proficiency had no effects on perceptions, although specific preferences varied, such as low-proficiency students valuing offline support and high-proficiency students favoring online independence.

Academic year differences emphasized the need for tailored learning approaches, as third-year students preferred online learning for its adaptability, while fourth-year students required more direct support. This study contributes to the existing literature by highlighting differences in students' perceptions based on gender, academic year, and self-proficiency. A humanities-based stance encourages us to interpret these findings not merely as data points, but as lived realities situated within broader cultural and social narratives. However, limitations exist. The focus on engineering students within a specific academic context may restrict the generalizability of the findings. Future research could address this by exploring similar questions across different disciplines or cultural contexts to identify broader trends. Moreover, employing cross-cultural comparisons, longitudinal studies, or investigating new variables, such as social support and technological literacy, could provide deeper insights into how students' perceptions evolve over time. Ultimately, this holistic, humanities-informed perspective enriches our understanding of student learning, guiding the creation of empathetic, equitable, and contextually resonant educational environments.

7. AUTHOR CONTRIBUTIONS

Xiaoxiao Zhang designed the study, developed the methodology, collected the data, and drafted the manuscript. Chunyu Hou analyzed the data and revised the manuscript. Yanqing Xia revised the manuscript. All authors approved the final version of the manuscript.

8. ACKNOWLEDGMENTS

This work was supported by Henan University of Science and Technology, People's Republic of China. The university has no role in the design and implementation of this study. The authors are also grateful to the insightful comments suggested by the editor and the anonymous reviewers.

9. ETHICAL APPROVAL

The study obtained approval from the Research Ethical Board at research University. Although no specific approval number was assigned, the research was conducted in accordance with the ethical guidelines set

forth by the university. Simultaneously, in studies involving human participants, all procedures adhered to the ethical standards of the institutional and/or national research committee, as well as the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

9.1 Informed Consent

The researchers sought and gained the consent of the participants to take part in the study. 347 participants and eight students accepted and voluntarily participated in the study after the researchers assured them of anonymity and that their responses were solely for academic purposes.

9.2 Declaration Conflicts of Interest

No potential conflicts of interest was reported by the authors.

Data Availability Statement

The datasets generated and analyzed during the current study are available from the corresponding author on reasonable request.

References

Ahmed, Y., Taha, M. H., Al-Neel, S., & Gaffar, A. M. (2018). Students' perception of the learning environment and its relation to their study year and performance in Sudan. *International journal of medical education*, *9*, 145.

Airey, J. (2016). EAP, EMI or CLIL? In *The Routledge handbook of English for academic purposes* (pp. 71-83). Routledge.

Arnó-Macià, E., & Rueda-Ramos, C. (2011). Promoting reflection on science, technology, and society among engineering students through an EAP online learning environment. *Journal of English for Academic Purposes*, *10*(1), 19-31.

Athirah, G. I. (2024). Academic language-related challenges, self-reported proficiency, and academic success at an EMI university in Brunei. *Asian Englishes*, *26*(1), 195-215.

Cloete, R. (2015). Blending offline and online feedback on EAP writing. *Journal of Teaching English for Specific and Academic Purposes*, *2*(4), 559-571.

Cranfield, D. J., Tick, A., Venter, I. M., Blignaut, R. J., & Renaud, K. (2021). Higher education students' perceptions of online learning during COVID-19—A comparative study. *Education Sciences*, *11*(8), 403.

Du, J., & Alm, A. (2024). The impact of ChatGPT on English for academic purposes (EAP) students' language learning experience: A self-determination theory perspective. *Education Sciences*, *14*(7), 726.

Hadgraft, R. G., & Kolmos, A. (2020). Emerging learning environments in engineering education. *Australasian Journal of Engineering Education*, *25*(1), 3-16.

Kharroubi, S., & ElMediouni, A. (2024). Conceptual Review: Cultivating Learner Autonomy Through Self-Directed Learning & Self-Regulated Learning: A Socio-Constructivist Exploration. *International Journal of Language and Literary Studies*, *6*(2), 276-296.

Kohnke, L. (2024). Exploring EAP students' perceptions of GenAI and traditional grammar-checking tools for language learning. *Computers and Education: Artificial Intelligence*, *7*, 100279.

Kolari, S., Savander-Ranne, C., & Viskari, E.-L. (2008). Learning needs time and effort: a time-use study of engineering students. *European Journal of Engineering Education*, *33*(5-6), 483-498.

Landrum, B. (2020). Examining Students' Confidence to Learn Online, Self-Regulation Skills and Perceptions of Satisfaction and Usefulness of Online Classes. *Online Learning*, *24*(3), 128-146.

Lin, C. C., & Tsai, C. C. (2009). The relationships between students' conceptions of learning engineering and their preferences for classroom and laboratory learning environments. *Journal of Engineering Education*, *98*(2), 193-204.

Maheshwari, G. (2021). Factors affecting students' intentions to undertake online learning: an empirical study in Vietnam. *Education and Information Technologies*, *26*(6), 6629-6649.

Martínez Cartas, M. L. (2012). Using an improved virtual learning environment for engineering students. *European Journal of Engineering Education*, *37*(3), 229-241.

Miranda, J., Navarrete, C., Noguez, J., Molina-Espinosa, J.-M., Ramírez-Montoya, M.-S., Navarro-Tuch, S. A., Bustamante-Bello, M.-R., Rosas-Fernández, J.-B., & Molina, A. (2021). The core components of education 4.0 in higher education: Three case studies in engineering education. *Computers & Electrical Engineering*, *93*, 107278.

Nguyen, S. V., & Habók, A. (2022). Non-English major students' perceptions of aspects of their autonomous language learning. *Language Learning in Higher Education*, *12*(1), 231-253.

Nix, R. K., Fraser, B. J., & Ledbetter, C. E. (2005). Evaluating an integrated science learning environment using the Constructivist Learning Environment Survey. *Learning Environments Research*, *8*, 109-133.

Pack, A., Barrett, A., Liang, H.-N., & Monteiro, D. V. (2020). University EAP students' perceptions of using a prototype virtual reality learning environment to learn writing structure. *International Journal of Computer-Assisted Language Learning and Teaching (IJCALLT)*, *10*(1), 27-46.

Park, J., & Park, C. (2018). Effects of learning environment differences (on and offline vs. off line) on intermediate level learners' writing development. *Journal of English Teaching through Movies and Media*, *19*(2), 169-193.

Pei, L., & Wu, H. (2019). Does online learning work better than offline learning in undergraduate medical education? A systematic review and meta-analysis. *Medical education online*, *24*(1), 1666538.

Ramburuth, P., & Tani, M. (2009). The impact of culture on learning: Exploring student perceptions. *Multicultural Education & Technology Journal*, *3*(3), 182-195.

Rienties, B., Lewis, T., McFarlane, R., Nguyen, Q., & Toetenel, L. (2018). Analytics in online and offline language learning environments: the role of learning design

to understand student online engagement. *Computer Assisted Language Learning*, *31*(3), 273-293.

Samarakou, M., Fylladitakis, E., Fruh, W.-G., Hatziapostolou, A., & Gelegenis, J. J. (2015). An advanced eLearning environment developed for engineering learners. *International Journal of Emerging Technologies in Learning*, *10*(3), 22-33.

Soltani, B., & Tran, L. (2023). Examining space, silence, and agency in language socialization of an international student in the EAP and mainstream courses. *Tesol Quarterly*, *57*(2), 480-510.

Trenor, J. M., Yu, S. L., Waight, C. L., Zerda, K. S., & Sha, T. L. (2008). The relations of ethnicity to female engineering students' educational experiences and college and career plans in an ethnically diverse learning environment. *Journal of Engineering Education*, *97*(4), 449-465.

Wu, B., Lu, Z., & Yuan, R. (2024). Motivation for english medium instruction among chinese university students: The effect of gender, academic level, attitude and linguistic self-confidence. *The Asia-Pacific Education Researcher*, *33*(5), 1265-1273.

Yen, S.-C., Lo, Y., Lee, A., & Enriquez, J. (2018). Learning online, offline, and in-between: comparing student academic outcomes and course satisfaction in face-to-face, online, and blended teaching modalities. *Education and Information Technologies*, *23*, 2141-2153.