The Influence of Learning Experience on Silence in WhatsApp-Based English Classrooms: Insights from Computer Engineering Students

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ABSTRACT

Silence in online learning, particularly in WhatsApp-based classroom, is an essential yet underexplored aspect of student engagement, especially among Computer Engineering students. While traditional theories suggest that silence fosters reflection, in practice, it often leads to discomfort or passivity, highlighting a gap between theoretical expectations and classroom realities. This study employing a quantitative ex post facto design aims to address this discrepancy by exploring how Computer Engineering students perceive silence in WhatsApp-based English classroom, focusing on the influence of age, gender, class type, and learning experience. Data were collected through two questionnaires. The first one assessed learning experiences and the second one examined silence of students in WhatsApp-based English classrooms. The data analysis included descriptive statistics and non-parametric tests (Mann-Whitney U and Kruskal-Wallis H tests) using SPSS 27.00. The findings revealed that students generally perceived silence as a natural yet sometimes uncomfortable part of learning. Age significantly influenced students' comfort with silence, while gender and class type had minimal impact. Students with more experience in WhatsApp-based learning environment recognized reflective benefits of silence, whereas less experienced students tended to struggle with it. Despite this, both groups shared similar reasons for and discomfort with silence. The study concludes that while silence can support reflective learning, it may also cause discomfort due to students' hesitancy to interrupt discussions. To enhance engagement, the study suggests that teaching methods be adapted based on students' age and familiarity with the platform, ensuring that silence fosters meaningful learning rather than students' passivity.

Keywords: *WhatsApp-Based Classroom, Computer Engineering Students, Students' Silence*

INTRODUCTION

English language education has in recent years undergone significant transformation due to advancements in digital technology (Dia, 2024; Duraipandi & A Murugan, 2024) and the COVID-19 pandemic, which has necessitated the adaptation of online learning platforms by both educators and students (Ajani & Khoalenyane, 2023; Moorhouse & Kohnke, 2021; Salihagic & Akay, 2022). Among various platforms available, WhatsApp has become popular for educational purposes (Jailobaev et al., 2021), allowing teachers and students to communicate and collaborate instantly, regardless of their location. Its use spans diverse educational contexts, from primary education to higher education and supports both real-time and delayed learning activities (Amry, 2014; Nasution & Munandar, 2023; Nyasulu & Chawinga, 2019; Ujakpa et

al., 2018). Globally, educators have used WhatsApp to facilitate discussions, share learning materials, and promote collaborative learning (Udenze & Oshionebo, 2020), especially when traditional classroom settings are not feasible. In Indonesia, as internet access continues to improve, WhatsApp is increasingly used to teach English, making it a favored tool for online learning (Al Arief et al., 2021). However, this trend not only reflects a broader global movement towards integrating mobile technologies to overcome challenges in educational delivery but also brings with it new challenges, particularly in maintaining student engagement and addressing the nuances of communication (Lakshminarayanan et al., 2015). One notable issue is the phenomenon of silence in communication, where students may exhibit passive engagement or lack of response during interactions. This silence can be attributed to several factors, including the quality of the WhatsApp-based learning experience (Isti & Istikharoh, 2019; Nuryanti et al., 2021), the design of instructional activities (Ansori, 2018; Arifani, 2019), and the dynamics of group interactions (Annese et al., 2022; Rahmadi, 2020; Ujakpa et al., 2018).

Silence, often perceived negatively in traditional classroom settings, takes on different meanings in virtual spaces (Ho et al., 2023; Huynh & Adams, 2022; Nurjamin et al., 2023). The dual nature of silence in online learning environments poses a significant challenge, especially for computer engineering students engaged in WhatsApp-based English classes. On one side, silence can be a useful pause, giving students time to think and reflect (Huynh & Adams, 2022); on the other side, it can prevent active participation and involvement (Amichai-Hamburger et al., 2016; Tang et al., 2020). This problem is even more noticeable for technical students, who may find the open-ended and communicative parts of language learning unfamiliar and more difficult (Romadhon, 2023; Topalov et al., 2023). Research on technical students in digital environments shows that their silence during language tasks often reflects challenges in balancing their usual structured learning with the more unpredictable demands of communication (Leyaley, 2023; Singhal, 2022). They often struggle to balance the demands of their technical studies with the need to actively participate in language learning, leading to more frequent instances of silence in the classroom (Sikandar et al., 2023). Additionally, the pressure to communicate well in English, which is not the first language for most, makes their learning experience even harder, causing silence that may be wrongly seen as a lack of interest or engagement (Jin, 2017; Kaufmann & Vallade, 2022). Moreover, the concept of learning experience in this digital context involves not only the acquisition of knowledge but also the interactions and participation that occur within the online classroom (Entusiastik & Siregar, 2022; Rahmadi, 2020). For computer engineering students, who are typically accustomed to problem-solving in more structured environments (Cassel & Victor, 2015; Daniels et al., 2007), dealing with more flexible and often ambiguous nature of language learning in a WhatsApp group can be quite challenging.

Recent studies have highlighted that WhatsApp can enhance communication and collaboration in various educational contexts (Kurni & Saritha, 2021; Lee et al., 2023; Martínez et al., 2023), offering benefits such as increased flexibility and accessibility for facilitating interaction and supporting learning activities (Jackson, 2020; Ratminingsih et al., 2022; Wariyati et al., 2020). However, most studies have focused on general educational contexts like how it relates to student participation and learning results, such as group participation (Bagewadi, 2021; Biton & Segel, 2024; Nugroho, 2022) educational and social functions (Baishya & Maheshwari, 2020), teacher-student interaction (Mubaraq et al., 2023; Naghdipour & Manca, 2023; Najeed et al., 2022; Sari, 2024; Sason & Kellerman, 2021), student achievements (Alamer et al., 2023; Joy et al., 2020; Kamal et al., 2021; Ofori-Kusi & Tachie, 2022; Permana et al., 2021), rather than specific academic disciplines or detailed interaction patterns, such as silence.

In contrast, research addressing specific academic disciplines and detailed interaction patterns, such as silence, remains limited. Although there is a growing body of research on

student silence in traditional (Hanh, 2020; Juma et al., 2022; Rahmi, 2024; Sedova & Navratilova, 2020; Soltani & Tran, 2023; Tang et al., 2020) and online learning environments (Baticulon et al., 2021; Nurjamin et al., 2023; Nurrohmah & Waloyo, 2021; Zhou, 2021), there is a distinct lack of comprehensive studies addressing silence in messaging platforms like WhatsApp. The existing literature on WhatsApp in education has mostly focused on student engagement and communication, not on silence (Montero et al., 2022; Teng, 2024), especially among engineering students (Desai, 2021; Morsidi et al., 2021), who may feel uncomfortable expressing themselves in online settings (Devi et al., 2018). While WhatsApp is a useful tool for asynchronous communication (Susilo & Sofiarini, 2021; van den Berg & Mudau, 2022), it can lead to problems like delayed replies (Cronjé & van Zyl, 2022; Jain et al., 2019) and limited verbal participation (Ahmad et al., 2021; Tragant et al., 2022), which may contribute silence in group chats. However, silence in these digital classrooms, especially within WhatsApp-based English learning contexts, may also reflect deeper cognitive processing (Annamalai et al., 2024), hesitation (Tragant et al., 2022), or discomfort in expressing ideas (Suardi & Pratiwi, 2022). Despite this, there is limited research on how silence is affected by students' academic backgrounds and their experiences in WhatsApp-based classrooms.This gap highlights the need for more comprehensive studies that examine how factors such as academic background, familiarity with digital platforms, and class dynamics shape students' engagement and their perception of silence in this unique learning environment. Therefore, the primary objectives of this study are to explore how factors such as gender, age, and class type affect silence levels and to investigate the impact of different learning experiences on student silence in WhatsApp-based learning environments. To achieve these objectives, the study will be guided by the following research questions: 1) To what extent do computer engineering students see themselves as silent readers in WhatsApp-based English classrooms? ;2) Are there significant differences in the level of silence among students based on gender, age, and class type?; 3) Do different learning experiences in WhatsApp-based classrooms lead to variations in students' levels of silence? These questions will help in systematically investigating the phenomenon of silence among computer engineering students and provide a framework for understanding the factors influencing their engagement in a digital learning environment.

METHOD

This study employed a quantitative approach with an ex post facto design to investigate how the silence of computer engineering students relates to their learning experiences in a WhatsApp-based English classroom. Ex post facto research or after-fact research is a research design category in which the investigation begins after the fact occurs without interference from the researcher. The majority of social research, in contexts where it is impossible or not acceptable to manipulate the characteristics of human participants, is based on an ex post facto research design (Rasimin & Yusra, 2020). This design was preferred over experimental methods due to ethical and practical constraints, as it would be inappropriate to control personal characteristics like age, gender, and class type, which may affect students' participation and silence. Since the students' learning experiences had already taken place, this approach allows for a natural analysis of potential connections with classroom silence. The selection of variables such as age, gender, and class type are crucial because this study aims to capture diverse perspectives that may reveal distinct patterns in students' engagement and silence.

The study sample consisted of 112 computer engineering students, purposively recruited from University of Indraprasta PGRI, Jakarta, to meet specific criteria of the study. The participants included 72 students (64.3%) aged 20 or younger and 40 students (35.7%) aged 21 or older. In terms of gender distribution, there were 93 males (83%) and 19 females (17%). As for class type, 67 students (59.8%) attended a regular class, while 45 students (40.2%) attended an employee class. The recruitment focused on students actively participating in the WAG-

based classroom. This approach ensures the sample accurately represents the target population and offers meaningful insights into how student silence and engagement vary in this educational setting. Table 1 provides demographic information of the participants. Further, the study excluded students' language proficiency as a criterion because the online format of the test at the research site limited instructor supervision and compromised result accuracy. This exclusion provided insights into students' learning behaviors and interactions without potential biases from test accuracy concerns.

Table 1. Demographic information of participants

Characteristics	Category	Number	Percentage (%)
Age	≤ 20	72	64.3
	≥ 21	40	35.7
Gender	Male	93	83
	Female	19	17
Class type	Regular	67	59.8
	Employee	45	40.2

Data were collected using two questionnaires, both translated into Bahasa Indonesia to ensure participants' full understanding and accurate responses. Before completing the questionnaires, all participants were required to read and agree to a consent statement included at the beginning of each questionnaire, which indicated their willingness to participate in filling out the two pre-prepared questionnaires. These questionnaires, administered via Google Forms links, were adapted from valid and reliable instruments in previous research in similar contexts. While formal validity and reliability testing of the translated versions was not conducted due to study constraints, forward and backward translation by a bilingual expert helped maintain the credibility of the instruments. The first questionnaire, adapted from Hamad (2023), focused only on students' experiences with WhatsApp Group as a learning medium. Initially containing eight items, it was refined to seven after removing an irrelevant item. Responses were measured using a multi-item Likert scale ranging from 1 (Strongly Agree) to 5 (Strongly Disagree), allowing for detailed insights into students' perceptions and experiences. The second questionnaire, adapted from Ho et al. (2023), explored students' silence in the WhatsApp-based English classroom. It included four sections: responses to silence (4 items), reasons for silence (13 items), awkwardness of silence (1 item), and perceptions of silence and meaningful learning (2 items). Responses were assessed using a Likert scale from 1 (Always) to 6 (Never).

The collected data were first analysed using descriptive statistics to calculate the mean and standard deviation, which provided a critical overview of the central tendencies and variability in students' responses. The data were then categorized into three levels: low (1.00-3.20), moderate (3.23-4.20), and high (4.23-6.00) to enable clear comparisons across different groups. This step was essential in identifying the general patterns and extent of silence among computer engineering students in WhatsApp-based English lessons, both overall and in specific aspects. After assessing the normality of the data, non-parametric tests were applied due to the non-normal distribution. The choice of non-parametric tests is justified as they are more appropriate for analyzing ordinal data and are robust against violations of normality assumptions, making them suitable for the dataset. The Mann-Whitney U test was used to examine differences in student silence based on gender, age, and class type, while the Kruskal-Wallis H test was employed to assess variations in silence among students with different levels of WhatsApp-based learning experience. The analysis, conducted using SPSS 27.00, provided reliable insights into the factors influencing student silence in this digital learning environment.

RESULTS AND DISCUSSION
Results

This section presents and discusses the data in three subsections, each corresponding to a specific research question. The first subsection addresses findings related to the initial research question, followed by an analysis of the second research question in the second subsection. The final subsection covers results relevant to the third research question. This structure ensures a clear and systematic presentation of the study outcomes.

Perceived silence of computer engineering students in WhatsApp-based English classroom

The findings indicated that overall level of silence perceived by engineering students in WhatsApp-based English classroom was moderate, as reflected by the mean score of 3.86. A total of 72 students (64.3%) reported moderate level of silence in WhatsApp-based English classroom, with mean scores ranging from 3.25 – 4.20. As many as 24 students (21.4%) showed high level of silence in WhatsApp-based English classroom, with mean scores ranging from 4.25 – 6.00. Only 16 students (14.3%) reported low level of silence English in WAG classroom, with mean scores ranging from 2.50 – 3.20. This distribution suggests that on average students engage primarily as silent readers rather than active participants of WhatsApp-based English classroom (See Figure 1).
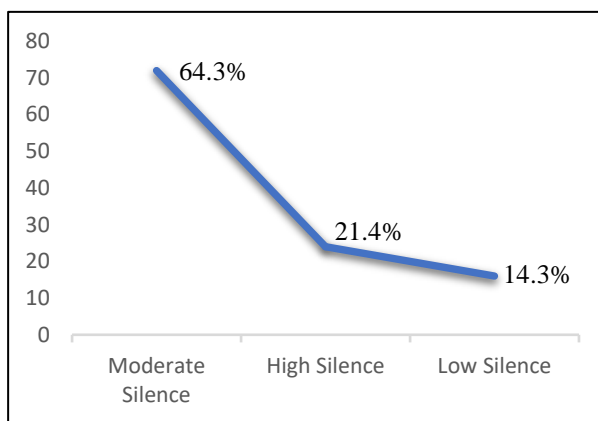

Figure 1. Overall Level of Students' Silence in WhatsApp-based English Classroom

Having measured the overall level of silence among students, it was time to analyse the four specific aspects of silence in the WhatsApp-based English classroom: (1) responses to silence as a common feature, (2) reasons for silence, (3) awkwardness of silence and (4) perceptions of silence and meaningful learning. The findings revealed that students reported moderate to high levels of perceived silence across these aspects, with moderate levels belonging to awkwardness of silence (M=4.14) and reasons for silence (M=3.55) and high levels belonging to response to silence as a common feature (M=4.59), perceptions of silence and meaningful learning (M=4.29). In descending order, the mean scores were as follows:
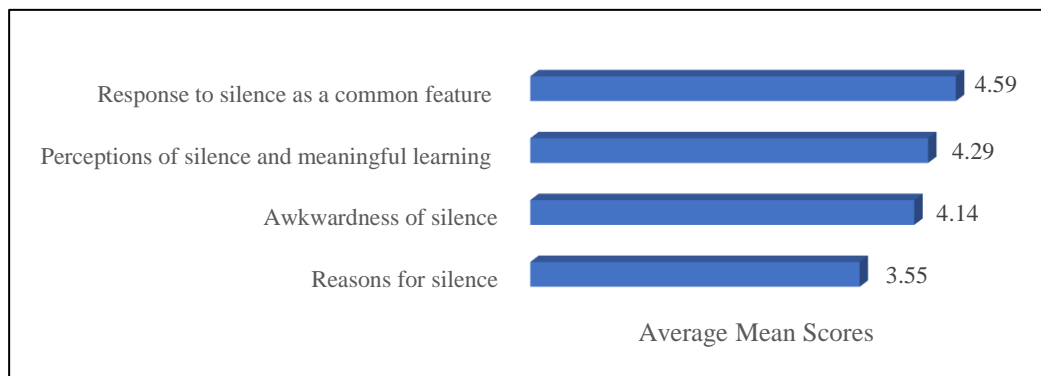

Figure 2. Aspects in Students' Perceived Silence in WhatsApp-Based English Classrooms

Moreover, the scores for individual items within each of four aspects of participants' silence in WhatsApp-based English classroom were detailed in descending order in tables 1–4. Regarding the first aspect, the students exhibited a high level of responses to silence as a common feature. As the data revealed, 86 (76.8%) participants showed a high level of response, whereas 21 (18.7%) participants had a medium level. Only 5 (4.5%) participants displayed a low level of responses (See Figure 3). The data further indicated that most participants considered their silence as a common practice. Table 2 displays 4 areas of responses to silence and the extent to which the students could perform them, perceiving silence as a natural component of WhatsApp-based English classroom.
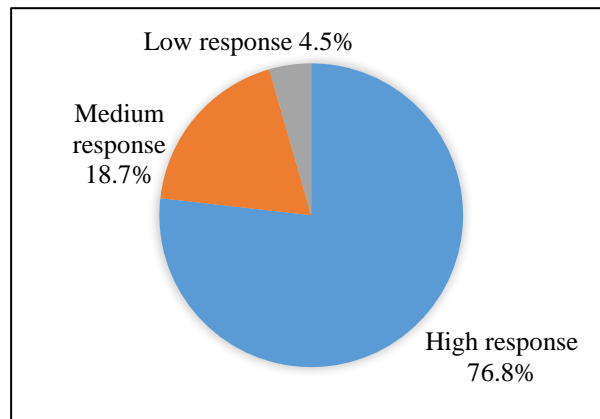

Figure 3. Level of Students' Responses to Silence in WhatsApp-Based English Classroom

Table 2. Responses to Silence as a Common Feature

	Items	M	SD
1	I find learning via a WAG classroom engaging	4.88	1.05
3	I feel confident about giving response in WAG classroom	4.52	1.14
2	I am interested in giving response in WAG classroom	4.51	1.14
4	I give answer whenever my lecturer asks questions in WAG classroom	4.47	1.03
	Avarage	4.59	0.87

The second aspect examined was the students' reasons for silence in WhatsApp-based English classroom. The data showed that, on average, the students displayed a low level of reasons for silence. More specifically, 27 (24.2%) students reported a high level of reasons for silence, 42 (37.5%) showed a medium level, and 43 (38.4%) displayed a low level of reasons for silence (see Figure 4). As presented in table 3, the primary reasons for students to be silent readers during WAG classroom were their reluctance to interrupt while materials were being explained and their preference for reading without responding to the teacher's explanation.
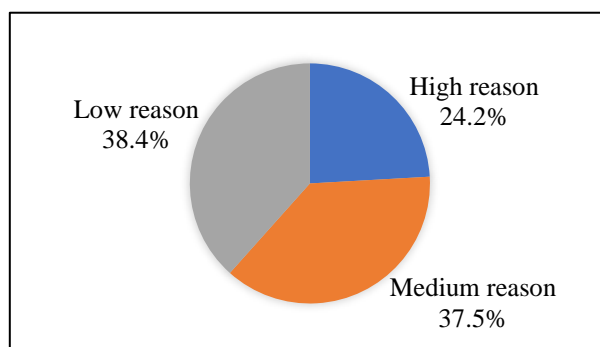

Figure 4. Level of Students' Reasons for Silence in WhatsApp-Based English Classroom

Table 3. Reasons for Silence

	Items	M	SD
7	I don't want to interrupt whilst my lecturer is giving explanation in WAG classroom	4.95	1.58
6	I prefer to read my lecturer explanations rather than verbally ask questions or make comments in WAG classroom	4.53	1.08
11	I prefer to wait for others to speak up before I do	4.18	1.22
9	If I give response, I think everyone's attention will be on me	3.89	1.52
18	I think misunderstandings frequently occur in WAG classroom interactions	3.81	1.44
17	I feel that it is more difficult to communicate efectively in WAG classroom than in offline classroom	3.44	1.69
10	I am unsure of the right moment to give response in WAG classroom	3.45	1.43
13	I don't give response because I don't know the material(s) well enough	3.28	1.31
8	I feel awkward about giving response in WAG classroom	3.02	1.43
16	I fear others will judge me if I give response in WAG classroom	2.99	1.61
15	I feel uncomfortable sharing my thoughts/ideas in WAG classroom	2.93	1.58
5	I feel less anxious in discussion in WAG classroom	2.87	1.38
14	I do not find the material(s) interesting enough to make any comments	2.84	1.44
	Average	3.55	0.88

The third aspect analysed was the students' awkwardness of silence in WhatsApp-based English classroom, as detailed in table 4. The data demonstrated that students fell into a high-level category. As the data revealed, as many as 44 (39.3%) students experienced a high level of awkwardness, 41 (36.6%) had a medium level and only 27 (24.1%) felt a low level of awkwardness of silence (see Figure 5). The findings suggest that the WAG environment may contribute to considerable discomfort during silent moments. Therefore, it would be helpful to understand and address what makes students feel awkward, making the learning experience more comfortable and engaging.
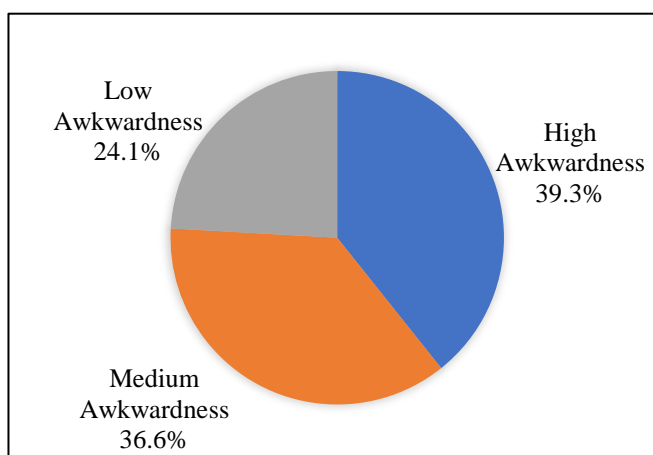

Figure 5. Level of Students' Awkwardness of Silence in WhatsApp-Based English Classroom

Table 4. Awkwardness of Silence

	Item	M	SD
12	I feel awkward when no one is giving answers when the lecturer asks questions	4.14	1.41
	Average	4.14	1.41

The last aspect explored was students' perceptions of silence and meaningful learning in WhatsApp-based English classroom. As the data revealed, 58 (51.8%) students showed a high level of perceptions, 34 (30.3%) had a medium perception, and 20 (17.8%) demonstrated a low level of perceptions (see Figure 6). Overall, the computer engineering students' perception of silence and meaningful learning in WhatsApp-based English classroom fell into a high-level category. The data further revealed that despite the challenges, participants recognize the potential benefits of silence for their online learning experience. Table 5 lists two statements and the extent to which the students could perceive their importance, showing that silence as an important part of meaningful learning in WhatsApp-based English classroom.
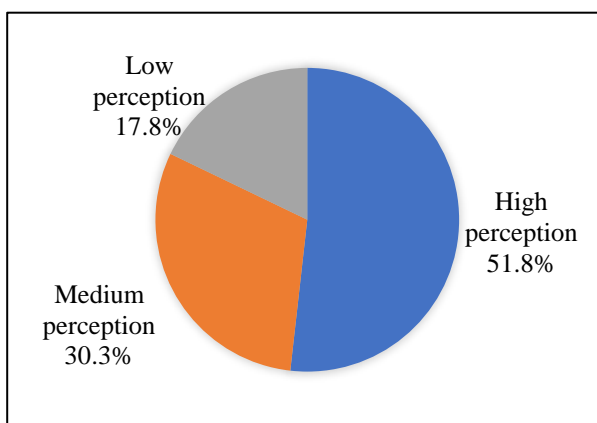

Figure 6. Level of Students' Perceptions of Silence and Meaningful Learning in WhatsApp Based English Classroom

Table 5. Perceptions of Silence and Meaningful Learning

	Items	M	SD
20	I think meaningful learning can still be achieved though I do not give response in WAG classroom	4.66	1.28
19	I receive more feedback from my lecturer in WAG classroom than in offline classroom	3.94	1.34
	Average	4.29	1.10

Patterns of Computer Engineering Students' Silence: Gender, Age, and Class Type Perspectives
After examining the extent of silence perceived by computer engineering students in their WhatsApp-based English classroom, and thus answered the first research question, a series of Mann-Whitney U tests was performed to find out any significant differences in four aspects of students' silence during WAG classroom in terms of gender, age and class type (see Table 6).

Table 6. Computer Engineering Students' Perceived Silence in WhatsApp-Based English Classroom: Differences in Gender, Age and Class Type

Aspect	Gender			Age			Class type		
	Mean rank		U/p	Mean rank		U/p	Mean rank		U/p
	Male	Female		≤ 20	≥ 21		Regular	Employee	
Responses to silence	54.47	66.45	694.500/.141	48.62	70.69	872.500/**.001***	51.51	63.92	1173.500/.046
Reasons for silence	57.23	52.92	815.500/.598	55.41	58.46	1361.500/.633	57.54	54.96	1483.000/.680
Awkwardness of silence	55.82	59.82	820.500/.613	56.68	56.18	1427.000/.935	58.70	53.22	1360.000/.365
Perceptions of silence and learning	56.57	56.16	877.000/.959	55.63	58.06	1377.500/.701	55.75	57.26	1457.000/.762

*: p < .05

With respect to aspect of response to silence as a common feature, the analysis revealed significant differences only in age variable ($U = 872.500$, $p = 001$). The mean rank of ≥ 21 group (70.69) was substantially higher than that of ≤ 20 group (48.62). It could mean that as students get older, their understanding and response to silence change, possibly showing greater comfort or deeper focus in the learning environment. In contrast, no significant differences were observed in the other variables: gender ($U = 694.500$, $p = .141$) with mean rank of 54.47 for males and 66.45 for females; class type ($U = 1173.500$, $p = .046$) with the mean rank of 51.51 for regular class students and 63.92 for employee class. These findings suggest that gender and class type do not significantly influence how students perceive or respond to silence in this digital learning environment, indicating a consistent engagement with silence across these demographic factors.

Next, the analysis of reasons for silence revealed no statistically significant differences across all examined variables. Specifically, gender ($U = 815.500$, $p = .598$) did not show a significant difference, with the mean rank of 57.23 for male and 52.92 for female. Similarly, age ($U = 1361.500$, $p = .633$) also did not yield a significant difference, with the mean rank of 55.41 for the ≤ 20 group and 58.46 for the ≥ 21 group. Lastly, class type ($U = 1483.000$, $p = .680$) showed identical mean ranks of 57.54 for both regular and employee classes. These findings suggest that students' reasons for silence are not significantly affected by gender, age, or class type, implying that other factors may play a more critical role in influencing students' experiences of silence in the WAG classroom.

In terms of awkwardness of silence, the analysis revealed no significant differences in the results from all variables: gender ($U = 820.500$, $p = .613$), with male students having a mean rank of 55.82 and female students 59.82; age ($U = 1427.000.935$, $p = .935$), with ≤ 20 group having a mean rank of 56.68 and ≥ 21 group 56.18; and class type ($U = 1360.000$, $p = .365$), with regular class students having a mean rank of 58.70 and employee class students 53.22. The lack of significant differences across analysed variables indicated that these demographic factors do not substantially influence how students experience awkwardness during silent periods in a WhatsApp-based English learning.

The analysis of the last aspect, perceptions of silence and meaningful learning, found no significant differences among variables. The results showed no substantial variation between gender ($U = 877.000$, $p = .959$) with the mean rank of 56.57 for male and 56.16 for female; age ($U = 1377.500$, $p = .701$) with the mean rank of 55.63 for students ≤ 20 years old and 58.06 for those ≥ 21 years old; and class type ($U = 1457.000$, $p = .762$) with the mean rank of 55.75 for regular class and 57.26 for employee class students. This uniformity in perceptions across diverse student groups implies that silence as a component of learning may be universally experienced, regardless of these demographic characteristics.

Variation in Computer Engineering Students' Silence by WhatsApp-Based Learning Experience Levels

The exploration of differences in four aspects of students' silence with their varying WAG-based English learning experience levels: low (n = 13), moderate (n = 59), and high (n = 40) revealed significant differences in two aspects, while the other two showed no significant differences. The detailed statistics, including mean ranks, χ^2 values, and *p*-values for all aspects, are provided in Table 7.

Table 7. Computer Engineering Students' Perceived Silence: Differences
in WAG Classroom Learning Experience

Aspects	Mean rank			χ^2	*P*
	Low	**Medium**	**High**		
Responses to silence	28.31	46.39	80.58	37.94	**.001***
Reasons for silence	74.08	54.25	54.11	4.31	.116
Awkwardness of silence	52.92	53.77	61.69	1.71	.426
Perceptions of silence and learning	43.19	47.95	73.44	17.57	**.001***

*: p < .05

Table 7 demonstrates significant differences in responses to silence as a common feature (χ^2 (2)= 37.94, *p* = .001) and perceptions of silence and meaningful learning in WhatsApp-based English class (χ^2 (2) = 17.57, *p* = .001) across the three WAG-based English learning experience levels. A pairwise comparison was then conducted to determine where these differences lay. The former showed significant differences between the low and high groups (*p* = .001) as well as between the moderate and high groups (*p* =.001), while no significant difference was observed between the low and moderate groups (*p* =.068). The latter demonstrated significant differences between the low and high groups (*p* =.003) and between the moderate and high groups (*p* =.001), with no significant difference between the low and moderate groups (*p* = .682). These findings suggest that students with higher WhatsApp-based learning experience are more aware of and accept of silence as a natural part of online classroom interactions. Furthermore, they may use silence as a reflective tool, enhancing their learning experience in ways that are not as apparent to those with lower and moderate experience. In conclusion, the findings introduce a new understanding that varying levels of engagement within WhatsApp-based English class can significantly influence how students perceive and respond to silence, highlighting an important area for further exploration in the context of digital learning environments. These findings also align with other studies that suggest more advanced learners have a deeper appreciation for the learning environment (Smith, 2020; Johnson & Lee, 2018).

In contrast to the significant differences observed in the previous aspects, the analysis of *reasons for silence* (χ^2 (2) = 4.31, *p* = .116) and *awkwardness of silence in* WhatsApp-based English class (χ^2 (2) = 1.71, *p* = .426) did not reveal statistically significant differences across varying levels of WhatsApp-based learning experience. However, an analysis of the mean ranks of these aspects offers additional insights. For reasons for silence, students with low experience tend to have a higher mean rank (74.08) compared to those with moderate (54.25) and high experience (54.11), indicating that newer students might find it harder to understand or explain why they stay silent. In terms of awkwardness of silence, as students gain more experience in these virtual classrooms, their sensitivity to the awkwardness of silence seems to increase, as indicated by the mean ranks increasing with experience: low (52.92), medium (53.77), and high (61.69). This pattern implies that as students become more accustomed to the WAG setting, they start to feel more uncomfortable with silence. These findings highlight the importance of considering experience levels when assessing student engagement in WhatsApp-based English

class and suggest that targeted strategies may be needed to help both new and experienced students deal with the challenges of silence in these settings more effectively.

Discussion

The results addressing the first Research Question reveal both alignment with and differences from previous research on silence in online learning environments. Consistent with Ho et al. (2023), this study found that engineering students often remain as silent readers, with 64.3% showing moderate levels of silence and 76.8% viewing silence as an inherent aspect of the learning environment. This finding is supported by Amur (2023) who claims that computer science students are silent during English language classrooms because of main factors like anxiety, lack of confidence, and L1 interference. This supports Ho's (2023) view that student silence is a prevalent issue in online classrooms, with learners often exhibiting low verbal participation. Besides, the results also match Nurrohmah & Waloyo's (2021) findings that EFL students often remain as silent readers in online classrooms. On the contrary, the findings diverge from another Ho's (2023) conclusion, linking student discomfort with silence to a lack of interactive features and delayed feedback. While this study observed significant discomfort (39.3%), it found that students' silence was more due to their reluctance to interrupt and preference for passive reading rather than issues with interactivity. Supporting this, Al-Ahmadi & King (2023) found that silence among EFL learners often stems from cultural communication preferences rather than the platform's interactive features, suggesting that students' silence may be culturally ingrained. This divergence highlights potential differences in the factors influencing students' discomfort with silence, indicating a need for further research to explore these factors in different online learning contexts.

This study's findings in response to the second Research Question reveal that age was the only significant factor influencing students' responses to silence in WhatsApp-based English classrooms, with older students demonstrating greater comfort and focus during silent periods. This finding underscores the influence of age-related cognitive and emotional development on the interpretation and utilization of silence. Similarly, as noted by Umino (2023), the silent period experienced by adult second language learners is not a period of incomprehension, but a struggle to find new ways for self-expression. Additionally, Ogawa et al., (2020) found that older students in technical classrooms display more quantitative and application-related capabilities compared to younger students. Contrarily, gender and class type did not show a significant impact on students' experiences with silence. This is further supported by Wang et al., (2023), who found no significant difference in online learning behaviors between genders, but differences in temporal patterns of activities. The implications of these findings advocate for the consideration of age-specific pedagogical strategies in online learning environments. However, the study's limitations, including a lack of geographical and cultural diversity, highlight the need for further research involving more varied samples and studies that track changes over time to gain a comprehensive understanding of how students' responses to silence evolve.

Moreover, this study examines how students' experience with WhatsApp-based English learning impacts their understanding and comfort with silence during online interactions, specifically addressing the third research question. The findings show that students with more experience using WhatsApp are more aware of and accepting of silence compared to their less experienced peers. This is backed by Akuratiya & Meddage (2020) who found IT students had a favourable perception of online learning during the COVID-19 pandemic in spite of challenges like reduced interaction and technical issues. In a similar context, this suggests that familiarity with WhatsApp may change how students perceive and react to silence in virtual classrooms. These findings are also backed by Huynh & Adams (2022), who noted that educators view silence differently, interpreting it as a thinking opportunity, an indication of uncertainty, or

conscious disengagement. However, the results contradict Deng & Jaganathan (2023), who claimed that experienced students in online EFL classes in China reported feeling more uncomfortable with silence due to student-related and online-related factors. Similarly, Cancino & Towle (2022) observed that EFL students had negative views toward online participation in fully online language learning, which can lead to feelings of isolation and discouragement, contrasting the comfort levels of experienced WhatsApp users in this study. These findings are crucial for developing better online education strategies but are limited by a small sample size and lack of long-term data. Future research should explore these issues in diverse settings and over longer periods to further validate and expand on the results of this study.

CONCLUSION

This study reveals key insights into how silence impacts online learning in WhatsApp-based classrooms. It confirms that engineering students often adopt a silent, passive approach, which supports the idea that silence can enhance reflective learning. These findings highlight the importance of fostering a culture that encourages active participation among technical students, as it can mitigate the negative aspects of silence and enhance their overall online learning experience. Contrary to previous research linking discomfort with issues like interactivity and slow feedback, our findings indicate that discomfort is primarily due to students' reluctance to interrupt and their preference for passive engagement. Age significantly influences how students perceive silence, with older students often perceiving it as an opportunity for deep reflection and focus, while younger students may feel discomfort due to their less developed learning approaches. Gender, though showing minimal impact, reveals subtle differences in how male and female students interpret silence, influenced by their communication preferences and confidence levels in sharing ideas online. Class type consisting of regular and employee students also affects how silence is experienced. Employee students generally show greater engagement due to professional communication experience. Additionally, students' familiarity with WhatsApp influences their comfort with silence. Those accustomed to the platform are more aware of nonverbal signals and asynchronous communication norms, making them more adaptable to silent moments in the learning process. These conclusions are important as they offer new perspectives on how various factors influence student interactions in digital learning environments. These findings suggest that educators should consider age-related differences when designing online courses and recognize that familiarity with specific platforms like WhatsApp can shape students' experiences with silence. By addressing these factors, educators can create more effective and inclusive online learning environments.

Furthermore, this study finds outs that while familiarity with WhatsApp can make students more at ease with silence, it can also make them more aware of small communication details, which could make them feel more uncomfortable. This challenges the typical belief that greater familiarity with digital tools always leads to greater comfort. The results suggest that online teaching should consider both the age of students and the unique features of different communication platforms. Educators might consider integrating features that help bridge the gap between familiarity and discomfort, such as tools that provide real-time feedback or interactive elements that encourage engagement without disrupting the learning flow. Additionally, these insights suggest that online learning environments could benefit from personalized approaches that adjust to individual comfort levels with silence and communication nuances. This study not only deepens our understanding of online learning but also points to innovative ways to enhance digital education by addressing these complex dynamics. For example, AI could help make communication more comfortable or provide customized support to reduce discomfort. This approach could redefine how educational

technology supports diverse learning needs and enhances the online learning experience by proactively addressing the nuanced effects of platform familiarity and silence.

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