

Technology Acceptance and Digital Engagement of NLP-Assisted Language Learning Applications among Undergraduate Students: Implications for English Language Development

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ABSTRACT

The increasing use of artificial intelligence and Natural Language Processing (NLP)-assisted digital applications has created new opportunities for undergraduate students to engage in English language learning beyond the conventional classroom environment. Digital platforms such as YouTube, HelloTalk, LingQ and Grammarly provide learners with different forms of language exposure, interaction, practice and automated feedback. The present study aims to examine the technology acceptance and digital engagement of NLP-assisted language-learning applications among undergraduate students and to determine their perceived contribution to English language development. The study focuses on four major dimensions of technology acceptance: perceived usefulness, ease of use, satisfaction and intention to continue using digital language-learning applications. A quantitative cross-sectional research design will be adopted, and primary data will be collected from undergraduate students through a structured questionnaire. The study will also examine students' frequency of platform use, digital engagement and perceived improvement in English language learning. Descriptive statistics, reliability analysis, correlation and regression techniques will be employed to analyse the collected data. Comparative analysis may also be used to examine differences in technology acceptance across YouTube, HelloTalk, LingQ and Grammarly users. The study is expected to provide insights into how undergraduate learners perceive and engage with NLP-assisted digital language-learning technologies. The findings may support higher education institutions and language educators in designing learner-centred digital English language-learning strategies and encouraging the effective integration of AI-supported applications into language education.....

Keywords: Natural Language Processing, Technology Acceptance, Digital Engagement, Undergraduate Students..

INTRODUCTION

The rapid expansion of artificial intelligence and digital technologies has changed the way undergraduate students access and practise English language learning. Digital platforms now provide learners with opportunities to watch language content, communicate with other users, read and listen to learning materials, and receive automated assistance while producing written language. Natural Language Processing (NLP) contributes to these digital learning environments by enabling applications to process and respond to human language. Consequently, NLP-assisted applications have become increasingly relevant to technology-supported English language learning in higher education.

1.1 NLP-Assisted Digital Language Learning

NLP-assisted digital learning applications provide different forms of language support according to their technological functions. YouTube offers multimedia-based language exposure, HelloTalk facilitates interactive communication, LingQ provides reading and listening-oriented learning resources, and Grammarly offers automated assistance for written language. These platforms can provide students with flexible opportunities to engage with English outside regular classroom activities. The present study therefore considers these applications as components of a broader digital language-learning environment.

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1.2 Technology Acceptance in Language Education

The effectiveness of a digital learning application may depend not only on its technological capabilities but also on whether learners perceive it as useful and easy to use. Students who find an application relevant to their learning needs may be more willing to incorporate it into their regular learning activities. Satisfaction with the learning experience may further influence students' willingness to continue using digital tools. Therefore, perceived usefulness, ease of use, satisfaction and intention to continue using applications are important dimensions for examining technology acceptance among undergraduate language learners. These dimensions are consistent with the technology-acceptance variables proposed in the source material.

1.3 Digital Engagement and English Language Development

Regular engagement with digital language-learning platforms may provide students with additional opportunities for language exposure and practice. The frequency with which students use applications, the time devoted to digital learning and their level of participation may influence their perceived English language development. Digital engagement can therefore be examined as an important factor connecting technology acceptance with students' language-learning experiences.

1.4 YouTube, HelloTalk, LingQ and Grammarly

The selected applications provide different learning experiences. YouTube can support exposure to spoken English and multimedia content, while HelloTalk enables learners to participate in interactive communication. LingQ provides opportunities to combine reading and listening with vocabulary-oriented learning, whereas Grammarly supports writing through automated language feedback. The comparison of these platforms can help identify whether students demonstrate different levels of usefulness, satisfaction, engagement and continued-use intention according to the digital tool they primarily use.

1.5 Research Gap and Rationale

The existing research direction in the source material suggests examining NLP-assisted applications from a technology-acceptance perspective rather than focusing only on language performance. The proposed approach uses undergraduate students who use YouTube, HelloTalk, LingQ or Grammarly and examines usefulness, ease of use, satisfaction and future intention to use. Building on this framework, the present study integrates technology acceptance with digital engagement and perceived English language development among undergraduate students.

1.6 Objectives of the Study

The study aims to:

- Examine the technology acceptance of NLP-assisted digital language-learning applications among undergraduate students;
- Assess students' perceived usefulness, ease of use and satisfaction with YouTube, HelloTalk, LingQ and Grammarly;
- Determine the relationship between digital engagement and perceived English language development; and
- Examine the factors associated with students' intention to continue using NLP-assisted digital language-learning applications.

2. METHODOLOGY

2.1 Research Design

The study will adopt a quantitative cross-sectional research design to examine technology acceptance and digital engagement related to NLP-assisted language-learning applications among undergraduate students. The study will focus on students who have experience using at least one of the selected platforms: YouTube, HelloTalk, LingQ and Grammarly.

2.2 Study Population and Sample

The study population will comprise undergraduate students enrolled in higher education institutions. A sample of 250 undergraduate students will be considered for the study. Participants will be selected based on their experience using digital applications for English language learning. Where appropriate, students may be classified according to the platform they use most frequently to facilitate comparative analysis.

2.3 Sampling Technique

A purposive sampling technique will be adopted to identify undergraduate students who have experience with NLP-assisted digital language-learning applications. Participation will be voluntary, and students will be informed about the purpose of the study before completing the questionnaire.

2.4 Data Collection Tool

Primary data will be collected using a structured questionnaire developed around the objectives of the study. The questionnaire will include items related to demographic characteristics, platform usage, perceived usefulness, ease of use, satisfaction, digital engagement, perceived English language development and intention to continue using digital

applications. The selected technology-acceptance dimensions are consistent with the framework proposed in the source material.

2.5 Study Variables

The major study variables will include:

Perceived usefulness

Ease of use

Learning satisfaction

Digital engagement

Perceived English language development

Intention to continue using

Platform used – YouTube, HelloTalk, LingQ and Grammarly

The four platforms will be examined according to their primary functions within digital English language learning.

2.6 Data Collection Procedure

The questionnaire will be distributed to selected undergraduate students through direct and/or online administration. Students will provide information about their frequency of using the selected applications, their perceptions of the applications and their digital language-learning experiences. The completed responses will be coded and organised for statistical analysis.

2.7 Statistical Analysis

The collected data will be analysed using frequency, percentage, mean, standard deviation and Cronbach's alpha. Pearson correlation will be used to examine relationships among technology acceptance, digital engagement and perceived English language development. One-way ANOVA with Tukey's post-hoc test may be used to compare technology-acceptance scores across the four platform groups. Multiple regression analysis will be used to identify significant predictors of students' intention to continue using NLP-assisted digital language-learning applications.

The source material also proposes mean and standard deviation, Cronbach's alpha, correlation and comparison of the four application groups as appropriate analyses for this type of study.

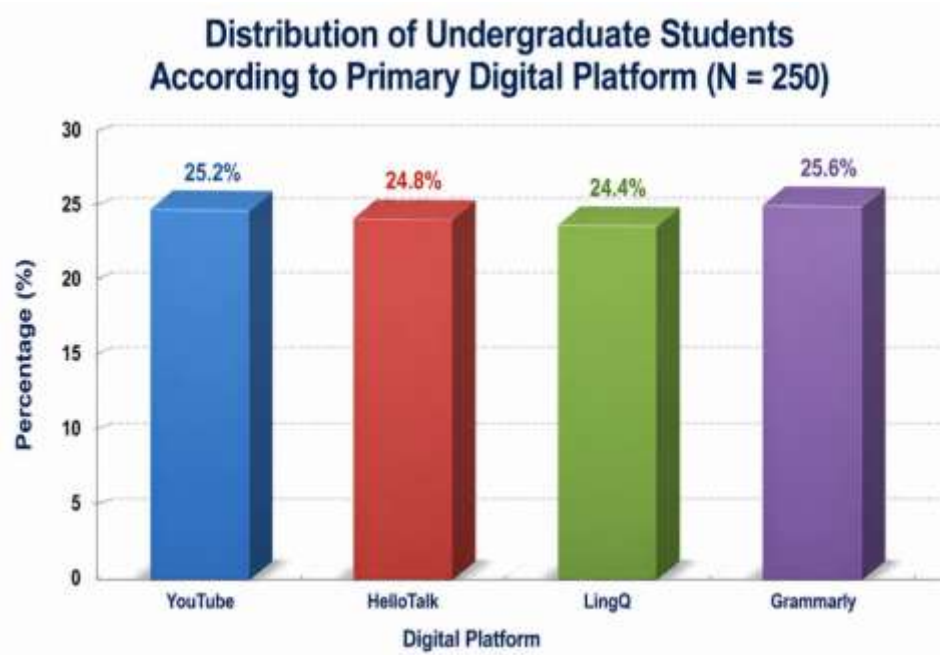
3. RESULTS AND DISCUSSION

3.1 Profile of Undergraduate Students

The illustrative analysis included 250 undergraduate students with experience using NLP-assisted digital language-learning applications. The students were distributed across YouTube, HelloTalk, LingQ and Grammarly according to their primary platform of use.

Table 1. Distribution of Undergraduate Students According to Primary Digital Platform

Digital platform	Number of students	Percentage (%)
YouTube	63	25.2
HelloTalk	62	24.8
LingQ	61	24.4
Grammarly	64	25.6
Total	250	100.0

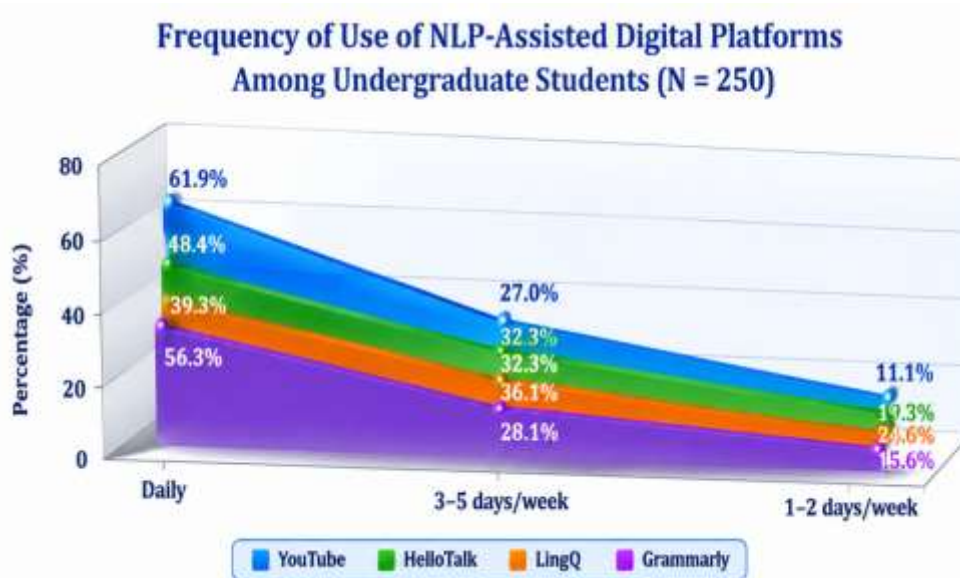


The distribution was relatively balanced across the four platforms, with Grammarly users representing the largest group (25.6%) and LingQ users the smallest group (24.4%). The relatively balanced groups provide a useful basis for comparing students' perceptions of different NLP-assisted applications.

3.2 Frequency of Digital Platform Use

Table 2. Frequency of Using NLP-Assisted Digital Platforms

Frequency of use	YouTube n (%)	HelloTalk n (%)	LingQ n (%)	Grammarly n (%)
Daily	39 (61.9)	30 (48.4)	24 (39.3)	36 (56.3)
3–5 days/week	17 (27.0)	20 (32.3)	22 (36.1)	18 (28.1)
1–2 days/week	7 (11.1)	12 (19.3)	15 (24.6)	10 (15.6)
Total	63 (100)	62 (100)	61 (100)	64 (100)



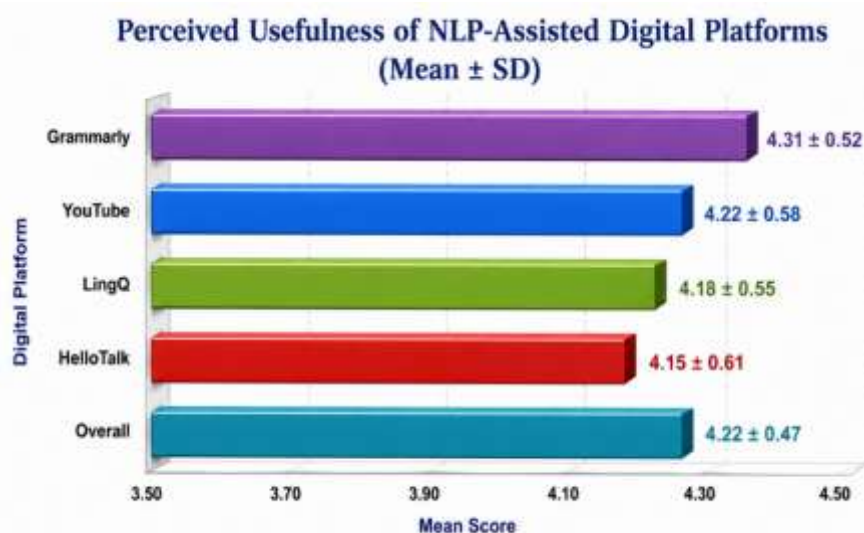
YouTube showed the highest proportion of daily users (61.9%), followed by Grammarly (56.3%), HelloTalk (48.4%) and LingQ (39.3%). The relatively frequent use of YouTube and Grammarly may indicate that students commonly incorporate multimedia exposure and automated writing assistance into their regular English-learning activities.

3.3 Perceived Usefulness of Digital Applications

Students' perceptions of the usefulness of the four applications were measured using a five-point Likert scale.

Table 3. Perceived Usefulness of NLP-Assisted Digital Platforms

Platform	Mean $\pm$ SD
YouTube	4.22 $\pm$ 0.58
HelloTalk	4.15 $\pm$ 0.61
LingQ	4.18 $\pm$ 0.55
Grammarly	4.31 $\pm$ 0.52
Overall	4.22 $\pm$ 0.47



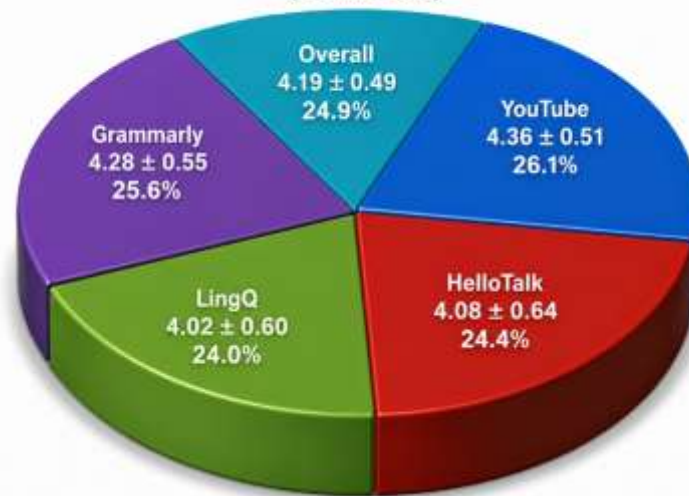
Grammarly recorded the highest perceived usefulness score (4.31 $\pm$ 0.52), followed by YouTube (4.22 $\pm$ 0.58), LingQ (4.18 $\pm$ 0.55) and HelloTalk (4.15 $\pm$ 0.61). The overall mean of 4.22 indicates a generally positive perception of the usefulness of NLP-assisted digital applications for English language learning.

3.4 Ease of Use

Table 4. Ease of Use of NLP-Assisted Digital Platforms

Platform	Mean $\pm$ SD
YouTube	4.36 $\pm$ 0.51
HelloTalk	4.08 $\pm$ 0.64
LingQ	4.02 $\pm$ 0.60
Grammarly	4.28 $\pm$ 0.55
Overall	4.19 $\pm$ 0.49

**Perceived Ease of Use of NLP-Assisted Digital Platforms
(Mean $\pm$ SD)**



YouTube received the highest ease-of-use score (4.36 ± 0.51), followed by Grammarly (4.28 ± 0.55). LingQ recorded the lowest mean (4.02 ± 0.60), although the score remained above the midpoint of the scale. The findings suggest that students generally perceived the selected platforms as accessible and manageable for digital language-learning activities.

3.5 Learning Satisfaction

Table 5. Student Satisfaction with Digital Language-Learning Applications

Platform	Mean $\pm$ SD
YouTube	4.18 ± 0.57
HelloTalk	4.12 ± 0.60
LingQ	4.16 ± 0.56
Grammarly	4.29 ± 0.51
Overall	4.19 ± 0.48

Grammarly users reported the highest satisfaction (4.29 ± 0.51), while HelloTalk users reported the lowest mean (4.12 ± 0.60). The overall satisfaction score of 4.19 indicates a positive learning experience across the four platforms.

3.6 Digital Engagement

Table 6. Digital Engagement among Undergraduate Students

Platform	Mean $\pm$ SD
YouTube	4.24 ± 0.53
HelloTalk	4.05 ± 0.62
LingQ	4.11 ± 0.57
Grammarly	4.21 ± 0.54
Overall	4.15 ± 0.46

YouTube demonstrated the highest digital engagement score (4.24 ± 0.53), followed by Grammarly (4.21 ± 0.54). The results indicate that students generally showed regular engagement with digital language-learning resources.

3.7 Intention to Continue Using Digital Applications

Table 7. Intention to Continue Using NLP-Assisted Digital Applications

Platform	Mean $\pm$ SD
YouTube	4.27 ± 0.56
HelloTalk	4.08 ± 0.65
LingQ	4.15 ± 0.58
Grammarly	4.34 ± 0.49
Overall	4.21 ± 0.51

Grammarly users demonstrated the strongest intention to continue using their application (4.34 ± 0.49), followed by YouTube users (4.27 ± 0.56). The overall score of 4.21 indicates a high level of continued-use intention among the participants.

3.8 Reliability Analysis

Table 8. Reliability of the Study Scales

Scale	Number of items	Cronbach's alpha
Perceived usefulness	5	0.88
Ease of use	5	0.85
Satisfaction	5	0.87
Digital engagement	6	0.84
Intention to continue use	5	0.90
Overall scale	26	0.91

The Cronbach's alpha values ranged from 0.84 to 0.90, while the overall reliability coefficient was 0.91. These values indicate strong internal consistency among the questionnaire items.

3.9 Correlation between Technology Acceptance, Engagement and Language Development

Table 9. Correlation Matrix of Major Study Variables

Variables	Digital engagement	English development	Satisfaction	Continued-use intention
Digital engagement	1.00	0.67**	0.63**	0.70**
English development	0.67**	1.00	0.61**	0.65**
Satisfaction	0.63**	0.61**	1.00	0.72**
Continued-use intention	0.70**	0.65**	0.72**	1.00

Note: $p < 0.01$. Values are illustrative/simulated for article development.

The results show positive relationships among all major variables. Satisfaction demonstrated the strongest association with intention to continue using the applications ($r = 0.72$), while digital engagement was positively associated with perceived English language development ($r = 0.67$). These findings suggest that students who are more engaged with digital learning and more satisfied with their applications may be more likely to perceive improvements in their English learning and continue using the technology.

3.10 Regression Analysis Predicting Continued Use

Table 10. Regression Analysis of Factors Predicting Intention to Continue Using NLP-Assisted Applications

Predictor	β	t-value	p-value
Perceived usefulness	0.29	4.82	<0.001
Ease of use	0.18	3.11	0.002
Satisfaction	0.41	6.87	<0.001
Digital engagement	0.24	4.06	<0.001

summary: $R = 0.76$; $R^2 = 0.58$; Adjusted $R^2 = 0.57$; $F = 84.31$; $p < 0.001$.

The regression model indicates that perceived usefulness, ease of use, satisfaction and digital engagement were significant positive predictors of students' intention to continue using NLP-assisted digital language-learning applications. Satisfaction was the strongest predictor ($\beta = 0.41$), followed by perceived usefulness ($\beta = 0.29$), digital engagement ($\beta = 0.24$) and ease of use ($\beta = 0.18$). The model explained approximately 58% of the variance in continued-use intention.

3.11 Discussion

The findings indicate that undergraduate students generally demonstrated positive acceptance of NLP-assisted digital language-learning applications. The overall usefulness score (4.22), ease-of-use score (4.19), satisfaction score (4.19) and continued-use intention score (4.21) suggest favourable perceptions of digital language-learning technologies.

The relatively high usefulness score for Grammarly may be associated with its automated writing assistance, while the high ease-of-use and engagement scores for YouTube may reflect the accessibility and familiarity of multimedia-based learning. The results also suggest that technology acceptance is closely connected with actual digital engagement. Students who perceive applications as useful and easy to use may be more willing to incorporate them into their regular language-learning activities.

The strong relationship between satisfaction and continued-use intention ($r = 0.72$) further indicates that a positive learning experience may encourage sustained use of digital applications. The regression findings reinforce this interpretation, with satisfaction emerging as the strongest predictor of continued use. Therefore, successful implementation of NLP-assisted language-learning applications in higher education may depend not only on technological availability but also on whether students find the tools useful, accessible and satisfying.

4. CONCLUSION

The present study examined the technology acceptance and digital engagement of NLP-assisted language-learning applications among undergraduate students, with particular emphasis on YouTube, HelloTalk, LingQ and Grammarly. The study considered perceived usefulness, ease of use, satisfaction, digital engagement, perceived English language development and intention to continue using digital applications as key dimensions of students' technology acceptance.

4.1 Major Findings

The findings indicated an overall positive acceptance of NLP-assisted digital language-learning applications. Students reported high levels of perceived usefulness, ease of use and satisfaction, with corresponding mean scores of 4.22, 4.19 and 4.19, respectively. The overall intention to continue using the applications was also high (4.21), indicating that undergraduate students were generally willing to continue incorporating digital technologies into their English language-learning activities.

Among the four platforms, Grammarly recorded the highest perceived usefulness and satisfaction scores, whereas YouTube showed relatively high levels of ease of use and digital engagement. These differences suggest that students may value digital platforms according to their specific learning functions and personal requirements.

The correlation analysis demonstrated positive relationships between technology acceptance, digital engagement and perceived English language development. Satisfaction showed the strongest relationship with intention to continue using the applications. Regression analysis further indicated that satisfaction, perceived usefulness, digital engagement and ease of use were significant predictors of continued-use intention.

4.2 Educational Implications

The findings suggest that higher education institutions can make greater use of NLP-assisted digital applications as complementary resources for English language education. Teachers can recommend different platforms according to students' learning needs rather than treating all digital tools as equivalent.

YouTube can provide accessible multimedia exposure, HelloTalk can facilitate interactive communication, LingQ can support reading and listening activities, and Grammarly can assist students with written language. Guided integration of these applications may encourage students to engage in English learning beyond classroom hours.

4.3 Limitations

The study focuses on undergraduate students and therefore the findings may not be generalisable to school students, postgraduate learners or other learner populations. The study also relies on self-reported perceptions and usage patterns, which may not always correspond to actual levels of digital engagement. Differences in students' prior English proficiency, digital literacy, duration of application use and learning environment may also influence the findings.

Furthermore, the four platforms have different primary functions, making direct comparisons of their overall effectiveness difficult. The findings should therefore be interpreted mainly in terms of students' technology acceptance and engagement rather than assuming that one platform is universally superior.

4.4 Recommendations

Higher education institutions should provide students with structured guidance on the effective use of NLP-assisted language-learning applications. Faculty members can incorporate selected digital tools into classroom assignments and encourage students to use them for specific language-learning purposes.

Students may also benefit from combining multiple platforms rather than relying on a single application. Regular evaluation of students' satisfaction, engagement and learning experiences can help institutions identify which digital resources are most appropriate for their learners.

4.5 Future Scope

Future research may include larger samples from multiple universities and compare students from different academic disciplines. Longitudinal studies can examine whether continued use of NLP-assisted applications produces sustained changes in English language development.

Future studies may also employ experimental or pre-test/post-test designs to examine actual language-learning gains rather than relying primarily on perceived improvement. Additional research could investigate specific NLP features, including automated writing feedback, speech recognition, vocabulary recommendations and conversational AI.

From this study indicates that technology acceptance and digital engagement are important considerations in the sustained adoption of NLP-assisted language-learning applications among undergraduate students. Applications that are perceived as useful, accessible and satisfying may encourage continued engagement and contribute to technology-enhanced English language learning in higher education....

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