AI-Related Language Learning Practice and Second Language Investment: Quantitative Evidence from Yemeni Postgraduate Students in India

WAGDI RASHAD ALI BIN-HADY[1*]
AMAL ABDELSATTAR METWALLY[2]
[1]*Department of English, College of Education, Humanities and Applied Sciences, Hadhramout University, Yemen*
[2]*Department of Translation, College of Languages and Translation, King Khalid University, Saudi Arabia*
***Corresponding author email: wagdyrashad@hu.edu.ye**

Article information
Article history:
Received: 30 Mar 2026
Last revised: 18 Oct 2026
Accepted: 22 Oct 2026
Available online: 27 Oct 2026

Keywords:
Artificial intelligence
Correlation
India
Perspectives
Second language investment
YPSs

Abstract

Second language (L2) investment is shaped by multifaceted interaction of identity, capital, and ideology. Despite the growing use of artificial intelligence (AI) in language learning, little quantitative research has examined whether AI-related language learning practices are associated with perceived second language (L2) investment among international students. This study bridges this gap by investigating the perceived usefulness of AI-related tools for language learning, learners' perceived L2 investment, the relationship between these two constructs, and whether English-major and non-English-major Yemeni postgraduate students (YPSs) differ in their perceptions towards L2 investment. A closed-ended questionnaire was administrated to a convenience sample of 78 YPSs studying in India. The results revealed a high level of AI usefulness for English language learning (M = 4.02), and a high level of perceived L2 investment (M = 4.14) among YPSs in India. Across the three dimensions of L2 investment, L2 Capital received the highest mean score (M = 4.27), followed by L2 Ideology (M = 4.14), and L2 identity (M = 4.02). The results further revealed the existence of a strong, positive, and statistically significant correlation between the self-reported AI-related language learning practices and perceived L2 investment ($r = .669$, $p < .001$). Notably, the Mann-Whitney U test indicated no statistically significant difference in perceived L2 investment between the perceptions of English-major and non-English-major YPSs ($U = 634.00$, $p = .880$). The findings provide quantitative evidence that AI-related language learning practices are positively associated with postgraduate L2 investment, showing greater emphasis placed on the instrumental and socio-economic value of English than on identity-related aspects.

INTRODUCTION

Artificial intelligence (AI) has revolutionized learning English as a Foreign Language (EFL) by providing innovative tools that enhance language learning (Negrila, 2023). Automatic

Speech Recognition (ASR), for example, provides learners with precise corrective feedback on pronunciation to promote intelligibility (Evers & Chen, 2022). Other AI-powered applications, such as Duolingo and Speak, facilitate language acquisition learning by enabling L2 learners to seamlessly code-switch between their native language (L1) and English (Strielkowski et al., 2025). Additionally, AI-powered platforms such as ELSA Speak, ELAi app, and Lyra Virtual Assistant support EFL learners' pronunciation by detecting their errors, providing personalized comprehensive feedback, and creating opportunities for conversing in English (Aryanti & Santosa, 2024). Despite these pedagogical benefits, little is known about how international postgraduate scholars perceive and engage in AI-related language learning practices, especially in multicultural contexts.

Second language (L2) learners bring their local varieties of English to the English classrooms, leveraging them to perform multilingual identity (Zhang & Gonzales, 2025). They invest efforts in their L2 abilities, a concept referred to as "language investment", which encompasses the deliberate actions that EFL learners take to enhance their language abilities in the second/target language (Dauzón-Ledesma & Izquierdo, 2023). When learners believe that engaging in language and literacy practices will help them extend their material resources, they are more likely to invest in these activities, ultimately accumulating cultural capital and social influence (Norton Peirce, 1995). L2 investment has been associated with a range of factors, including imagined identity (Fan et al., 2025; Wu, 2017), L2 identity development (Vasilopoulos, 2015), and pre-service teachers' education (Zhang, 2024, 2025). Given the scarcity of previous studies that explore the intersection between AI-related language learning tools and L2 investment, this study addresses this research gap by examining whether these tools correlate with perceived L2 investment among YPSs studying in India. While prior studies have predominantly employed qualitative design (Echavarría, 2022; Wu, 2017) or theoretical paradigms (Pittaway, 2004; Zhang, 2025) to explore L2 investment, a noticeable gap exists in examining this construct quantitatively. Furthermore, the majority of reviewed studies on L2 investment examined undergraduate students (Echeverri-Sucerquia et al., 2025; Zhang, 2024), leaving undergraduate students, especially from the Global South underrepresented. These methodological voids underscore the distinct niche that our study occupies in quantitatively examining L2 investment among Yemeni postgraduate students navigating English-medium higher education in India.

Previous studies explored L2 investment across various educational and geographical contexts. Vasilopoulos (2015) studied L2 investment and identity in the Korean EFL context. Zhang (2024) explored the divesting of investment from learning and teaching in the Chinese settings. Zhang (2025) investigated the challenges of first language (L1) on EFL monolingual identity in the German context. Dauzón-Ledesma and Izquierdo (2023) explored L2 investment in the Mexican settings. However, these studies have largely focused on East Asian, Latin American, and European contexts, leaving Middle Eastern mobility underexplored. There is a crucial need to explore L2 investment of postgraduate scholars from the Global South, particularly YPSs navigating English-medium education in the Indian higher education context, as their Arabic L1 represents a configuration not yet investigated in prior research. The current study addresses the following questions:

1. To what extent do YPSs in India perceive AI tools as useful for their English learning?
2. To what extent do YPSs in India perceive L2 investment?
3. Are self-reported AI-related language learning practices among YPSs in India statistically associated with perceived L2 investment?
4. Is there a significant difference in perceived L2 investment between English-major and non-English-major YPSs?

LITERATURE REVIEW

Artificial intelligence (AI) in second language learning (L2)

The integration of AI into L2 education represents a profound change in both pedagogy and learner experience (Metwally & Bin-Hady, 2025). Early AI applications were limited to narrow functions such as basic grammar correction or vocabulary drilling. However, with advancements in machine learning, natural language processing, and adaptive algorithms, contemporary AI tools can analyze learner input, predict problem areas, and adjust instruction dynamically (Strielkowski et al., 2025). These innovations have shifted language teaching away from the one-style model toward individualized, data-informed learning pathways (Thompson & Harris, 2025).

AI technologies in L2 learning now span multiple domains. ASR, for instance, supports pronunciation training, while automated writing provides evaluation for grammar and style feedback. Intelligent reading systems curate personalized texts, and adaptive vocabulary trainers that prioritize lexical items according to learner needs (Liao et al., 2025). Furthermore, Strielkowski et al. (2025) highlight the role of conversational chatbots and virtual agents in scaffolding dialogues that not only promote fluency but also reduce learner anxiety.

Empirical studies demonstrate the effectiveness of AI tools in improving vocabulary retention, grammar accuracy, and listening comprehension (Alrasheedi, 2024; Liao et al., 2025). Adaptive systems can detect at-risk learners early and provide targeted interventions, a practice known as “precision education” (Baker & Smith, 2019). This capacity for personalization is particularly valuable in contexts with high student-to-teacher ratios, where individualized feedback is otherwise difficult to provide. In turn, such affordances are motivational for EFL learners to actively engage with English learning.

Nonetheless, many AI designs remain technocentric, emphasizing quantifiable linguistic gains over sociocultural and identity-based learning outcomes (Strielkowski et al., 2025). There are also legitimate concerns about data privacy, algorithmic bias, and the potential marginalization of non-dominant language varieties (Chonka et al., 2023). In multilingual and multicultural settings, the homogenization of AI language models can unintentionally reinforce linguistic hierarchies (Sourati et al., 2026). These concerns highlight the importance of understanding how learners perceive the usefulness of AI tools within their specific linguistic and educational contexts. Given that learners are the cornerstone of the learning processes, examining their self-reported experience of adopting AI tools in language learning practice is inevitable

(Ali et al., 2025). Accordingly, the presents study examines the perceptions of YPSs in India, who rely extensively on English for academic communication in a multilingual educational setting.

Language learning investment (LLI)

Peirce (1995) introduced language learning investment (LLI) as a lens to understand language learning as a socially situated process rather than solely a psychological phenomenon like motivation. Investment reflects the learner's commitment of time, energy, and resources toward L2 learning in anticipation of both tangible and intangible returns (Darvin & Norton, 2015). These returns include economic capital (i.e., employment opportunities), cultural capital (i.e., educational advancement), social capital (i.e., networks and relationships), and symbolic capital (i.e., prestige) (Bourdieu, 1991, as cited in Soltanian et al., 2019). Soltanian et al. (2019) illustrated that while motivation and aspirations often correlate, identity and ideology can significantly affect learner persistence. For example, even highly motivated learners may disengage if classroom discourse marginalizes their identities or devalues their linguistic varieties. As YPSs in India are studying in a diverse linguistic and social environment, this necessitates examining factors that may intersect with L2 investment, notably self-reported language learning practices. Significantly, empirical evidence corroborates these dynamics. Echeverri-Sucerquia et al. (2025) found that undergraduates with greater symbolic capital, such as academic prestige, exhibited higher L2 investment. Llaban and Protacio (2025) similarly observed that the availability of resources and alignment with learner identity play a critical role in sustaining engagement-reinforcing Darvin and Norton's (2015) triadic framework of identity, capital, and ideology. Yet, Dauzón-Ledesma and Izquierdo (2023) explored the learning investment of 42 Mexican undergraduates in compulsory English course. Their findings demonstrated that while motivation and engagement were evident, agency and necessity were not, suggesting that institutional mandates may not be transferred into sustainable or holistic investment. Critically, the distinction between motivation and investment carries divergent pedagogical implications: whereas motivation research (e.g., Dörnyei & Ryan, 2015), focuses on learners' internal drives, investment foregrounds external structures and inequalities. Fan et al. (2025) suggest a synergistic framework integrating the two, noting that learners' imagined identities are influenced by both personal aspirations and structural realities. Given LLI's inherent dynamism and contextual dependent sensitivity–fluctuating with changes in personal, policy contexts, and sociopolitical shifts–it provides an appropriate lens for examining whether self-reported AI-related language learning practices are associated with perceived L2 investment among transient populations such as YPSs in India.

Identity, capital, and ideology in L2 investment

Darvin and Norton's (2015) model positioned identity, capital, and ideology as interdependent forces shaping L2 investment. Identity is "how a person understands his or her relationship to the world, how that relationship is structured across time and space, and how the person understands possibilities for the future" (Norton, 2013, p. 45). As such, identity is seen as a dynamic construct negotiated across time and space (Norton, 2013). Learners are active agents who navigate linguistic communities based on how their identities are recognized and valued (Echeverri-Sucerquia et al., 2025).

Capital, following Bourdieu (1991), included economic, cultural, and social resources that determine access to language learning opportunities and the value of those opportunities in specific contexts. Capital represents a form of power that spans material/economic dimensions (such as property, wealth, and income), cultural dimensions (including educational credentials, knowledge, and appreciation of cultural forms like local varieties of English), and social dimensions (exemplified by connections to power networks, such as student-teacher relationships) (Darvin & Norton, 2015). Echeverri-Sucerquia et al. (2025) demonstrated that symbolic capital, such as institutional recognition, correlates strongly with L2 investment, though the value of such capital varies across domains.

Ideology dictates which identities and forms of capital are legitimized. It is a complex and layered space in which a normative set of competing, dominant, residual, and marginal ideas operate. These beliefs heavily impact learners' cultural identities (Creese & Blackledge, 2015). Soltanian et al. (2019) noted that such ideologies can both encourage investment by enhancing the perceived value of English and deter it by fostering linguistic insecurity. Fan et al. (2025) further expanded this by highlighting imagined identities, aspirational self-concepts that guide investment. According to their study, these can be undermined by structural barriers, such as exclusion from high-prestige networks. Building on this perspective, the current study suggests that for marginalized learners, identity negotiation often involves strategic adoption or resistance to dominant language norms. Moreover, in AI-mediated contexts, this makes culturally aware design essential; otherwise, technological tools risk replicating existing inequalities.

AI and L2 investment: Bridging technology and sociolinguistics

AI can be a powerful mediator of L2 investment by expanding learners' access to linguistic, cultural, and social capital. AI-supported applications, including pronunciation training using ASR and personalized reading platforms, can align language development with learners' professional and personal goals (Liao et al., 2025). Such exposure to diverse registers and discourse communities supports Darvin and Norton's (2015) ideas that access to resources shapes learner investment and intercultural competence and mirrors findings on the importance of symbolic and cultural capital in sustaining engagement (Echeverri-Sucerquia et al., 2025). Beyond linguistic development, AI may facilitate global peer-to-peer exchanges through virtual classrooms, where learners from different countries collaborate on projects in various learning environments, and international networking opportunities (Fan et al., 2025). Such affordances suggest that AI-related language practices not only build learners' linguistic capital but also expand their social capital by creating international academic and professional networks that learners might not otherwise access (Echeverri-Sucerquia et al., 2025). However, the relationship is not always positive. AI system may privilege dominant language norms, unintentionally excluding non-standard varieties due to their lack of sociolinguistic sensitivity (Evers & Chen, 2020). Consequently, AI design should ensure embedding sociolinguistic awareness, validate translanguaging practices and incorporating culturally diverse content to mitigate this risk (Creese & Blackledge, 2015). When AI is intentionally designed to acknowledge and celebrate linguistic diversity, not only can it enhance language proficiency, but it can also strengthen learner's perceived legitimacy within

global discourse communities (Chonka et al., 2023). Critically, learners' investment depends not only on availability of resources per se but also on whether those resources resonate with their actual and imagined identities. This imperative suggests that AI design must go beyond functional efficiency to actively affirm learner agency and cultural identity (Fan et al., 2025). Despite these theoretical underpinnings, empirical evidence that directly investigates the relationships between self-reported AI-related language learning practices and perceived L2 investment among a group of postgraduate scholars studying in a second/foreign language context remains limited.

YPSs and Indian contexts in L2 investment

YPSs pursuing higher education in India navigate a complex interplay of transnational mobility, multilingualism, and socio-political influences. While many arrive with prior exposure to English through formal education, media, or international communication, their linguistic repertoires remain fundamentally rooted in Arabic and Yemeni dialects. In the Indian academic environment, English functions as a lingua franca, especially in postgraduate programs, serving both as the essential medium of instruction and as a key pathway to accessing symbolic and economic capital (Evers & Chen, 2020; Norton, 2013).

The investment of Yemeni learners in English is shaped by both structural and ideological forces. Institutional policies in India often privilege English-medium instruction, reinforcing the language's prestige and perceived utility for academic and professional advancement (Soltanian et al., 2019). At the same time, learners may experience linguistic marginalization when their speech diverges from dominant English varieties (Creese & Blackledge, 2015; Evers & Chen, 2020). Consequently, learners are encouraged to improve their proficiency regardless of the constrains or opportunities within their learning environment. AI offers affordances that could help mediate these challenges by providing personalized feedback, supporting pronunciation development, and reducing anxiety, thereby enabling learners to adapt to disciplinary discourse without the potential stigma associated with human error correction (Liao et al., 2025). Rather than perceiving AI solely as a language-learning technology, scholars have framed it as a means of enhancing AI-enabled virtual learning environments, thereby expanding access to social and cultural capital beyond local contexts (Echeverri-Sucerquia et al., 2025). Therefore, AI can be viewed as a source for consolidating learners' perceived L2 investment by supporting their identity, reinforcing their ideology and facilitating access to valued forms of capital. In sum, the intersection of Yemeni learners' linguistic heritage, the Indian higher education context, and AI-supported language learning creates a distinctive space for L2 investment–one that merits empirical investigation into whether self-reported AI-related language learning practices are associated with L2 investment. Given the limited quantitative evidence examining this intersection among Yemen scholars through the lens of identity, capital, and ideology, the present study seeks to provide valuable insights and contribute to the understanding of how AI may support learners' investment in their English learning.

Theoretical framework

This study examines the relationship between AI-related language-learning practices and perceived L2 investment (Figure 1). Therefore, this study is grounded in two frameworks: critical digital literacy (CDL) and L2 investment. CDL investigates how learners understand their use of AI tools, including issues of power, bias, and agency in digital spaces (Zhang & Dikilitaş, 2025). CDL is regarded as an essential prerequisite for L2 learners seeking to use AI productively in AI-based environments (Jiang & Gu, 2025). In this study, CDL is operationalized as the ways YPSs analyze, critique, and assess English language practice in AI based environments. This framework helps analyze the Yemen postgraduate scholars' perceptions of the usefulness of AI tools in English practice (RQ1).

For the second dimension, the study draws on Darvin and Norton's (2015) sociocultural model of investment, which conceptualizes L2 investment as emerging through the dynamic interaction of ideology (belief and power relations that shape language learning), identity (how learners see themselves and want to be recognized), and capital (benefits gain from language learning) within specific social and cultural contexts. These three constructs jointly shape how language learners gain access to social, symbolic and linguistic resources while communicating with others. This model helps analyze the YPSs' perceptions of L2 investment (RQ2), and how perceived L2 investment differs across gender (RQ4). Incorporating the CDL and L2 investment frameworks further enable analysis of the association between AI-related language practices and perceived L2 investment (RQ3). Additionally, whereas CDL offers a lens for understanding how L2 learners perceive and engage with AI tools including bias, limitations, usefulness and agency (Liu et al., 2025), L2 investment provides a background for understanding how learners engage with English in relation to their identity, ideology and capital. Together, integrating these models helps clarify whether Yemeni L2 scholars' reported AI-related language practices are associated with their perceived L2 investment while learning English or not. The relationship is presented in Table 2.

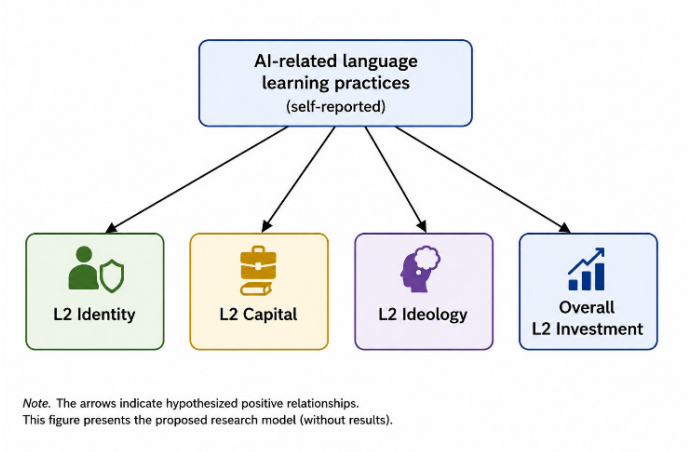


Figure 1 Conceptual framework

METHODS

Research design

To explore the YPSs regarding the role of self-reported AI-related language learning practices in perceived second language investment, a quantitative design was used. This research approach is useful for capturing the participants' perceptions effectively. This study was conducted in India during the academic year 2024–2025.

Participants

This study employed a convenient sampling method to recruit YPSs in India. The first researcher communicated with the directors of Yemeni student associations in India, who shared the questionnaire's link with their members through the association's official WhatsApp and Facebook groups. As nearly all YPSsin India are members of these groups for administrative and academic communication. The directors disseminated the questionnaire broadly across the target population, encouraging them to participate in this study. The researcher also shared the questionnaire through his existing academic friends who are currently studying in India to maximize participation. Over a period of two weeks, from July 15 to July 30, the researchers received 78 responses. These responses are considered the participants of the study.

Table 1 presents the background information of the participants. The majority of participants are non-English language specialists (69.2%), while less than one-third of them (30.8%) are English major researchers. The results in Table 1 indicate a dominance of male researchers (91%) over female researchers who constitute only 9%. This is normal for a conservative Islamic country; women are not travelling abroad without any male relative. Moreover, less than half of the participants (44.9%) have been in India for 1-3 years, while nearly a quarter (24.4%) have been in India for 4–6 years. This indicates that these researchers are pursuing their master and PhD degrees. Finally, just over 30% of them have been in India for more than 7 years. This shows that they have not come home because of the ongoing conflict in Yemen. Table 1 demonstrates a strong preference for investing in English (96.2%) as a second language, over Hindi language (3.8%) among the Yemen researchers, underscoring the awareness of these researchers on the importance of English in their academic pursuits. We received ethical approval from Hadhramaut University with approval number (HU, 2026/1).

Table 1

YPSs' background information

Categories		Frequency	Percentage
1. What is your academic major?	English language	24	30.8%
	Non-English language	54	69.2%
	Total	78	100.0%
2. What is your gender?	Male	71	91.0%
	Female	7	9.0%

Categories		Frequency	Percentage
3. How long have you been studying in India?	1–3 years	35	44.9%
	4–6 years	19	24.4%
	More than 7 years	24	30.8%
4. Which language do you primarily invest in as a second language?	English	75	96.2%
	Hindi	3	3.8%

The participants reported their experiences in learning English. A significant portion of them (43.6%) have spent more than 6 years learning English, while 26.9% have dedicated 1–3 years to it. Additionally, 14.1% have studied English for 4–6 years, with only 15.4% of them having less than a year of experience in learning English. Table 2 reveals that less than half (48.7%) of YPSs began learning English after the age of 18, typically at the university level. A substantial number of the participants (39.7%) started learning English between the age of 13 and 18, corresponding to the normal stage of learning English in Yemen, which is the 7th grade into the 3rd year of secondary school. The lowest percentage of them initiated learning English between the ages of 6 and 12 (7.7%), and just 3.8% began before 6. These two groups learned English from level one of their basic educations, and some before. These groups likely studied at international schools or private schools. Additionally, the majority of participants learned English at schools (mentioned 45 times), followed by self-study (mentioned 38 times), private schools (mentioned 38 times), university courses (mentioned 26 times), and online platforms (mentioned 13 times) (Table 2). Finally, less than half (48.7%) of participants assessed their English fluency as intermediate. Over a quarter (37.2%) considered themselves advanced, 9.0% identified themselves as beginners, and 5.1% regarded themselves as like-native speakers.

Table 2

YPSs' journey of English learning

Categories		Frequency	Percentage
5. How long have you been learning English?	Less than 1 year	12	15.4%
	1–3 years	21	26.9%
	4–6 years	11	14.1%
	More than 6 years	34	43.6%
6. At what age did you begin learning English?	Before age 6	3	3.8%
	Between the ages 6–12	6	7.7%
	Between the ages 13–18	31	39.7%
	After age 18	38	48.7%
7. Where did you primarily learn English before coming to India? More than one answer is allowed.	School-based instruction	45	29.2%
	Private language institutes	32	20.8%
	Self-study	38	24.7%
	University courses	26	16.9%
	Online platforms	13	8.4%
8. How would you rate your overall English proficiency?	Beginner	7	9.0%
	Intermediate	38	48.7%
	Advanced	29	37.2%
	Native-Like proficiency	4	5.1%

A large percentage of the participants also reported their occasional use of AI tools (43.6%). This was followed by a daily use of 26.9% and a weekly use of 23.1%. Only 6.4% of them reported that they never use AI tools (Q 9). Table 3 also indicates that the majority of YPSs (80.8%) reported that their primary use of AI tools was for purposes other than learning English, whereas 19.2% of them identified English language learning as their primarily purpose for using AI tools. These results report the primarily purpose of YPSs' leverage of AI was for their research topics (Q 12).

It is worth noting that, for questions 10 and 11, the reported percentage and frequencies were calculated based on the total number of mentioned responses, rather than the number of participants. The participants reported high frequency in using ChatGPT (occurred 72 times), Google Translate (occurred 52 times), Grammarly (occurred 23 times), and Duolingo (occurred 14 times), while the other tools were less frequently used (Q 11). The YPSs used AI tools for writing (occurred 53 times), vocabulary (occurred 45 times), speaking (occurred 42 times), grammar (occurred 40 times), reading (occurred 35 times), pronunciation (occurred 32 times), and listening (occurred 25 times) (Q 12) (Table 3).

Table 3

YPSs' use of AI tools

Categories		**Frequency**	**Percentage**
9. How often do you use AI tools (e.g., ChatGPT, Grammarly, Duolingo) for English learning?	Daily	21	26.9%
	Weekly	18	23.1%
	Occasionally	34	43.6%
	Never	5	6.4%
	Total	78	100.0%
10. Which AI tools do you currently use most frequently?	ChatGPT	72	41.6%
	Grammarly	23	13.3%
	Duolingo	14	8.1%
	Google Translate	52	30.1%
	ELSA Speak	3	1.7%
	Deepseek	4	2.3%
	Grok	2	1.2%
	Others, Quillbot, Gemini	3	1.7%
11. For which language skills/areas do you use AI tools?	Speaking	42	12.5%
	Listening	25	7.5%
	Reading	35	10.5%
	Writing	53	15.8%
	Grammar	40	11.9%
	Pronunciation	32	9.6%
	Vocabulary	45	13.4%
12. Do you have prior experience using AI tools for purposes other than English learning?	Yes	63	80.8%
	No	15	19.2%

Note. Participants' responses to Q 10 & 11 demonstrate the total number of mentions.

Instrument

To address the research questions, we have designed a closed-ended questionnaire based on previous studies (Bin-Hady et al., 2024; Darvin & Norton, 2015). A questionnaire is utilized to collect data from the intended participants. The questionnaire begins with background information, which comprises twelve items. Items 1 and 2 enquire about personal background (academic major and gender). Questions 3, 5, 6, and 7 ask about the learner's timeline and educational background. Question 4 is about the second language that YPSs invest in. Question 8 is self-assessed proficiency. Questions 9, 10, and 11 are about AI tool usage frequency, types, and areas of application. Finally, question 12 asks about prior experience of participants in using AI use beyond English learning.

The second part aims to collect Yemeni postgraduate students' perceptions regarding the use of AI in their language learning, consisting of six items (from 1 to 6) adapted from Bin-Hady et al. (2024). The third part focuses on collecting perceptions of investment in the English language among Yemeni postgraduate students. It comprises three subsections based on Darvin and Norton's (2015) model of investment in a second language, which includes identity, capital, and ideology. Identity comprises items from 7–13, and capital includes items from 13–19. The first two subsections are adapted from a comprehensive questionnaire developed by Soltanian et al. (2019), while the last subsection, i.e., ideology, compiling items from 20–24, was prepared by the authors themselves based on their understanding of Darvin and Norton's (2015) theorization of ideology (see Appendix). The questionnaire employs a five-point Likert scale ranging from "Strongly Agree" to "Strongly Disagree."

The questionnaire underwent a rigorous validation involving two university professors with expertise and prior publications on investment. The first referee suggested expanding the background items to include comprehensive information. After incorporating the modifications, we submitted the modified version to a distinguished professor in the field. Her comments were to clarify the confusion in two ideology-related items, and ensure the clarity of a few other items.

Subsequently, we have amended the questionnaire accordingly and translated it to enhance clarity. Expert checking procedures were employed to validate the accuracy of the Arabic translation. Two bilingual university professors in Applied Linguistics and Translation checked the translation of the items to ensure that the intended meaning was preserved and conveyed in Arabic. The experts resolved minor issues in translating some words, which we then fixed together. The questionnaire was prepared using Google Forms and piloted with some postgraduate scholars to check its clarity. They reported its well-structure and clarity. One of them reported rectifying an item which is repeated. We also asked them about the clarity of the translation, and they found it suitable for understanding. We statistically measured the validity and reliability of the questionnaire after being completed by 15 participants. Construct validity was assessed using corrected item-total correlations for each of the four constructs separately. The total-item coefficients range from .395 to .732, exceeding the acceptable threshold score of .30 (Field, 2018). These results indicate that each item correlates adequately with its respective total construct score, providing adequate convergent validity within each construct (Hair et al., 2019). The item-total correlation ranges for each construct

were as follows: Artificial intelligence (.571–.657), identity (.441–.732), capital (.421–.689), and ideology (.395–.665) (see Table 4 and Appendix).

The reliability was calculated using Cronbach's Alpha measure (Table 4). The overall average of the questionnaire scored .92, indicating a high level of consistency across the scale and establishing its trustworthiness for application in other similar contexts. Among the individual dimensions, the AI dimension achieved the highest reliability score of .87, followed by capital dimension with a score of .83, and then the identity dimension with .88. The ideology dimension scored the lowest, but still a good reliability score of .81. All in all, the reliability scores underscore the robustness of the scale and affirming its consistency for correlating the perceptions of YPSs on AI and investment in second language. Following this, the questionnaire was distributed widely across Yemeni forums and personally in India, aiming to collect a diverse range of respondents.

Table 4

Reliability scales

Dimensions	Cronbach's Alpha	Distributions of Items	Item-Total r Range
Artificial Intelligence	.87	1–6	.571–.657
Identity	.88	7–13	.441–.732
Capital	.83	14–19	.421–.689
Ideology	.81	20–24	.395–.665
Average	.92	24	

Data analysis

Quantitative research employed descriptive and inferential statistics in analyzing the numerical data systematically. This study used descriptive statistics to calculate the mean scores, standard deviation and frequencies, reporting the findings on the participants' background data and addressing the first research question. We also adopted inferential analysis to test the study's model and examine correlations and group differences. First, the Shapiro-Wilk was conducted to check the normality distribution of the data. Based on the normality results, appropriate statistical tests were employed. Specifically, the Mann-Whitney U test was utilized to examine whether a significant difference existed between English-major and non-major English participants regarding L2 investment. Pearson Correlation test was used measures the strengths and directions of the relationships between AI-tool usage and L2 investment among YPSs in India. Finally, simple liner regression analysis was performed to identify the predictive effect of self-reported AI-related language learning practices on the individual dimensions and overall, of L2 investment (L2 capital, L2 Ideology and L2 Identity).

RESULTS

RQ1: To what extent do YPSs in India perceive AI tools as useful for their English learning?

YPSs in India reported a high level of perceived usefulness of AI tools in their language learning, with an average mean score of 4.02 (*SD* = .677, Table 5). Notably, their perceptions

of the accessibility of AI tools for EFL learning received the highest rating, (*M* = 4.26, *SD* = .71), indicating that YPSs considered AI tools as accessible for language learning. Conversely, the perceived usefulness of AI-generated feedback received the lowest rating, though it remains within the high range (*M* = 3.79, *SD* = .945), indicating that the participants still regarded using AI feedback as a valuable tool for supporting their English language learning process.

Table 5

YPSs' perception on integrating AI in English learning

Statements	Mean	SD
1. I use AI tools to improve my English language skills in conversational practice.	3.88	1.03
2. AI tools provide personalized language instruction tailored to my learning needs.	4.05	.836
3. AI tools adapt each learner's level and pace to improve their learning experience.	4.01	.875
4. AI tools expose me to a wide range of language use, improving my language proficiency.	4.14	.768
5. AI tools are easily accessible and helpful for language learning for EFL learners of all levels.	4.26	.710
6. I receive useful feedback on my English from various AI tools.	3.79	.945
Average	4.02	.677

RQ2: To what extent do YPSs in India perceive L2 investment?

Table 6 displays the perceptions of YPSs toward investment in second language. The results indicate that the YPSs demonstrated a high level of perceived L2 investment, with an overall mean score of 4.14 (*SD* = .495). Among the three-dimension, YPSs reported the highest mean score in capital (*M* = 4.27, *SD* = .553). This indicates that the participants perceived English as a valuable source for enhancing their professional and social opportunities, including securing well-paid employment and gaining social recognition. This was followed by L2 ideology (*M* = 4.14, *SD* = .561), suggesting the YPSs held high positive beliefs in the importance and value of mastering English for future career development. Finally, L2 identity received the lowest mean score (*M* = 4.02, *SD* = .560), although this value falls with the high range, indicating that YPSs perceived English as an important component of their academic, personal and professional identity. Overall, the findings demonstrate consistently high levels of L2 investment across all the three domains, with L2 capital emerged as the strongest endorsed dimension.

Table 6

YPSs' perceptions on L2 investment

Investment dimensions	N	Mean	SD
AI Tools	78	4.02	0.68
Identity	78	4.02	.560
Capital	78	4.27	.553
Ideology	78	4.14	.593
L2 Investment	78	4.14	.495

RQ3: Are self-reported AI-related language learning practices among YPSs in India statistically associated with perceived L2 investment?

Overall, the zero-order correlation between YPSs' self-reported AI-related language practices and their perceived L2 Investment was size statistically significant and positive, with a large effect (r = 0.669, p < .001). Simple liner regression analysis (Table 7, Fig 2) showed that AI-related language practices significantly predicted L2 investment variables. AI-related practices significantly predicted L2 identity (B = 0.551, β = .667, R^2 = .445, F (1, 76) = 61.00, p < .001). These results indicate that for every one-unit increase in AI-related language learning practices, perceived L2 identity increase by 0.551-unit. AI practices accounted for 44.5% of the variance of L2 investment. Similarly, AI practices significantly predicted L2 capital (B = 0.465, β = .28, R^2 = .325, F (1, 76) = 36.60, p < .001), with an increase of each unit in AI practices leads to an increase by a 0.465 unit in L2 perceived capital; AI practices explained 32.5% of L2 capital variance. Furthermore, AI practices had also a significant correlation with L2 ideology (B = 0.451, β = .545, R^2 = .297, F (1, 76) = 32.09, p < .001), demonstrating 29.7% of the variance in YPSs' language ideology. Overall, AI-related language learning practices among YPSs significantly predicted overall L2 Investment (B = 0.489, β = .669, R^2 = .448, F (1, 76) = 61.68, p < .001). An increase by one unit in AI-related self-reported language learning practices was associated with 0.489 unit in overall L2 investment. Specifically, AI-related practices among YPSs demonstrate 44.8% of L2 investment variance. These findings indicate that AI-supported language learning exerts a substantial positive association with YPSs' L2 identity, capital, ideology and overall L2 investment in English with strong association with identity and L2 investment.

Table 7

The correlation between Yemeni scholar use of AI and L2 investment

Constructs	0.451	B	R^2	F (1, 76)	p
Identity	.667	0.551	.445	61.00	< .001
Capital	.570	0.465	.325	36.60	< .001
Ideology	.545	0.451	.297	32.09	< .001
L2 investment	.669	0.489	.448	61.68	< .001

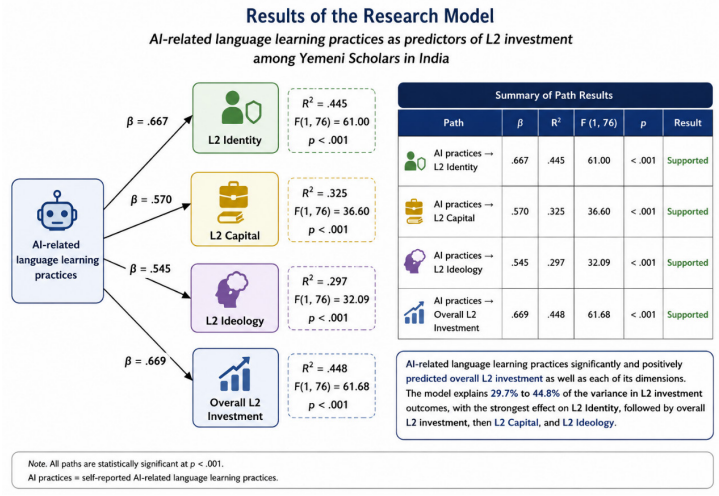


Figure 2 AI tools predict of L2 investment

Q4: Is there a significant difference in perceived L2 investment between English-major and non-English-major YPSs?

Table 8 compares the perceptions of English-major YPSs (*M* = 4.02, *SD* = .543), and non-English-major YPSs (*M* = 4.05, *SD* =.463) regarding their perceived L2 investment. The mean scores indicate that both groups of scholars reported high level of L2 investment, with only a negligible difference in the main score, favoring the non-English-major group. However, descriptive statistics alone could not indicate statistical significance. Therefore, we need to check the normality of the data using the Shapiro-Wilk tests. The results indicated that the participants' L2 investment scores were not normally distributed for English-majors (*W* = 0.88, *p* = .009), or for non-English majors, (*W* = 0.88, *p* < .001). Therefore, we employed the non-parametric Mann-Whitney U test to compare between the two independent groups. The results showed no statistically significant difference in perceived L2 investment between English-major (*n* = 24) and non-English-major (*n* = 54) Yemeni scholar (*U* = 634.00, *Z* = -0.152, *p* = .880). The results indicated that academic specialization did not influence YPSs' perceptions of L2 investment. However, non-English-major scholars obtained a marginally higher score.

Table 8

Perceptions of English-major and no-English-major YPSs on L2 investment

Major	N	Mean	SD	Shapiro-Wilk		Mann-Whitney		
				Statistic	Sig.	U	Z	Sig. (2-tailed)
English	24	4.02	.543	.882	.009	634.00	-0.152	.880
Non-English	54	4.05	.463	.884	.000			

DISCUSSION

Adopting CDL and Darvin and Norton's (2015) frameworks, this research quantitatively attempts to explore the perceptions of YPSs in India regarding the usefulness of AI tools for their English learning, their perceptions of L2 investment, the potential relationship between AI-related language learning practices and L2 investment, and whether a statistically significant difference exists between English-major and non-English-major YPSs in their perceptions of L2 investment. Notably, YPSs in India reported a high level of perceived usefulness of AI tools for their language learning (*M* = 4.02), showcasing that they generally considered AI tools as a valuable resource for language learning development. Despite this positive rating, the result reflects perceived usefulness rather than actual usefulness or extensive experience in using AI for language practice. From CDL lens, this result may indicate that YPSs recognize that the use of AI tools in language learning entails issues of agency, power and bias (Zhang & Dikilitaş, 2025). This result is consistent with previous findings on the potential of AI-supported applications to facilitate language learning (Aryanti & Santosa, 2024; Evers & Chen, 2020; Negrila, 2023; Strielkowski et al., 2025). For example, AI facilitates global peer exchanges and promotes equitable opportunities (Fan et al., 2025); AI tools offer EFL learners innovative resources for enhancing their language learning (Negrila, 2023); ASR technology provides EFL learners with precise feedback to improve their English pronunciation and promote intelligibility (Evers & Chen, 2020); and AI-powered applications, such as ELSA Speak, the ELAi app, and Lyra Virtual

Assistant, provide learners with opportunities to correct their pronunciation and engage in English conversation, thereby enhance their English fluency (Aryanti & Santosa, 2024). Although these findings indicate that AI tools provide diverse resources and opportunities for language learning through automatic feedback that contributes to learners' sustained engagement with English, awareness of AI tools also reveals their deficiencies, including marginalization of some linguistic and cultural language varieties. For example, many AI designs emphasize quantifiable linguistic gains over sociocultural and identity-based learning outcomes (Strielkowski et al., 2025), concerns include data privacy, algorithmic bias, and the potential marginalization of non-dominant language varieties (Chonka et al., 2023), and the homogenization of AI language models reinforces linguistic hierarchies (Sourati et al., 2026).

Furthermore, in responding to RQ2, this study found that YPSs demonstrated a high level of perceived L2 investment (*M* = 4.14), with L2 capital received the highest mean (*M* = 4.27), followed by ideology (*M* = 4.14), and then identity (*M* = 4.02). These findings highlighted that participants strongly recognized the importance of enhancing fluency in English language for enhancing education, cross-cultural professional opportunities. This result aligns with the findings of Darvin and Norton's (2015) and Liao et al. (2025), which posited that students are more likely to invest in L2 learning when they perceive the economic, social and cultural benefits of language proficiency. Moreover, the findings suggest that YPSs in India view L2 acquisition as a strategic investment, primarily linking with better career opportunities. This perspective supports Norton's (1995) argument that learners investment in L2 is driven by pragmatic considerations, such as acquiring material and symbolic resources, rather than solely serving as a communicative tool for social participation. These findings suggest that YPSs in India appear to prioritize all three components of L2 investment, with a comparatively strong emphasis on L2 capital, which may indicate that these scholars could be driven by financial needs and aspirations. They appear to associate achieving English proficiency with a means of acquiring social and economic resources. Theoretically, this pattern is consistent with Bourdieu (1991) who asserted that learning a language provides economic opportunities including access to properties, incomes and wealth, as well as cultural capital such as knowledge, educational credentials and social recognition. Furthermore, Echeverri-Sucerquia et al. (2025) argued that investing in L2 can lead to symbolic capital, such as institution recognition, which may be an asset for individuals.

L2 ideology emerged as the second most prominent dimension of investment among YPSs. This suggests that the participants seemed to recognize the influence of social class and ethnicity on opportunities to access the target language and spend considerable efforts accordingly. From Darvin and Norton's (2015) theoretical lens, this result can be interpreted as indicating that YPSs perceived the power and belief systems that shape their English learning as important relative to the benefits they expected to gain from mastering English language. This finding corresponds with Soltanian et al. (2019), who noted that language ideology may hinder L2 investment depending on the social and institutional contexts in which students learn the language.

In contrast, L2 identity emerged as the least emphasized dimensions of L2 investment among YPSs, although the mean is still relatively high. This finding can be interpreted from Darvin

and Norton's (2015) perspectives, that YPSs perceived understanding of the target language and its people, as important, though ranked below the benefits they expected to gain, and below their understanding of the power and belief systems that shape their L2 investment. The relevance of identity to investment is further supported by Llaban and Protacio (2025) and Soltanian et al. (2019), who showed that self-perception shape L2 investment, enabling learners to develop linguistic competence, expand future professionals and avoid marginalization; it is also consistent with Fan et al. (2025), who argued that learners' personal aspirations tend to accumulate with their imagined identity. A plausible interpretation for the lower ranking of identity is that YPSs may be relatively well treated in India. Since identity in L2 investment refers to how learners wish to be recognized (Darvin & Norton, 2015), therefore, they may have paid comparatively less attention to this dimension while investing in L2. In contrast, Yemeni EFL learners may experience identity conflict arising from cultural and social differences between Yemeni and English contexts, which can hinder language access (Attamimi et al., 2019). However, such conflict may be less pronounced in the Indian context. This may help explain why L2 identity received comparatively lower emphasis than capital and ideology among YPSs while investing in English.

In response to RQ3, the current study revealed a strong and positive correlation between self-reported AI-related language learning practices and perceived L2 investment among YPSs (r = .657, p <.001). This result indicates that participants who reported more frequent engagement in AI-related language learning practices also reported a higher level of L2 investment. Although the cross-sectional design precludes causal inference, this result can be interpreted through the incorporating of CDL and L2 investment (Darvin & Norton, 2015) lenses. CDL enables YPSs to perceive and engage with AI tools, including awareness of bias, usefulness, agency and limitations (Liu et al., 2025). In this sense, getting greater access to AI-resources provides more opportunities to practice English language, while L2 investment provides a framework for understanding how engagement with English entails identity, ideology and capital.

These results are consistent with the evolving landscape of L2 learning in which AI-powered tools are transforming language education through personalized and data-informed learning pathways (Baker & Smith (2019). AI tools have positive contribution to learners' language engagement and L2 investment by facilitating access to academic networking opportunities that might otherwise be unavailable (Echeverri-Sucerquia et al.,2025). Consistent with existing studies (Evers & Chen, 2020; Liao et al., 2025), our study confirms that engaging with AI-related language practices supports L2 investment, attributing this relation to participants' accessibility and personalized approach that caters to linguistic and cultural sensitivity in case of the AI system were designed to respond to diverse English varieties and multilingual practices.

Finally, in responding to RQ4, our study revealed no statistically significant difference between English-major and non-English major YPSs in their perceptions of L2 investment. This indicates that both groups recognize the importance of investing in English language skills for education, international communication and future career opportunities. This justifies that L2 investment can be driven by broader constructs of capital, identity and ideology construct

of L2 investment, as proposed by Darvin and Norton's (2015) framework, rather than being limited to academic major alone. Conversely, this result is inconsistent with the findings of Lee and Lee (2019), who argued that English-major students in Korea demonstrated stronger orientation toward varieties of English and strategies used in multicultural communication compared to non-English-major students. This discrepancy may be attributable to the sociolinguistic and cultural differences of the participants and learning contexts. These findings practically imply that EFL scholars should benefit from AI-supported tools in their learning to promote engagement, improve language proficiency and facilitate personalized feedback. EFL instructors are also encouraged to cultivate using AI to support their students' adoptive learning and offer opportunities for language development.

CONCLUSION

This study explored the intersections between AI-related language learning practices and L2 investment among YPSs studying in India through the lens of Darvin and Norton's (2015) model. The findings revealed that YPSs perceived AI tools as highly useful for their English language learning practices, reflecting their positive attitudes toward AI as a supportive tool for language learning. Furthermore, the results revealed that AI-related language learning practices were strongly and positively associated with perceived L2 investment and significantly predicted overall L2 investment as well as its three dimensions placing L2 capital as the highest endorsed, followed by L2 ideology and L2 identity, suggesting that YPSs primarily viewed English proficiency as a means for acquiring instrumental and sociocultural privileges.

The study found no statistically significant difference in perceived L2 investment between English-major and non-English-major YPSs. This finding suggests that investment in L2 is not determined by academic specialization, but by the broader educational goals and aspirations. This finding also suggests that fluency in English may be achieved while engaging in AI-related language practices and dedicated efforts. English proficiency is attainable for learners who consistently invest time and effort in L2 development.

Based on our findings, we recommend EFL learners, particularly those in resource-constructed settings such as Yemen to leverage AI-powered language learning tools in their learning routines to support classroom instruction through real-time conversing in English and getting instant feedback facilitating their learning development. Likewise, EFL instructors should incorporate AI-powered application into language learning to boost their students' autonomy and enhance their English language skills through meaningful interaction. Our study recommends curriculum designers and policy makers to consider integrating AI-powered language learning tools into English language curricula to better prepare learners for the linguistic demands and global workforce.

Despite its contribution, our study has several limitations. First, the quantitative design which relies on self-reported data, may be biased to subjective data and does not allow casual inference. Another limitation is the use of convenience sampling which may limit the

generalizability of the findings on other Yemen populations studying in other similar contexts. Future studies could employ mixed methods or longitudinal designs to explore in-depth how AI-related language learning practices shape learners' L2 investment overtime. Additionally, future research could productively investigate EFL students in diverse English-speaking countries such as the USA, UK, Canada and South Africa to provide a more comprehensive understanding of L2 investment in diverse contexts.

Conflict of interest statement

The authors declare no conflict of interest.

Author contributions

Funding statement

The authors extend their appreciation to the Deanship of Research and Graduate Studies at King Khalid University for funding this work through the Large Research Groups Program under grant number RGP2/488/47.

Data availability statement

Data will be made available on reasonable request.

Consent to participate

An informed written consent to participate were obtained from all participants. All participants gave voluntary, informed consent by choosing to contribute to the discussion after being informed of the study's academic purpose. No incentives were offered, and participants retained the right not to engage.

THE AUTHORS

Wagdi Rashad Ali Bin-Hady is an Associate Professor at the Department of English, College of Education, Humanities and Applied Sciences, Hadhramout University, Yemen. He is an accomplished academician specializing in Applied Linguistics, with a focus on ecolinguistic, discourse analysis, translation studies and technology-enhanced language learning. His work examines dynamic power in environmental and tourism discourse, and AI integration in EFL contexts.
wagdyrashad@hu.edu.ye

Amal Abdelsattar Metwally is an Assistant Professor in the Department of Translation, College of Languages and Translation, at King Khalid University, Saudi Arabia. Her research interests include corpus-based translation studies, technology-enhanced language learning, and the integration of digital technologies into translation and Teaching English as a Foreign Language (TEFL).
aamotwly@kku.edu.sa

REFERENCES

Ali, Z., Bhar, S. K., Abd Majid, S. N., & Masturi, S. Z. (2025). Exploring student beliefs: Does interaction with AI language tools correlate with perceived english learning improvements? *Education Sciences, 15*(5), Article 522. https://doi.org/10.3390/educsci15050522

Alrasheedi, S. (2024). The effect of using AI applications to develop EFL listening comprehension skills among university students. *Conhecimento & Diversidade, 16*(44), 601–637. https://doi.org/10.18316/rcd.v16i44.12346

Aryanti, R. D., & Santosa, M. H. (2024). A systematic review on artificial intelligence applications for enhancing EFL students' pronunciation skill. *The Art of Teaching English as a Foreign Language (TATEFL), 5*(1), 102–113. https://doi.org/10.36663/tatefl.v5i1.718

Attamimi, R. A., Al-Tamimi, N. O. M., & Chittick, J. A. (2019). Yemeni EFL learners' identity conflicts: An exploratory case study. *International Journal of English Linguistics, 9*(3), 268–278. https://doi.org/10.5539/ijel.v9n3p268

Bin-Hady, W. R. A., Ali, J. K. M., & Al-humari, M. A. (2024). The effect of ChatGPT on EFL students' social and emotional learning. *Journal of Research in Innovative Teaching & Learning, 17*(2), 243–255. https://doi.org/10.1108/JRIT-02-2024-0036

Bourdieu, P. (1991). *Language and symbolic power* (J. B. Thompson, Ed.; G. Raymond & M. Adamson, Trans.). Harvard University Press.

Chonka, P., Diepeveen, S., & Haile, Y. (2023). Algorithmic power and African indigenous languages: Search engine autocomplete and the global multilingual Internet. *Media, Culture & Society, 45*(2), 246–265. https://doi.org/10.1177/01634437221104705

Creese, A., & Blackledge, A. (2015). Translanguaging and identity in educational settings. *Annual Review of Applied Linguistics, 35*, 20–35. https://doi.org/10.1017/S0267190514000233

Darvin, R., & Norton, B. (2015). Identity and a model of investment in applied linguistics. *Annual Review of Applied Linguistics, 35*, Article 36e56.

Dauzón-Ledesma, L., & Izquierdo, J. (2023). Language learning investment in Higher Education: Validation and implementation of a Likert-scale questionnaire in the context of compulsory EFL learning. *Education Sciences, 13*(4), Article 370. https://doi.org/10.3390/educsci13040370

Dörnyei, Z., & Ryan, S. (2015). *The psychology of the language learner revisited*. Routledge.

Echavarría, P. A. (2022). E*xploring the role of students' language user identities in their L2 use and investment* [Master's thesis]. Universidad de Antioquia.

Echeverri-Sucerquia, P. A., Álvarez-Argaez, S. M., & Gómez-Giraldo, J. S. (2025). Student capital in L2 learning investment among undergraduate students. *Revista Brasileira de Linguística Aplicada, 25*(2), Article e44947. https://doi.org/10.1590/1984-6398202544947

Evers, K., & Chen, S. (2020). Effects of an automatic speech recognition system with peer feedback on pronunciation instruction for adults. *Computer Assisted Language Learning, 35*(8), 1869–1889. https://doi.org/10.1080/09588221.2020.1839504

Fan, W., Yu, S., & Darvin, R. (2025). Toward a synergistic framework of investment and motivation in language learning: The role of imagined identity. *System, 118*, Article 102956. https://doi.org/10.1016/j.system.2025.102956

Field, A. P. (2018). *Discovering statistics using IBM SPSS statistics* (5th ed). Sage.

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2019). *Multivariate data analysis* (8th ed.). Cengage Learning.

Jiang, L., & Gu, M. (2025). Enabling critical digital literacies through GenAI-assisted multimodal composing: A longitudinal inquiry of an ethnic minority English teacher. *System*, 103870. https://doi.org/10.1016/j.system.2025.103797

Lee, J. S., & Lee, K. (2019). Perceptions of English as an international language by Korean English-major and non-English-major students. *Journal of Multilingual and Multicultural Development, 40*(1), 76–89. https://doi.org/10.1080/01434632.2018.1480628

Liao, Y., Lee, J., & Chapelle, C. A. (2025). Accelerating second language learning through artificial intelligence: Opportunities and challenges. *Language Learning & Technology, 29*(1), 1–20. https://doi.org/10.10125/73491

Liu, G. L., Lee, J. S., & Zhao, X. (2025). Critical digital literacies, agentic practices, and AI-mediated informal digital learning of English. *System, 134*, Article 103797. https://doi.org/10.1016/j.system.2025.103797

Llaban, A., & Protacio, A. V. (2025). Language learning investment and students' communicative competence in English. *Psychology and Education: A Multidisciplinary Journal, 38*(8), 854–860. https://doi.org/10.70838/pemj.380801

Mavaddat, R., & Razmjoo, S. A. (2020). Similar positions in classroom but different positions in class: An analysis of narratives based on Darvin and Norton's investment model. *Teaching English Language, 14*(1), 309–339. https://doi.org/10.22132/tel.2020.111087

Metwally, A. A., & Bin-Hady, W. R. A. (2025). Probing the necessity and advantages of AI integration training for EFL educators in Saudi Arabia. *Cogent Education, 12*(1), Article 2472462. https://doi.org/10.1080/2331186X.2025.2472462

Negrila, A. M. C. (2023). The new revolution in language learning: The power of artificial intelligence and education 4.0. *Bulletin of "Carol I" National Defence University (EN), 12*(02), 16–27.

Norton Peirce, B. (1995). Social identity, investment, and language learning. *TESOL Quarterly, 29*(1), 9–31. https://doi.org/10.2307/3587803

Norton, B. (2013). *Identity and language learning: Extending the conversation* (2nd ed.). Multilingual Matters.

Pittaway, D. S. (2004). Investment and second language acquisition. *Critical Inquiry in Language Studies, 1*(4), 203–218. https://doi.org/10.1207/s15427595cils0104_2

Soltanian, N., Ghapanchi, Z., Rezaei, S., & Pishghadam, R. (2019). Quantifying investment in language learning: Model and questionnaire development and validation in the Iranian context. *Issues in Language Teaching, 7*(1), 25–56. https://doi.org/10.22054/ILT.2019.33374.302

Sourati, Z., Ziabari, A. S., & Dehghani, M. (2026). The homogenizing effect of large language models on human expression and thought. *Trends in Cognitive Sciences, 30*(9), 805–816. https://doi.org/10.1016/j.tics.2026.01.003

Strielkowski, W., Grebennikova, V., Lisovskiy, A., Rakhimova, G., & Vasileva, T. (2025). AI-driven adaptive learning for sustainable educational transformation. *Sustainable Development, 33*(2), 1921–1947. https://doi.org/10.1002/sd.3221

Thompson, J., & Harris, O. (2025). A narrative review of educational technology in higher education. *Social Science Chronicle, 5*, 1–27. https://doi.org/10.56106/ssc.2025.002

Vasilopoulos, G. (2015). Language learner investment and identity negotiation in the Korean EFL context. *Journal of Language, Identity & Education, 14*(2), 61–79. https://doi.org/10.1080/15348458.2015.1019783

Wu, H. Y. (2017). Imagined identities and investment in L2 learning. *Taiwan Journal of TESOL, 14*(2), 101–133.

Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2019). Systematic review of research on artificial intelligence applications in higher education – where are the educators? *International Journal of Educational Technology in Higher Education, 16*, Article 39. https://doi.org/10.1186/s41239-019-0171-0

Zhang, X. (2025). Proud to be a native speaker, but challenged by the role: Transnational monolingual English-L1 teachers' professional identity construction in Germany. *Journal of Multilingual and Multicultural Development, 47*(5), 2969–2982. https://doi.org/10.1080/01434632.2025.2498026

Zhang, Y. (2024). Investing in and divesting from learning-to-teach practices: A critical ethnography of a teacher of English in China. *Asia-Pacific Journal of Teacher Education, 53*(2), 153–171. https://doi.org/10.1080/1359866X.2024.2431021

Zhang, Y., & Dikilitaş, K. (2025). Investing in critical digital literacies involving generative AI: A multiple-case study of second language novice teachers. *International Journal of TESOL Studies, 7*(4), 8–32. https://doi.org/10.58304/ijts.250626

Zhang, Y., & Gonzales, W. D. W. (2025). World Englishes pedagogy: Constructing learner identity. *ELT Journal, 79*(2), 172–183.

Appendix

Artificial intelligence	Correlation	Cronbach's Alpha
1. I use AI tools to improve my English language skills in conversational practice.	.577	.922
2. AI tools provide personalized language instruction tailored to my learning needs.	.645	.920
3. AI tools adapt each learner's level and pace to improve their learning experience.	.613	.921
4. AI tools expose me to a wide range of language use, improving my language proficiency.	.596	.921
5. AI tools are easily accessible and helpful for language learning for EFL learners of all levels.	.657	.920
6. I receive useful feedback on my English from various AI tools.	.571	.921
Identity		
7. In future language classes, I will experience more active participation.	.732	.919
8. My goal of becoming a professional English speaker motivates me to improve.	.721	.919
9. I prefer language classes that involve me in various interactive ways.	.660	.920
10. I appreciate it when my language instructor designs activities that reflect my learning preferences.	.548	.922
11. After mastering English, I believe I will adopt more global habits or practice, (e.g., preferring English-language media).	.541	.922
12. As a competent language learner in the future, I will feel more confident in performing academic tasks that require English proficiency.	.634	.921
13. I am eager to learn English so that I can gain respect from educated people, my teachers, and peers.	.441	.923
Capital		
14. My limited English proficiency has restricted my academic or career goals.	.421	.924
15. I value English for the access it gives me to connect with people from around the world.	.669	.920
16. English proficiency can help me find work opportunities and earn money (e.g., tutoring or guiding tourists).	.610	.921
17. Learning English can give me access to social networks which are appropriate for my educational level.	.689	.920
18. Using English in digital contexts increases my social status (i.e., prestige, empowerment, honor, and fame nationally and transnationally).	.618	.921
19. Improving my English boosts my self-esteem and confidence.	.664	.920
Ideology		
20. I believe societal structures privilege English speakers in my field.	.395	.924
21. I recognize how government policies shape the status and accessibility of English education in my country.	.615	.921
22. My access to English learning resources (e.g., textbooks, online courses) reflects existing educational inequalities in my context.	.491	.923
23. I view English language as an essential tool for global communication and cultural exchange.	.469	.923
24. I am confident that being proficient in English will lead to better career prospects and personal growth opportunities.	.665	.920