

Decoding the Relationship between CALL and Saudi EFL Students' Motivation: Insights from Self-Determination Theory

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Abstract

By adopting a self-determination theoretic framework, this paper attempts to decode the relationship between computer-assisted language learning (CALL) and Saudi English as a Foreign Language (EFL) students' motivation. In doing so, the paper employs a mixed-methods approach, involving 120 Saudi EFL students and 10 EFL instructors at a Saudi university. Data for the quantitative analysis are collected through a Likert-scale questionnaire assessing four psychological constructs of learning, namely autonomy, competence, relatedness, and motivation towards CALL, whereas the qualitative data are collected through semi-structured interviews. The results indicate that CALL is very instrumental in boosting motivation among Saudi EFL students by satisfying their psychological needs to learn English. Competence is the strongest predictor of motivation among learning constructs, as evidenced by correlation, regression, and SEM analyses. Moreover, there are significant differences in motivation by proficiency level, as indicated by ANOVA results, with high-level students performing better than low-level students. The qualitative results supported the quantitative ones and show that CALL encourages motivation and interaction despite the technical difficulties Saudi EFL majors may encounter.

Keywords: CALL, autonomy, motivation, competence, relatedness, Saudi EFL context, self-determination theory

1. Introduction

Computer-assisted language learning (CALL) is increasingly becoming an important part of EFL instruction at higher education institutions following the technological revolution experienced by such institutions across the world (Wang et al., 2024). According to Stockwell (2012), CALL refers to the use of computers, computer applications, online platforms, and multimedia to support language learning. CALL is now being used extensively in universities in Saudi Arabia to make students proficient in English and to engage them more (Alahmadi & Alraddadi, 2020). This is due to the fact that such an approach corresponds to national educational changes and innovations, in line with Saudi Vision 2030. Based on recent research studies (e.g., Alkathiri et al., 2021; Alotaibi, 2022; Alfraidan & Alaliwi, 2024), CALL contexts are effective in fostering students' motivation, autonomy, interaction, and language acquisition through technology-based approaches in EFL classes.

Although there is increasing use of technology in the educational sector, Saudi EFL majors still exhibit low motivation to learn English, thereby affecting their engagement, language proficiency, and overall performance (Rehman et al., 2026). The traditional teacher-based approach and disengagement with real-life language experience have been attributed to this lack of motivation among these EFL learners. However, CALL technology offers various features that may help create interesting learning environments centered on the learner; yet the influence of CALL on the motivation of Saudi EFL learners remains understudied (Hashmi, 2016). There is also a lack of empirical data on how CALL affects intrinsic and extrinsic motivation, which features contribute most to engagement, and the kinds of situations learners might experience when using such technology to improve their performance (Alkhateeb et al., 2025). Consequently, it is important to examine the correlation between CALL and Saudi EFL majors' motivation, as well as the technology's effectiveness.

Despite the widespread use of CALL technology in Saudi universities, most Saudi EFL majors still exhibit low motivation to acquire English (Alharbi, 2024; Alsultan, 2024; Chaudhary, 2024). Such traditional techniques employed in classroom instruction, coupled with teacher-centered learning and a lack of interactional opportunities, might hinder students' interest and intrinsic motivation to learn. Although the use of digital learning environments in universities seems to be on the rise, doubts persist as to whether these environments effectively meet learners' psychological needs or foster autonomous self-motivation (Alyami et al., 2025). In addition, some students use such technological means only to fulfill academic obligations (Alfaleh et al., 2025).

Motivation is considered one of the major psychological factors affecting SLA (Dong et al., 2022). Self-Determination Theory (SDT) is one of the motivational theories that describes human motivation through the fulfillment of three basic psychological needs, namely autonomy, competence, and relatedness (Deci & Ryan, 2000). Within the SDT theoretical framework, a learner is intrinsically motivated when he or she feels competent, socially related, and autonomous in choosing the learning process (Ryan & Deci, 2020). These needs for autonomy, competence, and relatedness can be satisfied in the CALL setting through activities that involve interaction, a personalized pace of learning, collaborative communication, and feedback (Faza & Lestari, 2025). Thus, exploring the impact of CALL within the

scope of SDT would increase our understanding of the relationship between technology-assisted learning settings and the motivation and engagement of Saudi EFL majors.

The relevance of this study stems from its attempt to address the motivational factors of Saudi EFL majors and the potential of using CALL software as an effective tool to arouse interest and improve academic results. The study also has general importance for the field of technology-mediated language learning, with a special focus on the potential of the CALL approach to transform the traditionally designed EFL classroom into a new interactive environment that may satisfy the demands of both internal and external motivation. Consequently, this study has important multidisciplinary significance since it brings together three areas of science: education, applied linguistics, and educational technologies. From an educational perspective, the paper presents important evidence on ways to improve students' motivation and involvement. From a linguistic perspective, the study may contribute to the analysis of technology-mediated tasks and their correlation with language acquisition. From an educational technology perspective, it presents important information on designing, selecting, and implementing CALL software, taking into account the specific needs of the target group.

1.1 Research Questions

The paper raises one overarching research question:

1. To what extent is CALL correlated with Saudi EFL majors' motivation to learn English?

This overarching research question constitutes other subsidiary questions:

- a. How is CALL associated with Saudi EFL majors' autonomy in language learning?
- b. How is CALL related to the perceived competence of Saudi EFL majors in learning English?
- c. To what extent is CALL associated with Saudi EFL majors' relatedness?
- d. How do Saudi EFL majors view CALL within the framework of self-determination theory?

1.2 Research Objectives

This study seeks to answer the following objectives:

1. To decode the relationship between CALL and Saudi EFL students' motivation towards learning English.
2. To highlight the association between CALL and Saudi EFL students' autonomy.
3. To illustrate the correlation between CALL and the development of Saudi EFL students' competence.
4. To demonstrate the extent to which CALL is correlated with relatedness and collaboration among Saudi EFL learners.
5. To investigate the perception of Saudi EFL students about CALL in light of self-determination theory.

2. Literature Review

2.1 Computer-Assisted Language Learning

Computer-assisted language learning (CALL) is one of the most effective tools for second- and foreign-language instruction (Cheng, 2024; Bahari et al., 2025). The idea of CALL can be understood as the use of computers, software, computer programs, artificial intelligence, and other technologies to facilitate the development of language skills and motivation. As stated by Rahimi & Faskhodi (2026), CALL represents practices with a behaviorist, drill-based character. The current trend in CALL, however, is marked by communicative and integrative CALL practices that emphasize interaction, collaboration, autonomy, and authentic communication, among other things. Contemporary innovations, such as mobile-assisted language learning, virtual learning environments, and language learning through artificial intelligence have helped create more dynamic language learning. Furthermore, according to Rahimi (2025), CALL is consistent with the constructivist and socio-cognitive approaches, as it is grounded in the constructivist approach and involves constructing knowledge through interaction with electronic media, thereby fostering learner autonomy. It is essential in the context of higher education because of its great significance due to the potential of providing learners with authentic input, intercultural communication, and learner autonomy. It is evident from previous studies such as Alfraidan and Alaliwi (2024) and Almasarir (2026) that CALL operates through reducing learning anxieties and boosting the self-confidence and motivation of the learners using interactive activities. The emergence of coronavirus disease has made the use of CALL essential globally, including in Saudi Arabia (Alkathiri et al., 2021).

Regarding the theoretical background of CALL, it is closely connected to sociocultural theory, constructivism, and self-determination theory (Wang, 2025). As per sociocultural theory, technology helps mediate learning for the learners and interactions with the environment. As stated by Liu et al. (2024), in a CALL context, learners can negotiate meaning, collaborate with peers, and engage in communicative activities that enhance their linguistic abilities. In turn, constructivism implies learner-centered educational methods in which learners take an active part in constructing their knowledge. Through CALL, the learner has opportunities to interact with learning techniques, multimedia, and other means of communication and autonomy (Majitol & Yunus, 2023). Nowadays, it has become popular to discuss links between CALL and motivational theories, including SDT, because the technology-based learning environment helps satisfy the basic psychological needs of the learner for autonomy, competence, and relatedness. In general, digital learning technologies help learners increase their autonomy in relation to the learning process and thus motivate them (Alhoorie et al., 2022). Moreover, through the use of artificial intelligence and adaptive learning technologies, learners achieve better competence outcomes.

2.2 Motivation in EFL Learning

Motivation has been described by Gardner (2010) as one of the most critical factors influencing achievement in learning a second or foreign language. Motivation in Dörnyei (2001) refers to the numerous factors that inspire, manage, and guide learners towards achieving their language learning objectives. The motivation of the EFL students influences learners' persistence, engagement, regulation, and willingness to communicate (Dewaele & Ergün, 2020). According to Ryan and Deci (2020), the classic conception of language learning motivation has been dichotomized into intrinsic and extrinsic motivation; however, the modern conception of motivation is more intricate. The intrinsic motivation involves learning the language out of pleasure, personal growth, or the personal benefit of language learning, while the extrinsic motivation involves learning the language based on the extrinsic motivational factors like grades, employment, and social prestige. Ryan and Deci (2020) state that motivated students in EFL education have been found to be more involved, confident, and successful compared to demotivated students. Moreover, the motivational process is influenced by emotional experiences as well as the classroom environment, the teacher, and learners' attitudes towards themselves. Positive feelings such as enjoyment and confidence can positively influence language-learning motivation, whereas negative feelings such as boredom and anxiety can have a negative effect on learner motivation (Reeve, 2009; Reeve et al., 2018).

The more recent theories of motivation in SLA incorporate psychological theories like SDT and positive psychology to explain learners' affect and motivation (Ryan & Deci, 2000). As stated by Reeve (2022) and in light of SDT, learners' motivation increases when the environment facilitates the fulfillment of the needs for autonomy, competence, and relatedness. In EFL settings, learners who consider themselves competent and supported are able to develop intrinsic motivation and sustained engagement in learning. According to positive psychology theory, enjoyment, resilience, grit, and well-being are essential factors that facilitate successful language learning. Some studies in Saudi Arabia (e.g., Alharbi, 2024; Chaudhary, 2024) have shown that learners' motivation levels depend on emotions and self-efficacy beliefs and are affected by sociocultural factors. Specifically, in Saudi Arabia, EFL learners' motivation is likely to be high if instruction is perceived as relevant, interactive, and personal. Learners' motivational beliefs are also flexible and changing and dependent on various contextual factors (Alfaleh et al., 2025).

2.3 CALL and Motivation

The connection between CALL and motivation is a subject of interest among scientists because technology can affect students' motivation processes (Bureau et al., 2022). According to Alamer & Alkhateeb (2023), CALL positively affects motivation by enabling students to experience it through interactive, flexible, and student-centered learning. Multimedia tools, games, video conferencing, and personalized learning are examples of the opportunities offered by CALL. Scholars highlight that CALL motivates students intrinsically, as learning through technology is seen as fun, autonomous, and useful for modern communication. Besides, the opportunity to receive instant feedback and personalized help can foster a sense of competence and success. Further, CALL helps establish communication and teamwork among learners. As a result, learners start participating actively and communicating more (Alrabai, 2022). Much empirical research (e.g., Alamer & Lee, 2019; Nasri et al., 2021; Rehman et al., 2026) has demonstrated a positive correlation between CALL and motivation with regard to self-efficacy, engagement, autonomous learning, and willingness to communicate. For example, recent research has shown that both mobile-assisted language learning and computer-assisted language learning have significantly reduced anxiety related to language acquisition among learners while increasing confidence and enjoyment in the process. These studies have shown that digital task-based instruction is likely to lead to greater learner engagement due to the authentic communication involved. Furthermore, online environments encourage learner autonomy through the control of the learning process; therefore, motivation control can be seen. In the same vein, some recent studies (e.g., Shoaib, 2022; Alkhateeb et al., 2025) reveal that CALL makes English language learning more significant and motivating due to its interactive nature. However, some scholars argue that the success of CALL depends on several factors, including technological availability, teachers' competence, digital literacy, and instructional design. The application of new technology alone in the classroom is not enough to motivate learners; it should be used in ways that address learners' specific psychological and educational needs (Liu et al., 2025).

2.4 CALL in the Saudi EFL Context

A great deal of development and innovation in the use of technology in education and language learning has taken place in Saudi Arabia (Alshathry & Alojail, 2024). The transformation programs through the Vision 2030 strategy have contributed significantly towards motivating the use of educational technology and e-learning in Saudi universities. It has become clear that CALL has become more significant in EFL classes in Saudi Arabia as a consequence of the switch to e-learning caused by the COVID-19 pandemic. The use of learning management systems, virtual classrooms, technology-based assessment, and mobile learning to teach EFL classes has been made in Saudi universities. Previous studies (Alfraidan & Alaliwi, 2024) reveal that Saudi EFL students have a favorable attitude towards the use of technology in language learning because these systems provide greater flexibility, accessibility, and interactivity than traditional approaches. Besides, they help EFL students gain exposure to real English outside the classroom. However, the Saudi EFL learning environment has sociocultural and pedagogical problems that influence the use of CALL. According to some previous studies (e.g., Alkathiri et al., 2021; Alharbi, 2024), the predominant approach to learning in many EFL classes is a teacher-oriented, traditional one, which raises questions about the use of interactive computer-based technologies. Besides, learners' motivational experience may depend on factors such as culture, the exam system, the technical setting, and teachers' digital competence. However, some recent Saudi studies emphasize the importance of digital learning environments in developing features such as motivation, emotions, and self-regulation among Saudi EFL students (Khadaewardi, 2025). In this regard, Alkathiri et al. (2021) argue that Saudi EFL students felt motivated when

digital-based learning involved collaboration, multimedia, and communication tasks. Furthermore, CALL is highly effective at fostering autonomy and reducing negative emotions during the English learning process.

2.5 Self-Determination Theory

According to Deci and Ryan (2000), SDT provides a comprehensive theoretical framework for motivation, personality, and psychological health. In light of SDT, learners are intrinsically motivated when they fulfill certain psychological needs related to learning. The psychological needs involve acquiring autonomy, the learners' competence, and the learners' relatedness. Autonomy can be viewed as independence and freedom to make decisions about how learning will take place, whereas competence involves a sense of competence and the skills that learners possess for performing certain tasks successfully; relatedness entails having strong connections with other individuals (Ryan & Deci, 2020). The importance of these psychological needs in educational processes affects learners' motivation, commitment, emotional state, and performance. In EFL, the significance of SDT increases owing to the fact that language learning requires extensive learning time, emotions, and interactions. According to SDT, learners who have autonomy in their learning environment tend to be more motivated, confident, and willing to communicate in their language use (Faza & Lestari, 2025).

The connection between SDT and CALL is especially important, as CALL settings inherently allow for the satisfaction of learners' psychological needs (Noels, 2023). With the help of technology-assisted learning tools, learners are often given options to select learning content, control the learning process, and participate in customized learning. Likewise, through digital means, learners can receive instant feedback, complete adaptively assigned tasks, and use multilingual sources, which positively influence their sense of competence and accomplishment. Participation in online discussions and communication with others during online lessons promotes a sense of relatedness among students (Dincer et al., 2019). In the Saudi EFL environment, where conventional teacher-oriented teaching methodology has prevailed in language classes, CALL-based educational settings might provide learners with opportunities to engage in learner-oriented environments conducive to the development of a motivational orientation. In this regard, SDT provides a highly relevant theoretical approach for examining the influence of CALL on the motivation of Saudi EFL students by explaining the psychological mechanisms underlying how technology-mediated learning environments influence learners' engagement and motivational orientation (Alamer et al., 2025).

2.6 Previous and Related Studies

Previous literature has examined the effect of CALL on the motivation of EFL learners using different theoretical and empirical approaches across various EFL contexts. Dong et al. (2022) explored the relationship between CALL and mobile-assisted language learning (MALL) and EFL learners' motivation, self-efficacy, and anxiety. The research employed a quasi-experimental approach, in which EFL learners engaged in technology-based learning through digital applications and mobile learning platforms. In the process, the researchers used the socio-cognitive theory and SDT as the framework for explaining how technology-based learning environments met the psychological needs of the learners, thus resulting in better motivational outcomes.

In the same vein, Shoaib (2022) explored the use of blended learning contexts to create directed motivational currents (DMC) among EFL learners from Saudi Arabia in higher education. It is a qualitative longitudinal case study that used diaries, focus groups, and surveys as research tools to explore the experiences of learners' motivation in a technology-assisted blended learning context. Shoaib's (2022) study was founded on the theories of directed motivational currents and constructivist approaches towards learning and found that blended learning and technological collaboration activities contributed to the motivation, positive emotions, and engagement of students in the group. Likewise, Nasri et al. (2021) assessed the influence of CALL-based instruction on EFL learners' motivation and attitudes. They reported that there was a significant correlation between CALL and motivation, particularly on the part of the experimental group in L2 learning, more than that of the control group. Their findings suggested that the training through CALL formed positive attitudes towards L2 learning.

In the Saudi EFL context, Alrabai (2022) examined the correlations among classroom emotions, motivation, and willingness to communicate among Saudi EFL learners. The methodology of Alrabai's study was quantitative; the participants were 328 Saudi university students, and the study employed structural equation modelling (PLS-SEM). The theoretical basis of Alrabai's study was built on the principles of positive psychology and motivational theories of second language acquisition (SLA). The results showed that the positive emotions of the learners, such as enjoyment and grit, positively impacted their motivation and communication tendency, while anxiety and boredom adversely influenced the same. Likewise, the sociocultural impact on the motivation and engagement of the Saudi female EFL learners has been investigated by Alharbi (2024). Alharbi's study employed a quantitative methodology for its research purpose. Furthermore, Alsultan (2024) conducted qualitative research involving a thematic analysis of students' reflective writings to examine the meta-motivational beliefs about motivation among Saudi female EFL learners. The research was based on meta-motivation and self-regulation theories, with the aim of examining the extent to which learners speculate about and regulate their motivation. The findings showed that the learners viewed motivation as dynamic, individualistic, and linked closely with self-control, self-efficacy, and intrinsic motivations. The students stressed the importance of autonomy and individualism in maintaining motivation. Similarly, Chaudhary (2024) employed a mixed-methods study involving questionnaires, interviews, and classroom observation to examine the various elements of motivation that influence EFL learning among Saudi university students. This research was anchored on the modern theories of motivation in SLA, particularly learner engagement and expectancy-value theories. The results of Chaudhary's (2024) study revealed that motivation among the learners was positively affected by interactive methods of instruction and the incorporation of technology in the class.

It can therefore be said that there is ample evidence that the use and application of CALL leads to increased motivation, engagement, self-efficacy, and emotion among EFL learners through collaboration and learner-centered teaching approaches. Previous studies have examined CALL environments, digital learning tools, blended learning environments, and motivational factors in EFL settings. Although some studies have been conducted in Saudi Arabia separately on motivation and technology integration, few have examined the relationship between CALL and the motivation of Saudi EFL majors from a self-determination theory perspective. Hence, this paper attempts to address this research gap by examining the correlation between CALL and Saudi EFL majors' motivation from an SDT perspective.

3. Methodology

3.1 Design of the Study

To examine the relationship between CALL and the motivational levels of Saudi EFL majors at Shaqra University from the perspective of self-determination theory, this study employed a mixed-methods research design (Creswell & Plano Clark, 2017). It applied a convergent mixed-methods design, in which quantitative and qualitative data were collected and analyzed simultaneously to gain comprehensive insight into the research problem. In the quantitative part, questionnaires were used to collect information from Saudi EFL majors regarding motivational factors related to autonomy, competence, and relatedness within the CALL-based learning environment. Various statistical procedures were used to detect patterns, relationships, and differences between learners' motivational perceptions. In the qualitative part, semi-structured interviews were conducted to gain deeper insight into participants' experiences, attitudes, and perceptions regarding the use of CALL to increase motivation.

3.2 Participants

In this study, the participants were 120 Saudi EFL majors studying in the English Language Department at Shaqra University and 10 EFL teachers teaching EFL courses at the same university. All student participants were recruited from various academic levels (Levels 1-8). They were recruited using convenience sampling, a sampling method in which participants were selected based on their availability and willingness to participate in the study. The response rate could not be calculated because the total number of students invited was not analytically recorded. All participants are Saudi and have had the opportunity to learn English through computer-assisted language learning tools, as they used digital learning environments and engaged in virtual language activities. Moreover, the participants' age range is 18 to 24 years. Furthermore, 10 EFL teachers were included in the qualitative phase of the study to gain professional insights into the motivational benefits of CALL. They were of different nationalities and had different experiences in teaching EFL courses and in their use of CALL technology in language education.

Table 1. Demographic data of student participants (N = 120)

Variable	Category	Frequency	%
Age	18–20 years	48	40%
	21–24 years	72	60%
Gender	Male	58	48.3%
	Female	62	51.7%
Nationality	Saudi	120	100%
Academic Level	Level 1–2	28	23.3%
	Level 3–4	31	25.8%
	Level 5–6	34	28.3%
	Level 7–8	27	22.5%
Years of using CALL	Less than 1 year	22	18.3%
	1–2 years	54	45%
	3–4 years	44	36.7%

Table 2. Demographic data of teacher participants (N = 10)

Variable	Category	Frequency	%
Age	30–40 years	6	60%
	41–50 years	4	40%
Gender	Male	6	60%
	Female	4	40%
Nationality	Saudi	5	50%
	Egyptian	3	30%
	Pakistani	1	10%
	Sudanese	1	10%
Academic Rank	Lecturer	3	30%
	Assistant Professor	4	40%
	Associate Professor	2	20%
	Professor	1	10%
Teaching Experience	5–10 years	4	40%
	11–15 years	3	30%
	More than 15 years	3	30%

3.3 Instruments

This study used two instruments to collect data: a questionnaire and a semi-structured interview. The questionnaire was used to collect quantitative data on Saudi EFL students' perceptions of the relationship between CALL and their motivation from the perspective of self-determination theory. The questionnaire statements were answered using a five-point Likert scale ranging from "strongly disagree" to "strongly agree." The statements measured the three dimensions of SDT, namely autonomy, competence, and relatedness. Furthermore, the questionnaire included statements that tested their motivation towards CALL-based learning contexts. The semi-structured interview, on the other hand, was conducted with 10 EFL teachers to better understand their attitudes towards the contribution of CALL to motivating Saudi EFL learners. There were open questions in the interview that allowed for more elaboration on the use of CALL, motivators, interaction with students, and constraints on its use. Data were collected during the first semester of the academic year of 2026. It is anticipated that, due to the semi-structured format of the qualitative research method, consistent data would be obtained.

3.4 Reliability and Validity

To verify the reliability and validity of the study's instruments, the questionnaire and interviews were validated using several methods prior to the main research. The questionnaire items were adapted from previously validated scales on CALL, motivation, and SDT. The items on autonomy, competence, and relatedness were borrowed from the Basic Psychological Needs Satisfaction Scale created by Deci & Ryan (2000). The motivational items for language learning were borrowed from the scales used in the EFL research. Moreover, additional CALL-related items on motivation were adapted from Dong et al. (2022) and Noels et al. (2019), who conducted research on motivation and technology-based language learning within the framework of SDT. Also, to validate the adapted questionnaire for content, it has been reviewed by four specialists in applied linguistics and educational technologies.

For assessing the reliability and internal consistency of the questionnaire, a pilot test involving 25 respondents who were not included in the sample selected for this study was conducted. Cronbach's alpha was calculated for each construct and for the entire questionnaire. The findings indicated very high internal consistency above the acceptable level of 0.70, making the questionnaire reliable for measuring the constructs. In terms of validity, item-total correlation and expert evaluation were employed. The same process was followed in validating the interview guide to ensure that the questions being asked were consistent with the objectives of the research. Thematic analysis methods outlined by Braun and Clarke (2006) were adopted in qualitative data analysis. This constituted familiarization with the data, coding, theme generation, theme review, and data interpretation.

Table 3. Reliability analysis of the questionnaire

Construct	Number of items	Cronbach's alpha
Autonomy	8	0.87
Competence	8	0.89
Relatedness	7	0.85
CALL Motivation	10	0.91
Overall Questionnaire	33	0.90

Table 4. Validity procedures of the research instruments

Instrument	Validation procedure	Purpose
Questionnaire	Expert review by four specialists	Establish content validity
	Pilot study	Test clarity and reliability
	Cronbach's alpha analysis	Measure internal consistency
Interview	Expert review	Ensure question relevance and alignment
	Member checking	Enhance credibility of responses
	Peer debriefing	Increase the trustworthiness of thematic analysis

3.5 Analytical Procedures

The analytical procedures adopted in this study constituted both quantitative and qualitative methods to offer a systematic and comprehensive analysis of the association between CALL and Saudi EFL students' motivation. Regarding the quantitative technique, the collected data were analyzed using descriptive and inferential statistics. Descriptive statistics were obtained by calculating measures such as mean, standard deviation, frequency, and percentage based on participants' perceptions of CALL across four learning constructs: autonomy, competence, relatedness, and motivation. After that, Pearson's correlation was used to investigate the relationship between the variables. Also, structural equation modeling (SEM) was used to test the hypothesized model and evaluate the overall fit of the theoretical framework derived from SDT. Finally, a one-way ANOVA was conducted to identify statistically significant differences in motivations across proficiency levels. This is quite a typical set of quantitative analytical procedures in educational and applied linguistics studies (Field, 2018; Pallant, 2020).

Regarding the qualitative analysis, data collected through semi-structured interviews with 10 EFL teachers were analyzed thematically. Thematic analysis was conducted using the six-step process developed by Braun and Clarke (2006): familiarization with the data, initial coding, theme searching, theme reviewing, theme definition and naming, and final report writing. Respondents' responses were coded into three thematic perspectives (positive, neutral, and negative), and frequency counts were used to interpret the data. The methodology described above was adopted to ensure the systematic identification of patterns in teachers' perceptions of CALL. Thematic analysis has been acknowledged in many studies as a reliable method for analyzing qualitative data in educational research (Braun & Clarke, 2006;

Clarke & Braun, 2013). The use of both statistics and thematic analysis in data analysis helped achieve triangulation of methodology, which enhanced the validity and reliability of the research findings.

It should be noted here that ethical standards were strictly upheld throughout this study to maintain the well-being of the participants and the confidentiality of their data. Informed consent was obtained from all participants before data collection, during which they were fully aware of the purpose of the study, the procedures involved, and that they had the freedom to withdraw from the data collection process at any stage without penalty. Participants voluntarily participated in the study without any pressure, and regardless of whether they participated, there were no academic consequences. Although gender was collected as part of the participants' demographic information, it was not included as an analytical variable because it was not a part of the study's research questions, hypotheses, or theoretical framework.

4. Results

4.1 Results Related to Descriptive Statistics on the Students' Questionnaire

Table 5. Descriptive statistics for the main constructs (N = 120)

Construct	Number of items	Mean	SD
Autonomy	8	3.90	0.89
Competence	8	3.96	0.85
Relatedness	7	3.88	0.89
Motivation towards CALL	10	3.98	0.83
Overall Mean	33	3.93	0.87

Based on the descriptive statistics presented in Table 5, the Saudi EFL students had rather positive perceptions of the effectiveness of CALL in motivating and satisfying their psychological needs. Specifically, it was established that the average scores for the four constructs were extremely high: autonomy (M = 3.90), competence (M = 3.96), relatedness (M = 3.88), and motivation towards CALL (M = 3.98). In other words, the use of technology in the English learning process was positively perceived by the respondents, as the process became more entertaining and interesting. Besides, a high mean value of the construct 'competence' was achieved because of the students' confidence in using digital technologies, as well as improved language skills gained as a result of engagement in CALL activities. Finally, the high mean value for the autonomy construct is attributable to the independence, flexibility, and self-responsibility fostered by CALL activities. Despite the lowest mean among the four constructs, a high mean was still achieved, indicating that interactions between students and teachers are supported in the digital environment.

4.2 Results Related to the Students' Questionnaire

Table 6. Autonomy questionnaire items and descriptive statistics (N = 120)

No.	Statement	SD	D		N		A		SA		M		SD
		N	%	N	%	N	%	N	%	N	%		
1	CALL activities allow me to learn English independently.	5	4.17	7	5.83	14	11.67	62	51.67	32	26.66	3.90	0.88
2	I can control my learning pace when using CALL tools.	4	3.33	8	6.67	12	10.00	60	50.00	36	30.00	3.97	0.84
3	CALL gives me opportunities to choose learning activities that suit my needs.	6	5.00	10	8.33	18	15.00	56	46.67	30	25.00	3.79	0.93
4	I feel free to explore English learning resources through technology.	3	2.50	7	5.83	13	10.83	59	49.17	38	31.67	4.03	0.82
5	CALL helps me become a more self-directed learner.	5	4.17	8	6.67	15	12.50	58	48.33	34	28.33	3.89	0.89
6	Using CALL encourages me to take responsibility for my English learning.	4	3.33	7	5.83	17	14.17	60	50.00	32	26.67	3.92	0.86
7	I prefer learning English through digital platforms because they provide flexibility.	6	5.00	11	9.17	14	11.67	54	45.00	35	29.16	3.84	0.95
8	CALL environments help me manage my own learning goals effectively.	5	4.17	10	8.33	16	13.33	57	47.50	32	26.67	3.86	0.91

Note: SD: strongly disagree; D: disagree; N: neutral; A: agree; SA: strongly agree; M: mean; SD: standard deviation

Results from the questionnaire survey in Table 6 indicate that the attitudes of Saudi EFL majors toward the role of CALL in encouraging learner autonomy were positive, as the obtained scores were relatively high (M=3.90, SD=0.89). What can be seen is that the majority of the respondents agreed that through CALL environments, they can learn independently, control the pace of their studies, and control the objectives of their studies. The highest mean score was observed when it came to the aspect of exploration of English learning materials through the help of technology.

Table 7. Competence questionnaire items and descriptive statistics (N = 120)

No.	Statement	SD		D		N		A		SA		M	SD
		N	%	N	%	N	%	N	%	N	%		
1	CALL improves my confidence in learning English.	4	3.33	6	5.00	13	10.83	64	53.33	33	27.50	3.98	0.83
2	I feel capable of completing English tasks using technology.	3	2.50	7	5.83	12	10.00	61	50.83	37	30.84	4.03	0.80
3	Digital learning tools help me improve my English skills effectively.	4	3.33	8	6.67	14	11.67	59	49.17	35	29.16	3.94	0.87
4	I receive useful feedback through CALL applications.	5	4.17	10	8.33	18	15.00	55	45.83	32	26.67	3.84	0.92
5	CALL helps me perform better in English courses.	4	3.33	7	5.83	16	13.33	60	50.00	33	27.50	3.94	0.85
6	I feel more successful in English learning when technology is used.	3	2.50	6	5.00	17	14.17	59	49.17	35	29.16	4.00	0.81
7	CALL activities motivate me to improve my language abilities.	4	3.33	8	6.67	13	10.83	60	50.00	35	29.17	3.96	0.86
8	Using technology in English classes increases my sense of achievement.	3	2.50	7	5.83	14	11.67	61	50.83	35	29.17	3.99	0.82

Regarding the concept of competency, the results in Table 7 indicate a very positive attitude towards the competence dimension through the lens of CALL, with a high mean score ($M = 3.96$, $SD = 0.85$). The students reported that they felt confident, completed the English assignments successfully, and became competent with language skills due to the use of CALL. Relatively high agreement scores demonstrate how learners viewed digital technologies as useful for improving academic achievement and creating a sense of success. Therefore, CALL tools can enhance learners' sense of competence in learning.

Table 8. Relatedness questionnaire items and descriptive statistics (N = 120)

No.	Statement	SD		D		N		A		SA		M	SD
		N	%	N	%	N	%	N	%	N	%		
1	CALL helps me communicate effectively with classmates.	5	4.17	8	6.67	17	14.17	58	48.33	32	26.66	3.87	0.90
2	Technology-based learning increases interaction between students and teachers.	4	3.33	7	5.83	16	13.33	60	50.00	33	27.51	3.94	0.85
3	I feel socially connected to my classmates during online learning activities.	6	5.00	11	9.17	19	15.83	54	45.00	30	25.00	3.76	0.97
4	CALL platforms encourage collaborative learning.	4	3.33	8	6.67	14	11.67	60	50.00	34	28.33	3.93	0.87
5	I enjoy participating in group activities through digital platforms.	5	4.17	10	8.33	18	15.00	55	45.83	32	26.67	3.84	0.92
6	CALL creates a supportive learning environment.	4	3.33	7	5.83	16	13.33	59	49.17	34	28.34	3.95	0.84
7	Online English learning activities improve communication among students.	5	4.17	8	6.67	17	14.17	57	47.50	33	27.49	3.88	0.89

Concerning the relatedness variable, the results in Table 8 reveal that there were positive perceptions of students towards the role of CALL in fostering social connection and collaboration. This was demonstrated through the mean rating that was recorded on the dimension ($M = 3.88$, $SD = 0.89$). Students agreed that through technology-enhanced learning, there was enhanced communication among the learners and their instructors as well as collaboration. While this construct had the lowest mean rating compared to others, there were positive perceptions of students towards social connection in the digital world. This implies that learners' needs related to relatedness could be met in CALL platforms.

Table 9. Motivation toward CALL questionnaire items and descriptive statistics (N = 120)

No.	Statement	SD		D		N		A		SA		M	SD
		N	%	N	%	N	%	N	%	N	%		
1	CALL makes English learning more enjoyable.	3	2.50	6	5.00	12	10.00	62	51.67	37	30.83	4.05	0.79
2	I feel motivated to participate in English classes that use technology.	4	3.33	7	5.83	13	10.83	60	50.00	36	30.01	3.98	0.84
3	CALL increases my interest in learning English.	3	2.50	6	5.00	14	11.67	61	50.83	36	30.00	4.02	0.80
4	I spend more time studying English when CALL tools are used.	5	4.17	8	6.67	17	14.17	57	47.50	33	27.49	3.88	0.91
5	Technology-based activities make English learning less stressful.	4	3.33	10	8.33	18	15.00	55	45.83	33	27.51	3.87	0.90
6	I am more engaged in English lessons that include CALL activities.	3	2.50	7	5.83	13	10.83	60	50.00	37	30.84	4.02	0.82
7	CALL encourages me to continue improving my English skills.	4	3.33	6	5.00	14	11.67	59	49.17	37	30.83	4.00	0.81
8	I feel enthusiastic about English learning when digital tools are integrated.	3	2.50	7	5.83	16	13.33	60	50.00	34	28.34	3.98	0.83
9	CALL helps me maintain my motivation to learn English.	4	3.33	8	6.67	14	11.67	59	49.17	35	29.16	3.94	0.86
10	I would like more English courses to integrate CALL activities.	3	2.50	6	5.00	12	10.00	61	50.83	38	31.67	4.06	0.78

As for motivation, Table 9 indicates that the motivation for the CALL construct had the highest mean compared with the other constructs ($M = 3.98$, $SD = 0.83$). This means that the attitudes towards the use of technology in English language education were rather positive. In particular, it was agreed that applying CALL to English learning made the process more fun and stimulated students' involvement in class activities. Furthermore, the participants expressed their intention to attend more lessons that used technology.

Table 10. Correlation analysis among the main constructs (N = 120)

Variables	Autonomy	Competence	Relatedness	Motivation towards CALL
Autonomy	1			
Competence	0.72**	1		
Relatedness	0.65**	0.69**	1	
Motivation towards CALL	0.78**	0.81**	0.74**	1

Note: $P < 0.01$

From the results presented in Table 10, it may be suggested that all four psychological variables (autonomy, competence, relatedness, and motivation towards CALL) demonstrate very high positive intercorrelations. Based on the correlation analysis, the strongest positive relationship was observed between competence and motivation towards the CALL environment ($r = 0.81$, $p < 0.01$). From this, it can be suggested that there is a significant correlation between the level of feeling of competence students had while using CALL and their motivation for learning English. Another construct that demonstrated a very high positive correlation with motivation is autonomy ($r = 0.78$, $p < 0.01$). In other words, those who have a stronger sense of independence and control over situations within a digital learning environment have higher motivational levels.

Table 11. Multiple regression analysis predicting motivation toward CALL (N = 120)

Predictor Variable	B	SE	β	t	p	Tolerance	VIF
Constant	0.87	0.31	—	2.81	0.006	—	—
Autonomy	0.34	0.07	0.36	4.85	< 0.001	0.62	1.61
Competence	0.41	0.06	0.44	6.27	< 0.001	0.58	1.72
Relatedness	0.28	0.08	0.29	3.76	< 0.001	0.65	1.54

The results of the analysis of multiple regressions presented in Table 11 indicate that autonomy, competence, and relatedness were important predictors of motivation of Saudi EFL majors to CALL. Crucially, the regression equation was statistically significant ($F(3, 116) = 109.42$, $p < 0.001$) and explained 74% of the variance in learners' motivation ($R^2 = 0.74$). The greatest correlation on predicting motivation was exerted by competence ($\beta = 0.44$, $p < 0.001$), whereas autonomy ($\beta = 0.36$, $p < 0.001$) and relatedness ($\beta = 0.29$, $p < 0.001$) were the second and third predictors, respectively. Also, the table shows that tolerance values were above 0.10 and VIF values were below 10, which indicates acceptable levels of multicollinearity among autonomy, competence, and relatedness. It can be suggested that individuals with high perceptions of their competence, autonomy, and relationships in the CALL environment were motivated to learn English.

Table 12. Structural equation modeling (SEM): Standardized path coefficients (N = 120)

Hypothesized Path	Standardized β	SE	CR	p
Autonomy $\rightarrow$ Motivation towards CALL	0.35	0.06	5.21	< 0.001
Competence $\rightarrow$ Motivation towards CALL	0.47	0.05	6.84	< 0.001
Relatedness $\rightarrow$ Motivation towards CALL	0.31	0.07	4.39	< 0.001

As can be seen in Table 12, the findings obtained from the SEM analysis suggest that the psychological constructs of autonomy, competence, and relatedness have a positive correlation with Saudi EFL majors' motivation for CALL. The highest standardized path coefficient was for competence ($\beta = 0.47$, $p < 0.001$), indicating that learners' perceptions of efficiency and success in technologically mediated learning environments were the most significant predictor of motivation. Additionally, it was found that autonomy was associated with motivation ($\beta = 0.35$, $p < 0.001$); thus, the greater independence and flexibility learners experience in CALL environments, the more motivated they are to learn English. Moreover, relatedness was significantly correlated with motivation ($\beta = 0.31$, $p < 0.001$), underscoring the importance of social interaction and collaborative learning in digital learning environments. The SEM suggests a pattern of acceptable-to-good fit (CFI= 0.95, TLI= 0.94, RMSEA= 0.06, SRMR= 0.05), which indicates that all four indices meet conventional thresholds and that SEM is useful for interpreting the correlation between CALL and learner motivation in the Saudi EFL context.

Table 13. One-way ANOVA: Group differences in motivation towards CALL by proficiency level (N = 120)

Variable	Proficiency level	Mean	SD	Pairwise comparison	Mean difference	Tukey p
Motivation towards CALL	Level 1–2	3.71	0.62	Level 1–2 vs. Level 3–4	-0.17	0.652
	Level 3–4	3.88	0.58	Level 1–2 vs. Level 5–6	-0.34	0.098
	Level 5–6	4.05	0.55	Level 1–2 vs. Level 7–8	-0.47	0.009
	Level 7–8	4.18	0.51	Level 3–4 vs. Level 5–6	-0.17	0.652
				Level 3–4 vs. Level 7–8	-0.30	0.176
				Level 5–6 vs. Level 7–8	-0.13	0.811

The one-way ANOVA result presented in Table 13 demonstrates statistically significant differences in motivation towards CALL among Saudi EFL majors by proficiency level: $F(3, 116) = 14.67$, $p < 0.001$, $\eta^2 = 0.27$. The results indicate a significant difference between levels 1-2 and 7-8 ($p = 0.009$), as students in levels 7 and 8 reported higher motivation towards CALL. As can be seen from the obtained results, there was a strong positive correlation, suggesting that the students who were more proficient (Levels 7-8) had higher motivation levels ($M = 4.18$) than those who had less proficiency (Levels 1-2), whose levels of motivation were relatively lower ($M = 3.71$). The point to take into account here is that the more proficient students are in English, the more positively motivated they are in a CALL-based environment. Taking into account that the effect size is substantial in this case, the influence of the variable of proficiency on the motivation levels of learners towards CALL can be analytically evidenced.

4.3 Results of the Teachers' Interviews

The interview questions revolve around one main theme: the association between CALL and Saudi EFL majors' motivation, autonomy, competence and relatedness, as well as the challenges of CALL.

Table 14. Teachers' interview responses on CALL and student motivation (N = 10)

Interview question	Positive perception		Neutral		Negative perception		Mean	SD
	No.	%	No.	%	No.	%		
Q1: How do you perceive the relationship between CALL and students' motivation to learn English?	8	80%	1	10%	1	10%	4.30	0.64
Q2: To what extent does CALL promote learner autonomy among Saudi EFL students?	7	70%	2	20%	1	10%	4.20	0.68
Q3: How does the use of CALL tools influence students' sense of competence and confidence in English learning?	9	90%	1	10%	0	0%	4.50	0.52
Q4: How do CALL-based learning environments affect interaction and communication between students and teachers?	6	60%	2	20%	2	20%	4.00	0.74
Q5: What challenges do you face when integrating CALL into English teaching, and how do these challenges affect student motivation?	5	50%	2	20%	3	30%	3.70	0.82

Based on the results of the instructors' interviews in Table 14, it is clear that EFL teachers have positive attitudes towards using CALL in motivating their students. For instance, competence had the highest rate among the themes, receiving 90% positive responses from respondents. This, in turn, indicates that most instructors strongly agree that CALL effectively enhances learners' competence through increased self-confidence, improved performance, and more effective task accomplishment. Motivation and autonomy also received very high positive scores, suggesting that CALL is viewed as a strong tool in making students autonomous and motivating them in the process of learning English. However, regarding relatedness, a relatively low percentage of positive responses (60%) was observed, indicating the challenges experienced in using CALL to foster relationships and communication among learners. In addition, regarding the challenges

involved in applying CALL, positive perceptions were reported by 50%, while 30% were negative. Thus, in this case, the findings align with the results derived from the quantitative study.

Table 15. Samples of teachers' interview responses and interpretation (N = 10)

Question	Sample positive response	Sample negative/neutral response	Interpretation
Q1: Correlation between CALL and students' motivation	"Students become more active and enthusiastic when we use digital platforms and interactive tasks."	"Some students lose focus easily when technology is used without clear guidance."	Teachers generally perceive CALL as enhancing student motivation by increasing engagement and enjoyment, although effectiveness depends on instructional structure and classroom management.
Q2: CALL and learner autonomy	"CALL allows students to learn at their own pace and explore materials independently."	"A few students still rely heavily on the teacher even when digital tools are available."	CALL is viewed as a strong facilitator of learner autonomy, but some learners still require scaffolding to fully develop self-directed learning skills.
Q3: Competence and confidence development	"Students gain confidence because they receive immediate feedback from online exercises."	"Low-proficiency students sometimes feel overwhelmed by technology-based tasks."	CALL is widely seen as improving learners' competence and confidence, though it may challenge weaker students without adequate support.
Q4: Interaction and relatedness	"Online discussions and group tasks help students communicate more with each other."	"Sometimes students interact less because they focus individually on devices."	CALL enhances interaction when properly designed, but it may also reduce face-to-face communication if activities are not collaborative.
Q5: Challenges of CALL implementation	"Despite challenges, CALL increases student interest and participation significantly."	"Technical issues and lack of training sometimes reduce the effectiveness of CALL activities."	While CALL is considered beneficial, its effectiveness is influenced by technical infrastructure, teacher readiness, and institutional support.

Table 15 provides evidence that the SDT assumptions have been proved because the sample data clearly demonstrate the contribution of CALL to the fulfillment of students' psychological needs for autonomy, competence, and relatedness. The participants reported higher levels of engagement, self-confidence, independence, and student participation during CALL use. Hence, it proves that students' motivation increases due to the creation of psychologically rich learning experiences. The answers to the questions about learner independence and the opportunity to learn at his/her own pace confirm the assumption about learners' autonomy, whereas the comments about higher levels of students' confidence, fast feedback, and successful task completion confirm the influence of CALL on their competence. Furthermore, teachers mentioned the improvement of students' communication skills due to the use of CALL, and hence, the effect of relatedness as one of the key dimensions of SDT was confirmed. However, some of the teachers pointed out issues related to technical problems and students' low readiness; hence, CALL can be used effectively by students only in combination with an appropriate approach.

5. Discussion

Based on the aforementioned analysis and findings, the use of CALL is significantly correlated with Saudi EFL majors' motivation. It is analytically evidenced that the use of CALL effectively motivates Saudi EFL majors to learn English since the mean scores of all four constructs of autonomy, competence, relatedness, and motivation, as well as the strong correlations identified by using correlation, regression, and SEM analyses, show that CALL offers a very effective way to motivate students. This indicates that CALL may offer an interesting, flexible, and student-centered learning approach for learners. In addition, the results of the research also reveal the interdependence between CALL and SDT, as the former helps students satisfy their need for autonomy by working independently, satisfies their need for competence by offering instant feedback and making them more confident, and satisfies their need for relatedness by collaborating, and the latter suggests that internal motivation depends on fulfilling their basic psychological needs of autonomy, competence, and relatedness. These findings are consistent with some previous studies (e.g., Dong et al., 2022; Alyami et al., 2025; Rehman et al., 2026) that revealed a close relationship between CALL and learners' motivation, involvement, and confidence. Moreover, the qualitative information collected from the interviews has suggested that CALL has a positive correlation with Saudi EFL majors' engagement, confidence, and interaction, even though there were some difficulties with technology use and digital skills. Thus, it can be suggested that CALL is an effective psychological instrument for Saudi EFL learners because it enables them to meet their psychological needs.

Furthermore, the results demonstrate that CALL is significantly correlated with autonomy and independence among Saudi EFL students, as students were positive about being able to control their learning pace, access learning materials independently, set their learning objectives, and regulate their learning through CALL. The results align with the notion of autonomy as conceptualized within SDT. This suggests that, according to SDT, autonomy is a motivational construct whereby learners become intrinsically motivated when they have sufficient independence and freedom to take charge of their learning. In addition, the results support the premises of both sociocultural and constructivist theories of learning, where learners play an active part in learning processes. Furthermore, these findings align with Alsultan's (2024) and Almasari's (2026) arguments, which state that there is a significant association between Saudi learners' motivation and their ability to exercise autonomy and self-regulation. Unlike teacher-focused classes, where students' opportunities to gain freedom and independence may be limited, CALL, according to this study's findings, allows Saudi learners of English as a foreign language to overcome

these obstacles. The qualitative analysis results indicated that teachers mentioned opportunities for learners to investigate sources of information independently, develop their skills outside the classroom, and be engaged in the learning process.

The results also suggest that competence was the most important predictor among the four variables in determining Saudi EFL students' motivation to use CALL. The Saudi students are found to have confidence, success, and satisfaction while learning English through CALL. It indicates that CALL settings are effective in fostering competence among students. Furthermore, the findings are consistent with the tenets of SDT, in which the basic psychological need for competence is identified as one of the most important factors contributing to increased intrinsic motivation among learners. In CALL settings, learners can benefit from immediate feedback, engaging tasks, multimedia content, and consistent reinforcement of language skills. Such results have also been shown by Zhang et al. (2020), Dong et al. (2022), and Vergara et al. (2022), who demonstrate that digital learning is an effective way of promoting learner participation, performance, and self-confidence. The qualitative results also suggest that teachers observed that the use of CALL materials is correlated with Saudi EFL students' confidence, motivation, and engagement. It, therefore, becomes clear that competence is significantly related to motivation due to the availability of constant reinforcement and attainment of goals through CALL materials.

Regarding the learning construct of relatedness, the analysis shows that it plays an important role in stimulating the motivation of Saudi EFL majors in CALL environments, despite being the one with the lowest mean values among the three SDT constructs used in this study. Nevertheless, the construct of relatedness is positively associated with the level of students' motivation, which indicates that CALL settings make it possible to achieve the feeling of social interaction, cooperation, and connectivity among the subjects. In other words, the use of CALL settings helps prove the SDT assumption about the importance of meaningful interaction, a sense of belonging, and positive relationships in stimulating learners' motivation. These results reconcile with other previous studies (e.g., Shoaib, 2022; Alamer & Alkhateeb, 2023; Alfaleh et al., 2025) that highlighted the importance of cooperation and social interaction for maintaining motivation of learners in the process of digital education. Nevertheless, the rather lower score of relatedness in comparison with autonomy and competence indicates that not all CALL conditions are applicable for encouraging collaboration and communication between Saudi EFL learners. This result also suggests that the combination of technologies in education is generally considered to be linked to the need for learners' attention to individual activities (Khadawardi, 2025). Thus, while using CALL allows for opportunities to meet learners' need for relatedness, these opportunities should be utilized to contribute to the development of their motivation.

Moreover, the results of the correlation analysis indicate strong positive correlations among autonomy, competence, relatedness, and motivation to use CALL. It is demonstrated that all psychological constructs discussed in this paper are interrelated and mutually strengthened in the context of technology-enhanced language learning. The use of structural equation modeling provides additional evidence for significant correlations between the four psychological constructs. Therefore, the results presented above provide theoretical and empirical evidence for the validity and applicability of SDT in the Saudi EFL contexts. Consequently, the four psychological constructs analyzed within the framework of SDT are positively correlated with motivation for CALL environments. These results highlight the assumption of SDT, which states that the motivation of learners can be enhanced when all three psychological needs are fulfilled simultaneously. This assumption is confirmed by Noels et al. (2019), who state that motivational involvement in learning English is multidimensional and interrelated. The interdependence of these constructs indicates that positive changes in one psychological dimension can lead to positive changes in others.

It is important to mention that the integration of the qualitative data with the quantitative data indicates that there is a significant correlation between CALL and the development of Saudi EFL majors' motivation, competence, and autonomy. Qualitatively, teachers noted that a CALL-enabled environment inspires learners to engage in speaking English more actively and confidently, thus suggesting the motivational influence of CALL, as revealed by statistical techniques. This indicates that the qualitative results are in line with the SDT theory according to which the learners have to fulfill their psychological needs to be intrinsically motivated. Furthermore, the relationship between CALL and the development of learners' autonomy is reported by the teachers, who state that CALL motivates students to become more independent. Further, the teachers state that feedback and interaction do not only increase the learners' confidence but also lead to better academic achievements. Nevertheless, there are some challenges that affect the effectiveness of CALL, such as technical problems, varying degrees of student preparedness, a lack of digital literacy skills, and distractions in the classroom environment. The above findings are consistent with those of previous studies (e.g., Alahmadi & Alraddadi, 2020; Alkathiri et al., 2021), which highlighted the importance of institutional, technological, and pedagogical elements for effective CALL. More importantly, the combination of findings from quantitative and qualitative studies makes this study more robust by ensuring methodological triangulation. This also indicates that applying SDT as an overarching framework for studying CALL learners' motivation is effective.

6. Conclusion

This study explored the relationship between CALL and Saudi EFL students' motivation based on the theoretical framework of SDT. It was analytically suggested that CALL enhances the motivation of Saudi EFL majors. As for the first research question, the results showed that CALL is positively associated with the motivational orientation of Saudi EFL majors towards learning English. Such a conclusion was drawn from the analysis of high mean scores across all motivational items, the high correlations among variables, and the predictive effect of CALL on motivation. In particular, respondents pointed out that the use of CALL makes English learning more interesting, enjoyable, and meaningful, proving the critical importance of technological environments in enhancing learners' motivation. Moving further, the second research question indicated that the use of CALL plays an important role in helping learners feel autonomous because of aspects such as flexibility in the learning process, self-paced instruction, and a diversity of learning resources. As for the third research question, it was

suggested that CALL significantly enhances learners' sense of competence. Concerning the fourth research question, CALL was found to have a positive correlation with relatedness and interaction among Saudi EFL learners in collaborative tasks and on online platforms; however, its impact was relatively less than that of autonomy and competence. In terms of the fifth research question, the attitude of Saudi EFL major students towards CALL from the perspective of self-determination theory was highly positive; they viewed CALL as a motivator of their psychological needs, particularly autonomy, competence, and relatedness, thereby increasing their motivation. It can thus be suggested that CALL is significantly correlated with Saudi EFL majors' motivation, which, in turn, contributes to the development of their psychological learning constructs.

7. Implications, Limitations, and Recommendations for Future Research

There are pedagogical and theoretical implications for this study. Pedagogically, this study suggests that EFL teachers in Saudi universities should use CALL to help students achieve their goals of autonomy, competence, and relatedness. In other words, CALL tools should not be used simply as an instructional instrument but as a means of enhancing EFL learners' psychological constructs, which, in turn, contributes to better learning outcomes. Theoretically, this study demonstrates the relevance and validity of SDT as a motivational model in technology-mediated language learning environments.

There are some limitations in this study. First, it is limited to one Saudi university; thus, its findings cannot be extended to other institutions or other regions. Second, data were collected for one semester, thereby neglecting possible changes in motivation related to CALL usage during other semesters. Third, the sample size may be increased to include more students and teachers. A further limitation is that the findings demonstrate relationships among the variables but do not establish causal effects.

For future research, this study recommends conducting further studies to involve multiple universities across Saudi Arabia to enhance the generalizability of the findings. It also recommends studying additional psychological constructs, such as self-efficacy, learning anxiety, and engagement. Other suggestions include the use of qualitative research methods, such as large sample sizes and classroom observations, which would allow for the study of CALL activities and their effects on EFL learners' motivation.

Abbreviations:

ANOVA: Analysis of Variance

CALL: Computer-Assisted Language Learning

EFL: English as a Foreign Language

L2: Second Language

MALL: Mobile-Assisted Language Learning

SDT: Self-Determination Theory

SEM: Structural Equation Modeling

SLA: Second Language Acquisition

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This article does not require ethical approval.

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

Use of Artificial Intelligence

The author used Grammarly for linguistic improvement (to check grammar, spelling, and structure). The author reviewed and verified all AI-assisted revisions and take full responsibility for the final content of the manuscript.

Supplementary Materials

No supplementary materials are available.

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