

The Impact of Brain-Compatible E-Learning Platforms on Enhancing Motivation in Learning English Skills Among EFL Students

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ABSTRACT:- This study investigated the impact of brain-compatible e-learning platforms on enhancing students' motivation to learn English language skills in the English Departments at the Faculties of Education in Zolten and Sorman and the Faculty of Arts in Aljumail, affiliated with the University of Sabratha. The study examined students' perceptions of these platforms, the effectiveness of their features, their role in enhancing motivation, and their contribution to developing English language skills. A descriptive-analytical method was adopted, and data were collected through a questionnaire administered to a sample of 90 students. The findings revealed highly positive perceptions of brain-compatible e-learning platforms, with an overall mean of 4.19 (83.8%), alongside a high level of motivation to learn English language skills, with a mean of 4.18 (83.6%). Pearson's correlation analysis indicated strong, statistically significant positive relationships between platform design and motivation ($r = 0.756$, $p < 0.05$), platform features and motivation ($r = 0.744$, $p < 0.05$), and overall platform effectiveness and motivation ($r = 0.750$). Regression analysis showed that the platform dimensions explained 56.3% of the variance in students' motivation ($R^2 = 0.563$), with platform design emerging as the strongest predictor. The study concluded that brain-compatible e-learning platforms significantly enhance motivation and support English language learning. It recommended integrating brain-compatible principles into platform design and providing instructors with relevant training.

I. INTRODUCTION:

In recent decades, the rapid development of information and communication technologies has significantly transformed educational systems worldwide. One of the most notable outcomes of this transformation is the increasing adoption of e-learning platforms, which have become essential tools for facilitating teaching and learning processes. These platforms offer flexible learning environments that allow students to access educational resources anytime and anywhere, thereby promoting autonomous learning, interaction, and collaboration among learners (Garrison, 2017).

Within the context of language education, particularly English as a Foreign Language (EFL) learning, technological integration has played a critical role in enhancing students' engagement and learning outcomes. Digital platforms provide interactive features such as multimedia content, online discussions, instant feedback, and adaptive learning environments, which support the development of various language skills including listening, speaking, reading, and writing (Dörnyei & Ushioda, 2011).

Alongside technological advancements, research in educational neuroscience has contributed to the emergence of brain-based learning, also referred to as brain-compatible learning. This approach focuses on designing instructional strategies that align with the natural functioning of the human brain. Brain-based learning emphasizes meaningful learning experiences, emotional engagement, active participation, and multisensory instruction to improve comprehension and memory retention (Jensen, 2008).

Researchers such as Caine and Caine (1994) highlighted several principles of brain-compatible learning, including the brain's search for meaning, the role of emotions in learning, and the importance of social

interaction. When these principles are integrated into educational environments, they can significantly enhance students' cognitive engagement and motivation. Another study by (**Naser Abdulkareem Mohammed & et al 2025**), this study investigated the impact of online applications on the vocabulary development of EFL students. Using a questionnaire administered to 70 students from the English Departments at the Faculties of Education in Zolten and Surman, Sabratha University, the findings revealed that online applications play an important role in enhancing vocabulary acquisition by providing interactive and engaging learning experiences.

In recent years, the integration of brain-based learning principles with e-learning technologies has led to the development of brain-compatible e-learning platforms. These platforms are designed to support natural learning processes by incorporating features such as interactive multimedia, problem-based learning tasks, collaborative activities, and immediate feedback mechanisms (**Mujiyanto, Nurkamto, & Hartono, 2021**).

Motivation plays a crucial role in the success of foreign language learning. According to Dörnyei (2001), motivated learners tend to show greater persistence, engagement, and effort in language learning activities. When learning environments stimulate curiosity, provide meaningful tasks, and create supportive conditions, students are more likely to develop intrinsic motivation toward learning.

Several studies have demonstrated that technology-enhanced learning environments can significantly increase students' motivation and engagement in language learning contexts (**Hsu, 2024**). By combining digital learning tools with principles derived from neuroscience, brain-compatible e-learning platforms may provide more effective learning experiences that stimulate students' interest and motivation.

Therefore, investigating the impact of brain-compatible e-learning platforms on enhancing motivation in learning English skills among EFL students is essential for understanding how innovative educational technologies can support language learning in modern educational contexts.

Research Objectives:

1. To identify the level of English language students' perceptions toward brain-compatible e-learning platforms.
2. To determine the degree of effectiveness of the characteristics of brain-compatible e-learning platforms in supporting the learning process.
3. To explore the role of brain-compatible educational platforms in enhancing language learning motivation from the perspective of English language students.
4. To determine the effect of brain-compatible educational platforms on learning English language skills from the perspective of English language students.

Significance of the Research:

- Provides deeper insight into how neuroscience-based instructional design enhances language learning motivation.
- Helps educators adopt more effective digital tools that align with cognitive and emotional needs of learners.
- Offers a framework for designing or selecting e-learning platforms based on brain-compatible principles.
- Supports curriculum developers in improving digital English language instruction for EFL students.

Statement of the Problem:

Despite the growing use of e-learning platforms in language learning, many EFL students still report low motivation, lack of engagement, and difficulty sustaining interest during online English instruction. Traditional e-learning environments often rely on passive learning, do not reduce cognitive overload, and fail to integrate principles of brain-based learning that enhance attention and motivation. Therefore, the research problem can be expressed as:

“To what extent do brain-compatible e-learning platforms influence the motivation of EFL students to learn English skills?”

Research Questions:

Main Research Question:

What is the effect of using brain-compatible e-learning platforms on improving students' motivation to learn English language skills?

Sub-Questions:

1. What is the level of English language students' perceptions toward brain-compatible e-learning platforms?
2. What is the degree of effectiveness of the characteristics of brain-compatible e-learning platforms in supporting the learning process?
3. What is the role of brain-compatible educational platforms in enhancing language learning motivation from the perspective of English language students?

4. What is the effect of brain-compatible educational platforms on learning English language skills from the perspective of English language students?

Research Hypotheses:

There is a statistically significant effect at the significance level (0.05) of e-learning platforms, through their dimensions (electronic platform design and platform characteristics), on improving motivation to learn and acquire English language skills.

The following sub-hypotheses are derived from this main hypothesis:

1. There is a statistically significant effect at the significance level (0.05) of electronic platform design on improving motivation to learn and acquire English language skills.
2. There is a statistically significant effect at the significance level (0.05) of the characteristics of e-learning platforms on improving motivation to learn and acquire English language skills.

Research Tools:

To achieve the objectives of this study, a **structured questionnaire** was used as the primary data collection instrument. The questionnaire was developed based on a comprehensive review of relevant literature on brain-based learning, e-learning platforms, and motivation.

It consisted of two main sections:

- **Section One:** Personal and academic information (gender, age, academic semesters, English proficiency).
- **Section Two:** Statements measuring:
 1. Students' Perceptions of Brain-Compatible E-Learning Platforms.
 2. Effectiveness of Brain-Compatible Platform Features in Supporting Learning.
 3. The Role of Brain-Compatible Platforms in Enhancing Learning Motivation.
 4. The Impact of Brain-Compatible Platforms on Learning English Skills.

A **five-point Likert scale (Strongly Agree – Agree – Neutral – Disagree – Strongly Disagree)** was used.

The validity of the instrument was ensured through expert evaluation, while its reliability was measured using

Cronbach's Alpha.

Research Population:

The research population consisted of all EFL students enrolled in Department of English at the faculty of education / Zolten, faculty of education / Surman and faculty of art / Aljumail, University of Sabratha. The study period extended from the beginning of Autumn semester the academic year (2025–2026).

Research Sample and data collection instruments

The study sample included **90 students**, selected using a convenience sampling method.

The sample characteristics were as follows:

1. Primary Data

a. Questionnaire:

Primary data were collected by the researchers from the study population through a questionnaire, which served as the principal instrument for data collection. The collected data were subsequently coded, tabulated, and analyzed using the **Statistical Package for the Social Sciences (SPSS), version 27**, in order to obtain statistical indicators that support the objectives of the study.

The questionnaire was prepared in a sequence beginning with general questions, including basic information about the respondents: gender, age, academic background, semester, and English language proficiency level.

The questionnaire contained four main sections, each part contains five questions related to the research variables, "The impact of brain-compatible E-learning platforms on enhancing motivation in learning English skills among EFL students". These included independent variables and one statement representing the dependent variables. The questions were measured using a five-point Likert scale, as follows: **(Strongly Agree – Agree – Neutral – Disagree – Strongly Disagree)**.

This scale was selected in accordance with the **nature of the study and the characteristics of the target population**.

2. Secondary Data

Secondary data consisted of information obtained from books, reports, academic journals, and previous research studies related to the effectiveness of assessment tools and the improvement of test quality. These sources were utilized to provide a solid scientific foundation and to enrich the theoretical background of the research.

3. Sex

Table (1) shows frequency and percentages of the study sample by gender

Sex	Frequency	Percentages
Male	17	18.9%
Female	73	81.1%
Total	90	100.0 %

Table (1) above shows that the proportion of males has reached 18.9% which is less than the percentage of females 81.1%.

Research limitations:

The study is limited to the following:

- **Spatial Scope:** The faculty of education / Zolten, the faculty of education / Surman, and the faculty of art / Aljumail, University of Sabratha, Libay.
- **Temporal Scope:** Academic year 2025–2026.
- **Target population:** EFL students department of English at the faculty of education/ Zolten, the faculty of education / Surman and the faculty of art / Aljumail, University of Sabratha.
- **Thematic Scope:** Brain-compatible e-learning platforms and motivation in learning English skills.

Research Terms:

- **Brain-Compatible E-Learning Platforms:** Digital learning systems designed according to brain-based learning principles.
- **Motivation:** The internal and external factors that influence students' engagement and persistence.
- **EFL Students:** Learners studying English in non-English-speaking contexts.
- **Brain-Based Learning:** Instruction aligned with brain functioning and cognitive processes.

Research Design:

The study adopted a **descriptive-analytical design**.

- The descriptive method was used to present participant characteristics and summarize responses.
- The analytical method was used to test hypotheses and examine relationships between variables.

Statistical tools included:

1. Frequencies and percentages were used to describe the variables related to the personal characteristics of the study sample.
2. The arithmetic mean, standard deviation, relative weight, importance level, and ranking were used for each item of the questionnaire, as well as for the questionnaire as a whole.
3. Cronbach's Alpha coefficient was used to determine the reliability and validity of the questionnaire, as well as for each dimension of the questionnaire.
4. Pearson Correlation Coefficient (R) was used to test the relationship between variables.
5. T-test was used for testing differences between variables.
6. Multiple Regression analysis was used to examine the effect of a set of independent variables on the dependent variable.
7. The Coefficient of Determination (R^2) was used as the most important indicator in the regression model to determine the explanatory power of the model, which is considered a measure of the model's goodness of fit.
8. Effect Size was determined for the independent variables on the dependent variable using Eta Squared (η^2).

The study hypotheses were tested at the significance level of $\alpha = 0.05$, using the Statistical Package for Social Sciences (SPSS) version 27.

Theoretical Study:

Introduction:

This section presents the theoretical framework of the study, which examines, "The Impact of Brain-Compatible E-Learning Platforms on Enhancing Motivation in Learning English Skills among EFL Students". It provides a comprehensive review of key concepts and theories related to brain-based learning, e-learning, learner motivation, and English language skills.

The section also explores the relationships among these variables by integrating perspectives from educational neuroscience, cognitive psychology, and language learning theories. In addition, it highlights how brain-compatible digital environments can support the development of English language skills and enhance learners' motivation through effective instructional design.

Brain-Based Learning:

Brain-based learning is an instructional approach grounded in findings from neuroscience and cognitive science, aiming to align teaching strategies with the natural processes of the human brain. It emphasizes how learners perceive, process, store, and retrieve information in meaningful ways (Jensen, 2008).

According to **Caine and Caine (1994)**, brain-based learning involves understanding and applying the brain's natural principles of learning, such as pattern recognition, emotional engagement, and social interaction. They argue that effective learning occurs when instruction is designed in harmony with these principles.

This approach highlights several key characteristics:

- Learning is enhanced when it is meaningful and relevant
- Emotions play a critical role in cognitive processing
- Learning is more effective in social and interactive environments
- Multi-sensory experiences improve retention and understanding

From this perspective, brain-based learning shifts education from passive memorization to active, meaningful engagement, which is particularly relevant in language learning contexts.

Motivation in Language Learning:

Motivation is a central factor in the learning process, especially in foreign language acquisition. It refers to the internal and external forces that initiate, guide, and sustain learners' behavior toward achieving specific goals (Cook & Artino, 2016).

In the context of EFL learning, motivation plays a crucial role in determining learners' level of engagement, persistence, and success. Highly motivated learners are more likely to participate actively, practice language skills, and overcome learning challenges.

Motivation can be classified into two main types:

Intrinsic Motivation:

This type of motivation arises from internal interest, enjoyment, or personal satisfaction in learning.

Extrinsic Motivation

This type is driven by external rewards such as grades, career opportunities, or social recognition.

Additionally, **integrative and instrumental motivation** (Gardner & Lambert, 1972) are particularly relevant in language learning:

- **Integrative motivation:** Desire to interact with the target language community
- **Instrumental motivation:** Learning for practical purposes such as employment or education.

Motivation not only influences learning outcomes but also determines learners' attitudes toward digital learning environments.

E-Learning:

E-learning refers to the use of digital technologies and internet-based platforms to deliver educational content and facilitate learning. It provides flexible, accessible, and interactive learning environments that go beyond traditional classroom boundaries.

E-learning platforms incorporate tools such as:

- Multimedia content (audio, video, images)
- Online discussions and collaboration tools
- Instant feedback mechanisms
- Adaptive learning systems

These features enhance learner engagement and support individualized learning experiences. As a result, e-learning plays a vital role in modern education, particularly in language learning contexts.

English Language Skills:

English language learning involves four fundamental skills:

- Listening
- Speaking
- Reading
- Writing

These skills are interrelated and essential for effective communication. Technology-enhanced learning environments significantly contribute to developing these skills by providing authentic contexts and interactive opportunities (Gilakjani, 2017).

E-learning platforms support language skills development by:

- Providing multimedia input for listening and speaking
- Offering interactive texts for reading comprehension
- Enabling writing practice through digital tools
- Creating authentic communication opportunities

EFL Students

EFL (English as a Foreign Language) students are learners who study English in contexts where it is not used as a primary means of communication. These learners often face challenges such as:

- Limited exposure to authentic language input
- Dependence on rote memorization
- Difficulty in active participation

Therefore, innovative approaches such as brain-based learning and e-learning platforms are essential to support their learning process and enhance motivation.

Multimedia Learning Theory:

Multimedia Learning Theory, developed by **Mayer (2002)**, explains how learners process information through both visual and auditory channels.

According to this theory, learning is more effective when:

- Words and images are presented together
- Information is organized and meaningful
- Cognitive overload is minimized

Multimedia enhances language learning by:

- Improving vocabulary retention
- Supporting listening comprehension
- Creating meaningful learning experiences

This theory is highly relevant to e-learning platforms, which rely on multimedia to deliver content effectively.

Cognitive Load Theory:

Cognitive Load Theory (Sweller et al., 1998) focuses on the limitations of working memory and the importance of designing instructional materials that do not overload learners cognitively.

It identifies three types of cognitive load:

- **Intrinsic Load:** Related to task difficulty
- **Extraneous Load:** Caused by poor instructional design
- **Germane Load:** Supports learning and schema construction

Effective e-learning platforms reduce extraneous load and enhance germane load, allowing learners to process information efficiently.

Information Processing Theory

Information Processing Theory explains how learners receive, process, store, and retrieve information (Miller, 1956).

Learning involves several stages:

1. Attention
2. Encoding
3. Storage
4. Retrieval

This theory emphasizes:

- The importance of organizing information
- Linking new knowledge with prior knowledge
- Using repetition and meaningful context

It supports the design of structured e-learning environments that enhance comprehension and retention.

Communicative Language Teaching (CLT)

The Communicative Approach focuses on using language for real communication rather than memorization (Azimova, 2019).

It emphasizes:

- Interaction and communication
- Integration of all language skills
- Authentic learning tasks

Brain-compatible e-learning platforms support CLT by providing:

- Interactive activities
- Collaborative tasks
- Real-life communication simulations

Brain-Compatible E-Learning Platforms

Brain-compatible e-learning platforms integrate principles of neuroscience with digital learning technologies.

These platforms are designed to:

- Support natural cognitive processes

- Encourage active participation
- Provide meaningful and engaging content
- Use multimedia and interactive tools

Key features include:

- Gamification
- Immediate feedback
- Adaptive learning
- Social interaction

Such platforms create learning environments that align with how the brain learns best.

Relationship Between Brain-Compatible Platforms and Motivation

Motivation and e-learning are closely interconnected. Well-designed platforms can significantly enhance motivation by:

- Providing engaging and interactive content
- Offering rewards and feedback
- Supporting autonomy and self-paced learning

Gamification elements such as badges and points increase motivation and engagement (Deterding et al., 2011). Additionally, ease of use and perceived usefulness (Technology Acceptance Model) influence learners' motivation to use digital platforms.

Role of E-Learning Platforms in Developing English Skills

E-learning platforms play a vital role in enhancing English language skills by:

- Providing authentic learning contexts
- Supporting self-directed learning
- Offering interactive and multimedia-rich content

Research indicates that digital platforms improve:

- Vocabulary acquisition
- Listening and speaking skills
- Learner engagement and motivation

Designing Brain-Compatible Educational Platforms

To be brain-compatible, e-learning platforms should:

- Use multimedia effectively
- Organize content into manageable units (chunking)
- Provide interactive and meaningful tasks
- Incorporate emotional and social elements

Advanced technologies such as **VR and AR** can further enhance engagement, attention, and retention.

The Importance of Motivation in EFL Learning

Motivation is essential for successful language learning. It:

- Increases participation and engagement
- Enhances learning outcomes
- Supports persistence in learning

Low motivation, on the other hand, leads to poor performance and disengagement.

Literature review:

A considerable body of research has examined the role of e-learning, brain-based learning, and motivation in enhancing English language learning among EFL students. These studies provide a solid foundation for understanding how technological and cognitive approaches can improve language acquisition and learner engagement.

In the context of e-learning and language skill development, the study conducted by **Al-Jarf (2012)** investigated the impact of e-learning tools on developing English language skills and motivation among EFL students. The study adopted a quasi-experimental design involving two groups: an experimental group exposed to e-learning tools and a control group receiving traditional instruction. Data were collected using achievement tests and motivation questionnaires. The findings revealed that students in the experimental group significantly outperformed their counterparts in vocabulary acquisition, listening comprehension, and speaking skills. Additionally, they demonstrated higher levels of motivation, indicating that digital learning environments can positively influence both cognitive and affective domains of language learning.

Similarly, **Al-Qahtani (2019)** conducted a comparative study to examine the effectiveness of online learning versus traditional classroom instruction in English language acquisition. Using a quantitative approach, the study compared two groups of EFL learners. The results showed that students who learned through online platforms achieved better outcomes in vocabulary development and reported higher motivation levels.

However, the study also noted that traditional methods were more effective in improving pronunciation and conversational fluency, suggesting the importance of integrating both approaches.

From a broader perspective, **Sun and Chen (2016)** conducted a comprehensive review of online education practices, analyzing multiple empirical studies. Their findings emphasized that effective e-learning environments depend on several factors, including interaction, course design, learner autonomy, and timely feedback. These elements were found to significantly enhance learner engagement and motivation, which aligns with the principles of brain-based learning that stress meaningful and interactive learning experiences.

In relation to motivation, **Saadé and AlSharhan (2015)** explored the relationship between student motivation and the acceptance of technology in learning environments through a quantitative correlational study. The study involved university students and utilized structured questionnaires to measure motivation and technology acceptance. The findings indicated that intrinsic motivation plays a significant role in determining students' willingness to adopt e-learning systems. Learners who were internally motivated perceived digital platforms as more useful and enjoyable, which increased their engagement and persistence.

Furthermore, **Hsu (2024)** examined the impact of technology-enhanced learning on student motivation in EFL contexts using a mixed-methods approach that combined surveys and interviews. The study revealed that students who engaged with digital learning tools demonstrated higher levels of intrinsic motivation, satisfaction, and participation. These findings confirm the importance of integrating technology in language learning to foster positive learning attitudes.

The role of multimedia in enhancing learning has also been extensively explored. **Mayer (2009)**, through a series of experimental studies, developed the Cognitive Theory of Multimedia Learning, which explains how learners process information through dual channels (visual and auditory). The findings suggest that integrating text, images, and audio in a structured manner improves comprehension and retention, provided that cognitive overload is minimized. This is further supported by **Sweller, van Merriënboer, and Paas (1998)**, who introduced Cognitive Load Theory, emphasizing that instructional materials must be carefully designed to avoid overloading learners' working memory. Their research highlighted the importance of reducing extraneous cognitive load and enhancing germane load to optimize learning outcomes.

In the same vein, **Ghareb (2023)** investigated the role of interactive multimedia in enhancing learner motivation within digital learning environments using a mixed-methods approach. The results indicated that interactive elements, such as immediate feedback and learner control, significantly increased student engagement and motivation. These findings reinforce the importance of incorporating multimedia features into e-learning platforms.

The integration of advanced technologies in language learning has also gained attention. **Jiang et al. (2021)** conducted a quasi-experimental study to examine the use of virtual reality (VR) and automatic speech recognition (ASR) in language learning. The findings revealed that students exposed to these technologies showed significant improvement in speaking skills and motivation compared to those in traditional learning environments. This highlights the potential of emerging technologies in creating brain-compatible learning experiences.

Moreover, the importance of gamification in enhancing motivation has been widely recognized. **Deterding et al. (2011)** introduced the concept of gamification and demonstrated that incorporating game elements such as points, badges, and leaderboards into digital environments increases user engagement and intrinsic motivation. Similarly, **Uzun (2017)**, through a quasi-experimental study, found that gamified learning environments significantly improved student engagement and participation, indicating that motivational design plays a crucial role in digital learning success.

In the context of brain-based learning, **Akbar and Hussein (2020)** conducted an experimental study to investigate the effectiveness of brain-based learning strategies in EFL classrooms. The results showed that students who were taught using brain-based approaches demonstrated higher motivation and better comprehension compared to those taught using traditional methods. These findings emphasize the importance of aligning instructional strategies with how the brain naturally learns.

Additionally, **Gilakjani (2017)**, through a descriptive review of literature, highlighted the significant role of technology in enhancing English language skills. The study concluded that integrating digital tools into language learning improves all four language skills and increases learner interaction and autonomy.

Finally, **Alshammari (2021)** conducted a quantitative comparative study to examine differences in student motivation between online and traditional learning environments. The findings indicated that students in online learning settings reported higher levels of motivation, autonomy, and satisfaction, suggesting that digital platforms provide more flexible and engaging learning experiences.

Research Gap:

Based on the reviewed studies, it is evident that e-learning platforms, multimedia integration, and motivational strategies play a significant role in enhancing English language learning. Moreover, brain-based learning

approaches contribute to improving comprehension, retention, and learner engagement by aligning instruction with cognitive processes.

However, despite the extensive research in these areas, most studies have examined these variables independently. There is a noticeable lack of research that integrates brain-based learning principles with e-learning platforms to investigate their combined impact on enhancing motivation among EFL students.

Therefore, the current study seeks to bridge this gap by examining how brain-compatible e-learning platforms can enhance motivation in learning English skills, providing a more comprehensive and integrated perspective.

Critical Analysis of Previous Studies:

The reviewed studies collectively provide strong empirical and theoretical support for the integration of e-learning technologies, brain-based learning principles, and motivational strategies in EFL contexts. However, a deeper analysis reveals important patterns, strengths, and limitations that justify the need for the current study.

1. General Trends in Previous Studies

A clear trend across the reviewed literature is the increasing emphasis on **technology-enhanced learning environments** as effective tools for improving both language skills and learner motivation. Studies such as Al-Jarf (2012), Al-Qahtani (2019), and Hsu (2024) consistently demonstrated that digital platforms positively influence students' engagement, participation, and language performance.

Additionally, there is a strong focus on **interactive and learner-centered approaches**, as highlighted in Sun and Chen (2016) and Ghareb (2023), where interaction, feedback, and autonomy were identified as key factors for successful learning outcomes.

Another significant trend is the integration of **motivational elements**, particularly gamification (Deterding et al., 2011; Uzun, 2017), which has been shown to enhance learner engagement and intrinsic motivation.

Furthermore, cognitive and neuroscience-based perspectives, such as **Multimedia Learning Theory (Mayer, 2009)** and **Cognitive Load Theory (Sweller et al., 1998)**, have provided a strong theoretical foundation for designing effective learning environments that align with human cognitive processes.

2. Methodological Analysis

From a methodological perspective, the reviewed studies employed a variety of research designs:

1. Experimental and quasi-experimental designs (Al-Jarf, 2012; Jiang et al., 2021; Akbar & Hussein, 2020).

These studies provided strong evidence of causal relationships between instructional methods and learning outcomes.

2. Quantitative correlational studies (Saadé & AlSharhan, 2015; Alshammari, 2021).

These studies focused on relationships between variables such as motivation and technology acceptance.

3. Mixed-methods studies (Hsu, 2024; Ghareb, 2023).

These offered deeper insights by combining numerical data with qualitative interpretations.

4. Literature reviews (Sun & Chen, 2016; Gilakjani, 2017).

These provided broad overviews but lacked direct empirical evidence.

Critical Observation

While experimental studies offer strong validity, many studies relied heavily on **self-reported data (questionnaires)**, which may introduce bias. Moreover, limited longitudinal studies were found, indicating a lack of investigation into **long-term effects**.

3. Analysis of Key Variables

A. E-Learning Platforms

Most studies agree that e-learning platforms:

- Improve access to learning resources
- Enhance flexibility and autonomy
- Support interactive learning

However, some limitations were identified:

- Lack of consistent feedback in some platforms
- Reduced face-to-face interaction
- Variability in platform design quality

This suggests that **not all e-learning platforms are equally effective**, and effectiveness depends largely on design quality.

B. Motivation

Motivation emerged as a central variable across studies. The findings indicate that:

- Intrinsic motivation is more influential than extrinsic motivation
- Interactive environments increase engagement
- Gamification significantly enhances motivation

However, some studies (e.g., Saadé & AlSharhan, 2015) emphasized that motivation is also influenced by:

- Ease of use

- Perceived usefulness
- Learner attitudes toward technology

Critical Observation

Most studies treated motivation as a **dependent variable only**, without deeply exploring how it interacts dynamically with cognitive processes.

C. Brain-Based Learning

Studies such as Akbar & Hussein (2020) confirmed that brain-based learning:

- Enhances comprehension
- Improves retention
- Increases motivation

However, brain-based learning was mostly applied in **traditional classroom settings**, with limited integration into digital environments.

D. Multimedia and Cognitive Factors

Theories such as:

- Multimedia Learning (Mayer, 2009)
- Cognitive Load Theory (Sweller et al., 1998)

highlight the importance of:

- Managing cognitive load
- Using dual-channel processing
- Structuring information effectively

Critical Observation

Although these theories are widely cited, many applied studies **do not explicitly measure cognitive load**, this represents an important research gap.

4. Agreements Among Studies

There is strong consensus that:

- Technology enhances language learning outcomes
- Motivation is a key determinant of success
- Interactive and multimedia environments improve engagement
- Learner-centered approaches are more effective than traditional methods

5. Differences Among Studies

Despite the general agreement among previous studies, several differences have emerged:

1. Some studies suggest that traditional learning is more effective in developing certain skills, such as pronunciation (Al-Qahtani, 2019).
2. There is variation in the impact of technology depending on the type of tool used.
3. Differences in motivational outcomes are influenced by the design of the learning platform.

6. Limitations of Previous Studies

The analysis reveals several limitations:

- **Lack of integration:**

Most studies have examined the variables separately (e-learning, motivation, or brain-based learning) rather than integrating them.

- **Limited focus on brain-compatible design:**

Insufficient attention has been given to designing platforms based on brain-based learning principles.

- **Short-term studies:**

There is a lack of research examining long-term effects.

- **Context limitations:**

Many studies were conducted in non-EFL environments or within different cultural contexts.

- **Measurement issues:**

There is a heavy reliance on questionnaires without the use of diverse measurement tools.

II. CONCLUSION OF ANALYSIS

In conclusion, previous studies provide strong evidence for the effectiveness of technology and brain-based approaches in enhancing language learning. However, the lack of integration between these variables highlights the importance of the current study, which seeks to bridge this gap by examining how brain-compatible e-learning platforms can enhance motivation in learning English skills among EFL students.

Research methodology (Methodological procedures)

This chapter addresses the methodological procedures followed in conducting this study, including the identification of the research approach adopted, the research population and sample selected, the methods used in data collection, and the statistical techniques employed in analyzing the collected data.

Since the objective of this study is to measure and evaluate the impact of brain-compatible e-learning platforms on enhancing motivation for learning English language skills among EFL learners from the perspectives of university students, the researchers adopted the descriptive-analytical method, as it is considered appropriate to the nature and objectives of the study. The research relied on two main types of data:

1. Primary Data

a. Questionnaire

The researchers collected primary data from the research population through a questionnaire, which was adopted as the main instrument for data collection. The collected responses were coded, tabulated, and statistically analyzed using the Statistical Package for the Social Sciences (SPSS), Version 27, in order to obtain indicators that support and validate the study objectives.

b. Personal Interviews

The researchers also conducted several personal interviews with students from the English Department in the university faculties to clarify the objectives of the study and to obtain additional qualitative information that would enrich and support the research.

2. Secondary Data

Secondary data consisted of information derived from books, reports, academic journals, and previous empirical studies related to the evaluation of e-learning platforms and their impact on enhancing motivation for learning. These sources were utilized to provide a sound scientific foundation and to enrich the theoretical and analytical dimensions of the study.

1. Research Population

The research population consisted of all students enrolled in the Department of English at Sabratha University during the academic year 2026.

2. Research Sample

The researchers adopted a random sampling technique in selecting the study sample. The sample consisted of 90 students drawn from the target population of the study. Questionnaires were distributed to all selected participants, and 90 questionnaires were retrieved and deemed valid for statistical analysis, representing a full response rate.

Table (2): Distribution of the Sample Members by Gender

Gender	Frequency	Percentage %
Male	17	18.9%
Female	73	81.1%
Total	90	100

It is evident from Table (2) above that 18.9% of the study sample were male, whereas 81.1% were female. This indicates that the proportion of female participants was considerably higher than that of male participants within the total sample. The following figure illustrates the percentage distribution of the sample according to gender.

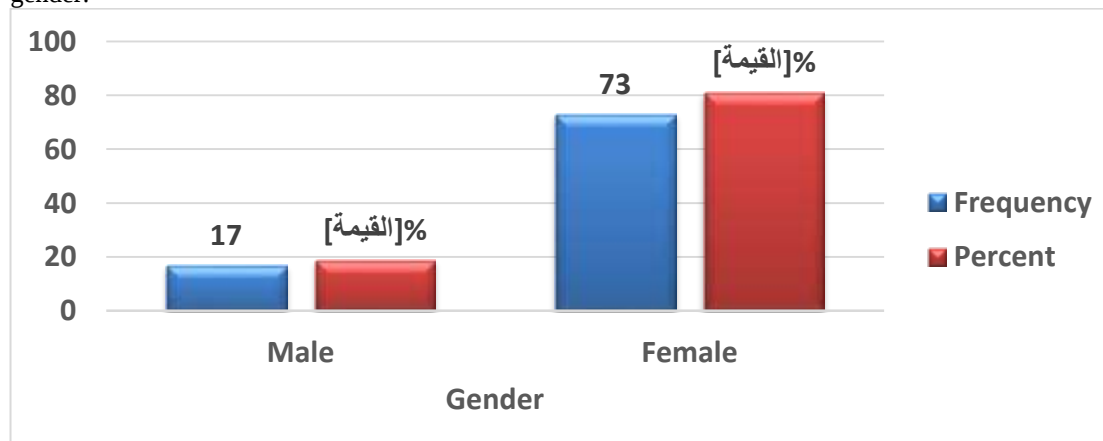


Figure (1): Percentages of Sample Members by Gender

Table (3): Distribution of the Sample Members by Age

Age	Frequency	Percentage%
18-22	70	77.8%
23-27	20	22.2%
Total	90	100

Table (3) above exposes that 77.8% of the study sample were between 18 and 22 years old, representing the highest percentage compared to those aged 23–27 years within the total sample. This indicates that the majority of participants belonged to the younger age group. The following figure illustrates the percentage distribution of the sample according to age.

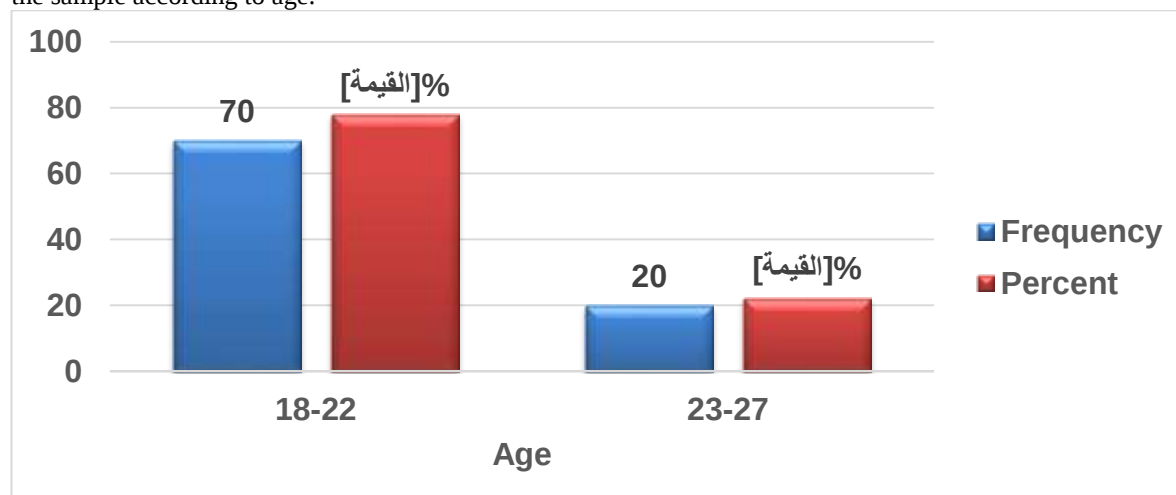


Figure (2): Percentages of Sample Members by Age

Table (4): Distribution of the Sample Members by Level of study

Level of study	Frequency	Percentage %
3 rd semester	6	6.7%
4 th semester	4	4.4%
5 th semester	42	46.7%
7 th semester	38	42.2%
Total	90	100

Table (4) above shows that 46.7% of the study sample were enrolled in the fifth semester, representing the highest proportion, followed by 42.2% of participants in the seventh semester. In addition, 6.7% of the respondents were in the third semester, while 4.4% were in the fourth semester, representing the lowest proportion in the sample.

This diversity in participants' academic semesters reflects the inclusiveness of the study across multiple academic levels, which enhances the possibility of accurately assessing the impact of e-learning platforms on enhancing motivation for language learning.

The following figure illustrates the percentage distribution of the sample according to academic semester.

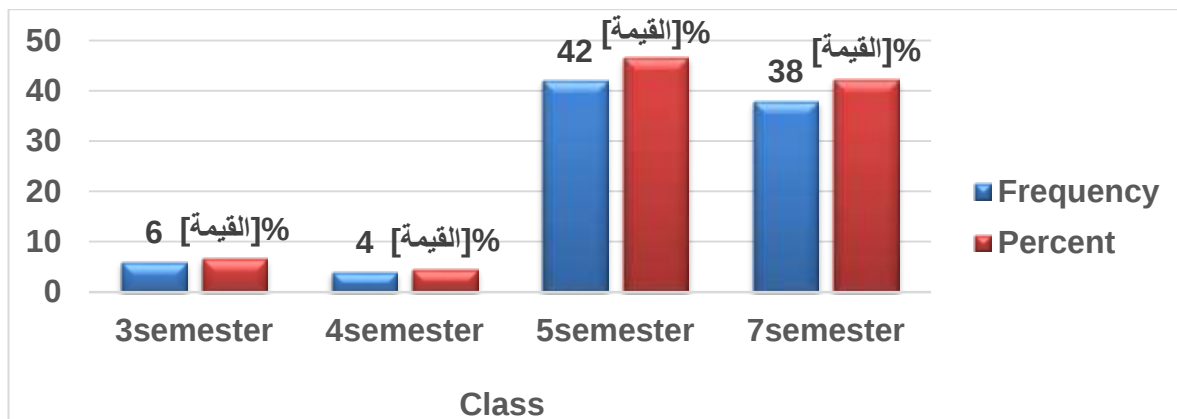


Figure (3): Percentages of Sample Members by Level of study

Table (5): Distribution of the Sample by English Proficiency Level

English level	Frequency	Percentage %
Beginner	10	11.1%
Intermediate	67	74.4%
Advanced	13	14.4%
Total	90	100

It is evident from **Table (5)** above that **74.4%** of the study sample possessed an **intermediate level** of English proficiency, representing a high proportion approximately three quarters of the participants. In contrast, **14.4%** of the respondents demonstrated an **advanced level** of English proficiency, while **11.1%** were at the **beginner level**.

This indicates that the majority of students possess prior knowledge and a foundational competence in English, which reinforces the significance of investigating motivation among this group and makes them an appropriate population for examining the impact of brain-compatible e-learning platforms in moving learners from the stage of reception toward mastery and fluency.

The following figure illustrates the percentage distribution of the sample according to English proficiency levels.



Figure (4): Percentages of Sample by English Proficiency Level

Table (6): Have you used E-learning platforms before?

Have you used E-learning platforms before?	Frequency	Percentage %
Yes	87	96.7%
No	3	3.3%
Total	90	100

Table (6) above exposes that **96.7%** of the study sample had prior experience using e-learning platforms, representing a remarkably high proportion and indicating that nearly all participants were familiar with the use of such platforms. In contrast, only **3.3%** of the respondents reported having no previous experience with e-learning platforms.

These findings reflect the widespread prevalence of e-learning culture among students and suggest that participants possess the basic technological skills required to interact effectively with educational platforms, which may further enhance their motivation to develop English language skills.

The following figure illustrates the percentage distribution of the sample according to prior use of e-learning platforms.

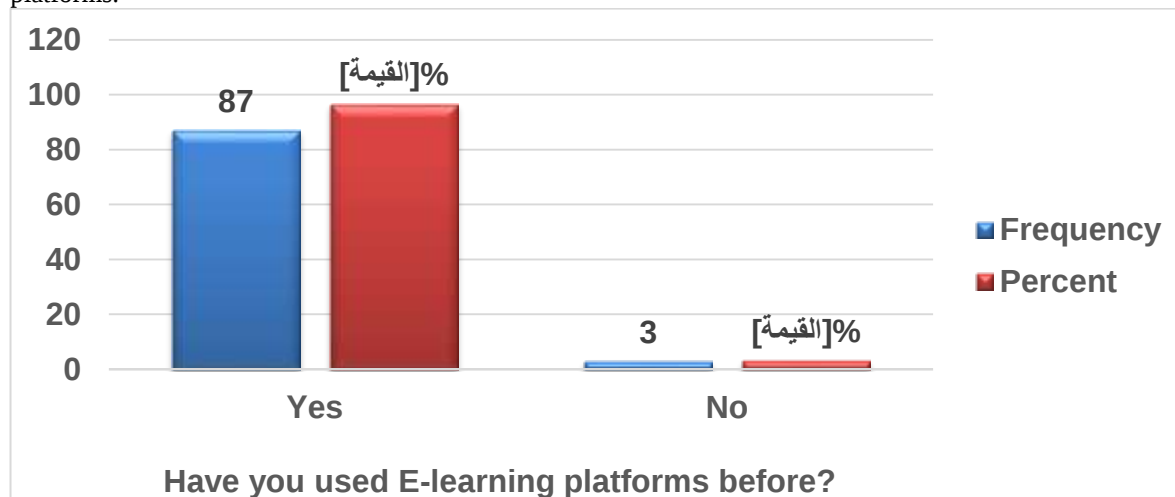


Figure (5): Percentages of Sample Members by Question

3. Research Instrument

The researchers designed a **questionnaire** as the primary instrument for data collection, with the aim of obtaining evaluations and opinions from students in the English Department regarding the impact of brain-compatible e-learning platforms on enhancing motivation for learning English language skills among EFL learners, from the students' perspectives.

The questionnaire consisted of **two sections**, as outlined below:

Section One: Demographic and Academic Information

This section included **five questions** intended to identify selected personal and academic characteristics of the study sample. It covered the following variables: (**Gender, Age, Academic semester, English language proficiency level, and Extent of e-learning platform use**).

Section Two: Research Variables

The second section comprised statements designed to measure the study variables and to explore participants' opinions and evaluations regarding the impact of brain-compatible e-learning platforms on enhancing motivation in learning English skills among EFL students.

This section included **20 statements (items)** developed to measure the effect of brain-compatible e-learning platforms on students' motivation for learning English language skills.

After preparing the research instrument (the questionnaire), the researchers submitted it to **two expert reviewers** from the department, in addition to the research supervisor, for validation and review. The reviewers suggested several modifications to some questionnaire items, and the researchers incorporated these recommendations in developing the final version of the instrument.

After ensuring the linguistic clarity and appropriateness of the questionnaire, the researchers adopted a **five-point Likert scale** to measure participants' responses, as follows:

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

This scale was considered suitable for the nature of the study and the target population.

It should be noted that the **five-point Likert scale**, as an ordinal measurement scale, was assigned weighted values, as illustrated in the following table.

Table (7): The Five-Point Likert Scale

Level of Availability				
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	2	3	4	5

After that, the **weighted mean** was calculated to determine the level of evaluation reflected in the responses of the study sample participants, as illustrated in the following table.

Table (8): Weighted Arithmetic Mean

Weighted Mean	Scale	Level of Performance
From 1 to 1.79	Strongly Disagree	Very Low
From 1.80 to 2.59	Disagree	Low
From 2.60 to 3.39	Neutral	Moderate
From 3.40 to 4.19	Agree	High
From 4.20 to 5	Strongly Agree	Very High

4. Validity and Reliability of the Research Instrument (Questionnaire)

The stage of data collection is considered one of the most important and most difficult stages in scientific research. The process of selecting an appropriate data collection instrument is highly precise and critical, as it always requires choosing a tool that is characterized by validity and reliability. This is because any weakness in the research instrument, meaning a lack of validity and reliability, leads to weak results obtained in scientific research, and consequently, such results cannot be relied upon in interpreting findings. Therefore, the researcher must always ensure, when selecting the research instrument, that it is characterized by validity and reliability. From this perspective, it is necessary to examine the validity and reliability of the research instrument used in the study.

First: Validity

Questionnaire validity refers to the extent to which the items of the questionnaire measure what they are intended to measure. It refers to the accuracy of the instrument in measuring the purpose for which it was designed. The researchers verified the validity of the questionnaire using two methods:

- **Apparent validity (validity of the arbitrators):**

The researchers presented the initial version of the questionnaire to a group of expert professors with experience and interest in the research topic. This was done to ensure the suitability of each item for the dimension to which it belongs within the questionnaire. The researchers requested feedback and opinions regarding each item of the questionnaire. The experts provided several comments on some of the items, and the researchers took these observations into consideration when preparing the final version of the questionnaire. **See Appendix**

- **Calculation of Validity Coefficient:**

Validity refers to the degree of consistency between the questionnaire items and the dimension to which they belong. This means that each item measures only what it is intended to measure. To ensure this, the researchers calculated the validity coefficient for each item of the dimension and for the overall scale by calculating the square root of Cronbach's Alpha coefficient.

Second: Reliability

The main objective of testing the reliability of the questionnaire is to ensure that it is suitable for the research purposes and possesses reliability. Reliability means that the questionnaire would give the same results if it is redistributed more than once under the same conditions to the same sample. This indicates stability in results and that they do not change significantly, which provides the possibility of obtaining accurate and reliable results that can be depended upon in the research.

Cronbach's Alpha Coefficient:

Cronbach's Alpha is considered one of the most important statistical methods used to measure the reliability of the questionnaire. Its value ranges between (zero) and (one). The closer the value is to one, the higher the reliability of the questionnaire. The Cronbach's Alpha test is considered acceptable if its value is greater than (60%), and the closer the value is to one, the better and more reliable the results of the test (**Sekaran, 2003**). The researchers used Cronbach's Alpha method to measure the reliability coefficient of the questionnaire as well as the validity coefficient, and the obtained results were as follows:

Table (9): Reliability and Validity Coefficients for Questionnaire

Parts	No. of Items	Cronbach's Alpha (Reliability)	Validity Coefficient
Students' Perceptions of Brain-Compatible E-Learning Platforms	5	0.971	0.985
The Role of Brain-Compatible Platforms in Enhancing Learning Motivation	5	0.973	0.986
The Impact of Brain-Compatible Platforms on Learning English Skills	5	0.971	0.985
Effectiveness of Brain-Compatible Platform Features in Supporting Learning	5	0.970	0.985
Questionnaire	20	0.983	0.991

5. Statistical Methods Used in the Study

After coding and entering the questionnaire data, the researchers employed a set of statistical techniques that are consistent with the nature of the study. These methods were used as follows:

1. Frequencies and percentages were used to describe the variables related to the personal characteristics of the study sample.
 2. The arithmetic mean, standard deviation, relative weight, importance level, and ranking were used for each item of the questionnaire, as well as for the questionnaire as a whole.
 3. Cronbach's Alpha coefficient was used to determine the reliability and validity of the questionnaire, as well as for each dimension of the questionnaire.
 4. Pearson Correlation Coefficient (R) was used to test the relationship between variables.
 5. T-test was used for testing differences between variables.
 6. Multiple Regression analysis was used to examine the effect of a set of independent variables on the dependent variable.
 7. The Coefficient of Determination (R^2) was used as the most important indicator in the regression model to determine the explanatory power of the model, which is considered a measure of the model's goodness of fit.
 8. Effect Size was determined for the independent variables on the dependent variable using Eta Squared (η^2).
- The study hypotheses were tested at the significance level of $\alpha = 0.05$, using the Statistical Package for Social Sciences (SPSS) version 27.

Results and Discussion (General statistic):

Statistical Analysis of the Study parts (Questionnaire)

After collecting the study data using the research instrument (questionnaire), the responses were carefully reviewed and checked in preparation for data entry into the computer for statistical analysis. This process aimed to extract results that contribute to achieving the objectives of the study. The analysis focused on deriving findings through the examination of the collected data, where the arithmetic means, standard deviations, and response percentages for each item of the questionnaire were calculated.

Results Related to Answering the Study Questions

This section presents the results related to the main research question:

"What is the impact of using brain-compatible e-learning platforms on enhancing students' motivation to learn English language skills?", as well as the sub-questions derived from it.

The following tables present the participants' responses to the scale items and its parts, which reflect the impact of brain-compatible e-learning platforms on enhancing students' motivation to learn English language skills. The results are classified according to the study questions, scales, and parts as follows:

Results Related to the First Research Question

What is the level of English language students' perceptions toward brain-compatible e-learning platforms?

The following table presents the participants' responses to the statements of the first part, which reflects English department students' perceptions of brain-compatible e-learning platforms from the students' point of view. These responses were categorized according to the first part of the study.

First part: Students' Perceptions of Brain-Compatible E-Learning Platforms

In this section, the items of the first part (students' perceptions of e-learning platforms) were analyzed individually. The data presented in Table (10) show the frequency distribution (frequency and percentage) of participants' responses to each item of the part. In addition, Table (11) presents the statistical analysis (arithmetic mean, standard deviation, relative importance, and dominant trend) of participants' responses to the same part. The obtained results are presented as follows:

Table (10): Frequencies and Percentages of the First Part Items

X1	Items		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1	Brain-compatible e-learning platforms help me maintain focus while learning English.	N	37	40	12	1	-
		%	41.1	44.4	13.3	1.1	-
2	I believe the design of these platforms makes the content easier to understand.	N	38	39	10	2	1
		%	42.2	43.3	11.1	2.2	1.1
3	These platforms provide a learning environment suitable for my learning style.	N	26	33	24	6	1
		%	28.9	36.7	26.7	6.7	1.1
4	I feel that the presentation methods used in these platforms consider my cognitive abilities.	N	28	33	25	3	1
		%	31.1	36.7	27.8	3.3	1.1
5	I think that using brain-compatible learning principles makes learning English more effective.	N	48	33	8	-	1
		%	53.3	36.7	8.9	-	1.1

Table (11): Weighted Mean, Standard Deviation, and Level for the Items of the First Part.

X1	Items	Weighted Mean	Standard Deviation	Level	Relative Importance %.	Rank
1	Brain-compatible e-learning platforms help me maintain focus while learning English.	4.25	0.72	Very High	85	2
2	I believe the design of these platforms makes the content easier to understand.	4.23	0.82	Very High	84.6	3
3	These platforms provide a learning environment suitable for my learning style.	3.85	0.95	High	77	5
4	I feel that the presentation methods used in these platforms consider my cognitive abilities.	3.93	0.90	High	78.6	4
5	I think that using brain-compatible learning principles makes learning English more effective.	4.41	0.74	Very High	88.2	1
	Students' Perceptions of Brain-Compatible E-Learning Platforms	4.13	0.79	High	82.6	

1. **These platforms provide a learning environment suitable for my learning style:** Regarding the evaluation results of this item, the data in Table (10) show that (36.7%) of participants selected "Agree," while (28.9%) selected "Strongly Agree." Table (11) shows that the weighted arithmetic mean for this item is (3.85) with a standard deviation of (0.95), indicating that the dominant level of agreement is "high," with a relative importance of (77%).

2. **I feel that the presentation methods used in these platforms consider my cognitive abilities:** Regarding the evaluation results of this item, the data in Table (10) indicate that (36.7%) of participants selected "Agree," while (31.1%) selected "Strongly Agree." Table (11) shows that the weighted arithmetic mean for this

item is (3.93) with a standard deviation of (0.90), indicating that the dominant level of agreement is “high,” with a relative importance of (78.6%).

3. I believe that applying brain-compatible learning principles makes learning English more effective:

Regarding the evaluation results of this item, the data in Table (10) show that (53.3%) of participants selected “Strongly Agree,” while (36.7%) selected “Agree.” Table (11) shows that the weighted arithmetic mean for this item is (4.41) with a standard deviation of (0.74), indicating that the dominant level of agreement is “very high,” with a relative importance of (88.2%).

It is also noted that the overall result of the first dimension (Students’ perceptions of brain-compatible e-learning platforms) is “Agree,” as the mean score for the dimension is (4.13), which is higher than the acceptable mean (3.00), with a standard deviation of (0.79) and a relative importance of (82.6%).

This indicates that the study participants demonstrated a high level of evaluation regarding their perceptions of brain-compatible e-learning platforms. Such a high evaluation reflects strong positive satisfaction toward the effectiveness of these platforms. It also suggests a generally positive perception among English department students, confirming their strong belief in the usefulness of this type of learning. This makes it an important educational necessity that facilitates smoother and more comprehensible content delivery.

This aligns with the principles of educational neuroscience, which emphasize that the brain naturally tends to prefer systems that reduce cognitive load and enhance cognitive focus, thereby providing a strong pedagogical justification for modern teaching methods. The positive impact of e-learning platforms in facilitating English language learning establishes a solid foundation for enhancing students’ learning motivation within English departments.

Results Related to the Second Research Question

What is the degree of effectiveness of the features of brain-compatible e-learning platforms in supporting the learning process?

The following table presents the participants’ responses to the items of the second part, which reflects the effectiveness of brain-compatible e-learning platform features in supporting learning from the students’ point of view. These responses were categorized according to the second part of the study.

Second part: Effectiveness of Brain-Compatible Platform Features in Supporting Learning

In this section, the items of the second part (effectiveness of brain-compatible platform features in supporting learning) were analyzed individually. The data presented in Table (12) show the frequency distribution (frequency and percentage) of participants’ responses to each item of the part. In addition, Table (13) presents the statistical analysis (arithmetic mean, standard deviation, relative importance, and dominant trend) of participants’ responses to the same part. The results obtained are presented as follows:

Table (12): Frequencies and Percentages of the Second Part Items

X2	Items		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1	The platforms provide diverse activities that suit my different learning styles.	N	31	45	11	3	-
		%	34.4	50	12.2	3.3	-
2	Interactive tools help me understand English content more quickly.	N	41	41	7	1	-
		%	45.6	45.6	7.8	1.1	-
3	Breaking content into smaller units makes learning easier.	N	37	30	18	5	-
		%	41.1	33.3	20	5.6	-
4	Visual materials (images–videos–charts) help me understand information clearly.	N	50	26	10	4	-
		%	55.6	28.9	11.1	4.4	-
5	These platforms save time and effort compared to traditional learning methods.	N	49	23	12	6	-
		%	54.4	25.6	13.3	6.7	-

Table (13): Weighted Mean, Standard Deviation, and Level for the Items of the Second Part.

X2	Items	Weighted Mean	Standard Deviation	Level	Relative Importance %.	Rank
1	The platforms provide diverse activities that suit my different	4.15	0.76	High	83	4

X2	Items	Weighted Mean	Standard Deviation	Level	Relative Importance %.	Rank
	learning styles.					
2	Interactive tools help me understand English content more quickly.	4.35	0.67	Very High	87	5
3	Breaking content into smaller units makes learning easier.	4.10	0.91	High	82	6
4	Visual materials (images–videos–charts) help me understand information clearly.	4.35	0.85	Very High	87	2
5	These platforms save time and effort compared to traditional learning methods.	4.27	0.93	Very High	85.4	3
	Effectiveness of Brain-Compatible Platform Features in Supporting Learning	4.24	0.78	Very High	84.8	

Results Derived from the Above Tables:

1. The platforms provide diverse activities that suit different learning styles:

Regarding the evaluation results of this item, the data presented in Table (12) show that (50%) of the study participants selected “Agree,” while (34.4%) selected “Strongly Agree.” Table (13) shows that the weighted arithmetic mean for this item is (4.15) with a standard deviation of (0.76), indicating that the dominant level of agreement is “high,” with a relative importance of (83%).

2. Interactive tools help me understand English content more quickly:

Regarding the evaluation results of this item, the data in Table (12) indicate that (45.6%) of participants selected “Strongly Agree,” while (45.6%) selected “Agree.” Table (13) shows that the weighted arithmetic mean for this item is (4.35) with a standard deviation of (0.67), indicating that the dominant level of agreement is “very high,” with a relative importance of (87%).

3. Dividing content into small units facilitates the learning process:

Regarding the evaluation results of this item, the data in Table (12) show that (41.1%) of participants selected “Strongly Agree,” while (33.3%) selected “Agree.” Table (13) shows that the weighted arithmetic mean for this item is (4.10) with a standard deviation of (0.91), indicating that the dominant level of agreement is “high,” with a relative importance of (82%).

4. Visual materials (images, videos, and graphs) help clarify information:

Regarding the evaluation results of this item, the data in Table (12) indicate that (55.6%) of participants selected “Strongly Agree,” while (28.9%) selected “Agree.” Table (13) shows that the weighted arithmetic mean for this item is (4.35) with a standard deviation of (0.85), indicating that the dominant level of agreement is “very high,” with a relative importance of (87%).

5. These platforms save time and effort compared to traditional learning methods:

Regarding the evaluation results of this item, the data in Table (12) show that (54.4%) of participants selected “Strongly Agree,” while (25.6%) selected “Agree.” Table (13) shows that the weighted arithmetic mean for this item is (4.27) with a standard deviation of (0.93), indicating that the dominant level of agreement is “very high,” with a relative importance of (85.4%).

It is also noted that the overall result of the second dimension (Effectiveness of brain-compatible platform features in supporting learning) is “Strongly Agree,” as the mean score for the dimension is (4.24), which is higher than the acceptable mean (3.00), with a standard deviation of (0.78) and a relative importance of (84.8%).

This indicates that the study participants demonstrated a very high level of evaluation regarding the effectiveness of brain-compatible e-learning platform features. Such a high level of evaluation reflects strong satisfaction among students regarding the ability of these platforms to build linguistic knowledge, develop language skills, and support efficient retrieval of information. This makes learning more flexible, sustainable, and effective.

It also indicates a generally positive perception among English department students regarding the effectiveness of brain-compatible platforms in supporting learning. This effectiveness is attributed to their ability to simulate

natural learning processes similar to how the brain acquires language, making them an essential tool in the development of English language skills in light of modern technological advancements in teaching methods.

Results Related to the Third Research Question

What is the role of brain-compatible educational platforms in enhancing motivation for learning English from the perspective of English language students?

The following table presents the participants' responses to the items of the third part, which reflects the role of brain-compatible educational platforms in enhancing motivation for learning English from the students' point of view. These responses were categorized according to the third part of the study.

Third part: The Role of Brain-Compatible Platforms in Enhancing Learning Motivation

In this section, the items of the third part (the role of brain-compatible educational platforms in enhancing learning motivation) were analyzed individually. The data presented in Table (14) show the frequency distribution (frequency and percentage) of participants' responses to each item of the part. In addition, Table (15) presents the statistical analysis (arithmetic mean, standard deviation, relative importance, and dominant trend) of participants' responses to the same part. The obtained results are presented as follows:

Table (14): Frequencies and Percentages of the Third Part Items

X3	Items		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1	These platforms increase my desire to learn English.	N	35	44	9	1	1
		%	38.9	48.9	10	1.1	1.1
2	I feel motivated to continue learning when using these platforms.	N	34	36	18	1	1
		%	37.8	40	20	1.1	1.1
3	These platforms create an enjoyable learning environment that encourages participation.	N	38	37	14	1	-
		%	42.2	41.1	15.6	1.1	-
4	The platforms help me track my progress, which boosts my motivation.	N	29	36	22	3	-
		%	32.2	40	24.4	3.3	-
5	Learning through these platforms makes me more committed to English-learning tasks.	N	27	31	20	12	-
		%	30	34.4	22.2	13.3	-

Table (15): Weighted Mean, Standard Deviation, and Level for the Items of the Third Part.

X3	Items	Weighted Mean	Standard Deviation	Level	Relative Importance %.	Rank
1	These platforms increase my desire to learn English.	4.23	0.76	Very High	84.6	2
2	I feel motivated to continue learning when using these platforms.	4.12	0.84	High	82.4	3
3	These platforms create an enjoyable learning environment that encourages participation.	4.24	0.75	Very High	84.8	1
4	The platforms help me track my progress, which boosts my motivation.	4.01	0.84	High	80.2	4
5	Learning through these platforms makes me more committed to English-learning tasks.	3.81	1.01	High	76.4	5
	The Role of Brain-Compatible Platforms in	4.08	0.80	High	81.6	

X3	Items	Weighted Mean	Standard Deviation	Level	Relative Importance %	Rank
	Enhancing Learning Motivation					

Through the results presented in the two tables above, the following can be observed:

1) These platforms increase my desire to learn English:

Regarding the evaluation results of this item, the data presented in Table (14) show that **48.9%** of the participants rated this statement as **“Agree,”** while **38.9%** rated it **“Strongly Agree.”** Table (15) indicates that the weighted mean for this item reached **4.23**, with a standard deviation of **0.76**, suggesting that the prevailing level of agreement for this item was **very high**, with a relative importance of **84.6%**.

2) I feel motivated to continue learning when using these platforms:

With regard to this item, the data in Table (14) reveal that **40%** of participants selected **“Agree,”** while **37.8%** selected **“Strongly Agree.”** As shown in Table (15), the weighted mean for this item was **4.12**, with a standard deviation of **0.84**, indicating a **high** level of agreement, with a relative importance of **82.4%**.

3) These platforms create an enjoyable learning environment that encourages participation:

Regarding this statement, the data in Table (14) show that **42.2%** of participants selected **“Strongly Agree,”** while **41.1%** selected **“Agree.”** Table (15) demonstrates that the weighted mean reached **4.24**, with a standard deviation of **0.75**, reflecting a **very high** degree of agreement, with a relative importance of **84.8%**.

4) These platforms help me track my progress, which enhances my motivation:

The data in Table (14) indicate that **40%** of participants rated this item as **“Agree,”** while **32.2%** rated it **“Strongly Agree.”** Table (15) shows a weighted mean of **4.01**, with a standard deviation of **0.84**, indicating a **high** level of agreement, with a relative importance of **80.2%**.

5) Learning through these platforms increases my commitment to English learning tasks:

With respect to this item, the data in Table (14) show that **34.4%** of participants selected **“Agree,”** while **30%** selected **“Strongly Agree.”** Table (15) indicates that the weighted mean for this statement was **3.81**, with a standard deviation of **1.01**, reflecting a **high** level of agreement, with a relative importance of **76.4%**.

Moreover, the overall result for the **third part (The Role of Brain-Compatible Platforms in Enhancing Learning Motivation)** was **“Agree,”** as the mean score for the dimension as a whole reached **4.08**, which exceeds the acceptable mean of **3**, with a standard deviation of **0.80** and a relative importance of **81.6%**.

This indicates that participants expressed a **high level of evaluation** regarding the role of brain-compatible educational platforms in enhancing learning motivation. Such a high evaluation reflects substantial satisfaction among English Department students concerning the success of these platforms in creating a supportive and secure learning environment. It also suggests an overall positive impact of these platforms, as they contributed to enhancing self-confidence while reducing anxiety associated with learning English, which, in turn, increased students' motivation toward language learning.

Results Related to Answering the Fourth Research Question:

What is the impact of brain-compatible educational platforms on learning English language skills from the perspectives of English language students?

The following tables present participants' responses regarding the statements of the **fourth part**, which reflect the impact of brain-compatible educational platforms on the acquisition and learning of English language skills. These responses were classified according to the following part:

Part Four: The Impact of Brain-Compatible Platforms on Learning English Language Skills

In this section, the items of the fourth part (**The Impact of Brain-Compatible Platforms on Learning English Language Skills**) were examined individually. Table (16) presents the frequency distribution (**frequencies and percentages**) of participants' responses to each item within this part, while Table (17) presents the statistical analysis (**means, standard deviations, relative importance, and prevailing trends**) of participants' responses to the same part. The results obtained are presented as follows:

Table (16): Frequencies and Percentages of the Forth Part Items

X4	Items		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1	These platforms help me improve my listening skills.	N	57	25	5	3	-
		%	63.3	27.8	5.6	3.3	-
2	The platforms contribute to the development of my speaking skills.	N	47	31	10	2	-
		%	52.2	34.4	11.1	2.2	-

X4	Items		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
3	I feel an improvement in my reading skills when using these platforms.	N	43	35	11	1	-
		%	47.8	38.9	12.2	1.1	-
4	These platforms help me enhance my writing skills.	N	37	29	17	7	-
		%	41.1	32.2	18.9	7.8	-
5	These platforms make learning English skills more gradual and manageable.	N	36	35	16	2	1
		%	40	38.9	17.8	2.2	1.1

Table (17): Weighted Mean, Standard Deviation, and Level for the Items of the Forth Part.

X4	Items	Weighted Mean	Standard Deviation	Level	Relative Importance %.	Rank
1	These platforms help me improve my listening skills.	4.51	0.75	Very High	90.2	1
2	The platforms contribute to the development of my speaking skills.	4.36	0.77	Very High	87.2	2
3	I feel an improvement in my reading skills when using these platforms.	4.33	0.73	Very High	86.6	3
4	These platforms help me enhance my writing skills.	4.06	0.95	High	81.2	5
5	These platforms make learning English skills more gradual and manageable.	4.14	0.86	High	82.8	4
	The Impact of Brain-Compatible Platforms on Learning English Skills	4.28	0.77	Very High	85.6	

Through the results presented in the two tables above, the following can be observed:

1) These platforms help me improve my listening skills:

Regarding the evaluation results of this item, the data presented in Table (16) indicate that **63.3%** of the study participants rated this statement as “**Strongly Agree**,” while **27.8%** rated it “**Agree**.” Table (17) shows that the weighted mean for this item reached **4.51**, with a standard deviation of **0.75**, indicating that the prevailing level of agreement for this statement was **very high**, with a relative importance of **90.2%**.

2) These platforms contribute to developing my speaking skills:

With regard to this item, the data in Table (16) reveal that **52.2%** of participants selected “**Strongly Agree**,” while **34.4%** selected “**Agree**.” Table (17) indicates that the weighted mean for this item was **4.36**, with a standard deviation of **0.77**, reflecting a **very high** level of agreement, with a relative importance of **87.2%**.

3) I feel improvement in my reading skills when using these platforms:

Regarding this statement, the data presented in Table (16) show that **47.8%** of participants rated it as “**Strongly Agree**,” while **38.9%** selected “**Agree**.” Table (17) demonstrates that the weighted mean reached **4.33**, with a standard deviation of **0.73**, indicating a **very high** level of agreement, with a relative importance of **86.6%**.

4) These platforms help me develop my writing skills:

Concerning this item, the data in Table (16) show that **41.1%** of participants selected “**Strongly Agree**,” while **32.2%** selected “**Agree**.” Table (17) indicates that the weighted mean for this statement was **4.06**, with a standard deviation of **0.95**, suggesting a **high** level of agreement, with a relative importance of **81.2%**.

5) These platforms make learning English language skills more gradual and easier to manage:

With respect to this item, the data in Table (16) show that **40%** of participants rated it as “**Strongly Agree**,” while **38.9%** rated it “**Agree**.” Table (17) indicates that the weighted mean for this item reached **4.14**, with a standard deviation of **0.86**, reflecting a **high** level of agreement, with a relative importance of **82.8%**.

Moreover, the overall result for the **fourth part** (The Impact of Brain-Compatible Platforms on Learning English Language Skills) was **“Strongly Agree,”** as the mean score for the dimension as a whole reached **4.28**, which exceeds the acceptable mean of **3**, with a standard deviation of **0.77** and a relative importance of **85.6%**. This indicates that participants expressed a **very high level of evaluation** regarding the impact of brain-compatible platforms on learning English language skills. This reflects a substantial effect of brain-compatible e-learning platforms in enhancing English language learning skills. Such a high evaluation also indicates strong satisfaction among students regarding the integration of neuroscience principles into the modern digital design of educational platforms, which acts as a positive stimulus aligned with the brain’s cognitive processes and contributes to developing students’ linguistic abilities, leading to stronger learning responses. Furthermore, the findings suggest that brain-compatible educational platforms have succeeded in accommodating essential learning characteristics, such as reducing cognitive effort and activating memory through interaction with educational platforms, by creating a scientifically stimulating learning environment. This is further reinforced by the platforms’ ability to provide language learning through multiple educational media **auditory, visual, and interactive modalities** simultaneously during the process of learning English.

Levels of Brain-Compatible E-Learning Platforms and Motivation for Learning English Language Skills:

To identify the levels, ranking, and relative importance of the dimensions of brain-compatible e-learning platforms, represented by (**students’ perceptions of brain-compatible e-learning platforms and the effectiveness of brain-compatible platform features in supporting learning**), which constitute the **independent variable** in this study, as well as the dimensions of motivation for learning English language skills, represented by (**the role of brain-compatible platforms in enhancing motivation for learning and the impact of brain-compatible platforms on learning English language skills**), which constitute the **dependent variable** under investigation, the arithmetic mean, standard deviation, relative importance, and ranking were calculated for all parts and axes of the questionnaire.

Level of the Parts of Brain-Compatible E-Learning Platforms:

To determine the ranking and levels of the parts of brain-compatible e-learning platforms, the arithmetic mean, standard deviation, relative importance, and ranking for these parts were calculated, as illustrated in the following table:

Table (18): Ranking and Levels of the Parts of Brain-Compatible E-Learning Platforms

No	Code	Variable	General Average	Standard Deviation	Level	Relative Importance%	Rank
1	X ₁	Students’ Perceptions of E-Learning Platforms	4.13	0.79	High	82.6	2
2	X ₂	Effectiveness of Brain-Compatible Platform Features	4.24	0.78	Very High	84.6	1
	X	Brain-Compatible E-Learning Platforms	4.19	0.78	High	83.8	

The results presented in the table above indicate the following:

1) Students’ Perceptions of E-Learning Platforms:

With regard to the level of this variable, the data presented in Table (18) indicate that it ranked **second**, with a mean score of **4.13** and a standard deviation of **0.79**. It is noted that the mean score for the dimension of students’ perceptions of e-learning platforms is higher than the hypothetical mean (**3**), which confirms that the prevailing level of this variable is **high** regarding the role of brain-compatible educational platforms, with a relative importance of **82.6%**, from the perspectives of English Department students.

2) Effectiveness of Brain-Compatible Platform Features:

Regarding the level of this variable, the data in Table (18) show that it ranked **first**, with a mean score of **4.24** and a standard deviation of **0.78**. The mean score for the dimension of the effectiveness of educational platform features exceeds the hypothetical mean (**3**), indicating that the prevailing level of this variable is **very high** concerning the role of brain-compatible educational platforms in enhancing learning motivation, with a relative importance of **84.6%**, from the perspectives of the English Department students participating in the study.

With regard to the **brain-compatible e-learning platforms scale as a whole**, which represents the **independent variable**, the results indicate that the dimensions of brain-compatible e-learning platforms namely **students’ perceptions of brain-compatible e-learning platforms and the effectiveness of brain-compatible platform features in supporting learning** have a positive contribution and a clear effect on motivation for learning English language skills, in a manner that reflects the participants’ satisfaction from their perspectives.

Furthermore, the overall mean score for the brain-compatible e-learning platforms scale reached **4.19**, which is higher than the hypothetical mean (3). This mean reflects the role of brain-compatible e-learning platforms and their impact on motivation for learning English language skills among the English Department students targeted in this study. It represents the prevailing level of this variable overall as **high**, with a standard deviation of **0.78** and a relative importance of **83.8%**.

These findings reflect participants' satisfaction with the role of educational platforms in terms of instructional approach, presentation, and ease of understanding in improving **listening, speaking, reading, and writing skills**, making language learning more gradual, accessible, and supportive of enhancing motivation for learning language skills.

Level of the parts of Motivation for Learning English Language Skills:

To determine the ranking and levels of the parts of motivation for learning and acquiring English language skills, the arithmetic mean, standard deviation, relative importance, and ranking were calculated for the parts of motivation for learning English language skills, as illustrated in the following table:

Table (19): Ranking and Levels of the parts of Motivation for Learning English Language Skills

No	Code	Variable	General Average	Standard Deviation	Level	Relative Importance%	Rank
2	Y1	Role of Brain-Compatible Educational Platforms	4.08	0.80	High	81.6	2
1	Y2	Impact of Brain-Compatible Platforms on Learning Language Skills	4.28	0.77	Very High	85.6	1
	Y	Motivation for Learning English Language Skills	4.18	0.79	High	83.6	

The results presented in the table above indicate the following:

1) The Role of Brain-Compatible Platforms in Enhancing Learning Motivation:

With regard to the level of this variable, the data presented in Table (19) indicate that it ranked **second**, with a mean score of **4.08** and a standard deviation of **0.80**. It is also evident that the mean score for the part of the role of brain-compatible platforms exceeds the hypothetical mean (3), confirming that the prevailing level of this variable is **high** within the parts of motivation for learning language skills, with a relative importance of **81.6%**, from the perspectives of English Department students.

2) The Impact of Brain-Compatible Platforms on Learning English Language Skills:

Regarding the level of this variable, the data presented in Table (19) indicate that it ranked **first**, with a mean score of **4.28** and a standard deviation of **0.77**. The mean score for the part of the impact of brain-compatible platforms exceeds the hypothetical mean (3), indicating that the prevailing level of this variable is **very high** in relation to motivation for learning language skills, with a relative importance of **85.6%**, from the perspectives of English Department students.

With regard to the **motivation for learning English language skills scale as a whole**, which represents the **dependent variable**, the findings indicate that the parts of motivation for learning English language skills namely **the role of brain-compatible platforms in enhancing learning motivation** and **the impact of brain-compatible platforms on learning English language skills** have a positive contribution to motivation for learning and acquiring English language skills in a manner that reflects participants' satisfaction from their perspectives.

Furthermore, the overall mean score for the motivation for learning English language skills scale reached **4.18**, which is higher than the hypothetical mean (3). This mean reflects the level of motivation for learning English language skills among the English Department students targeted in this study, representing the prevailing level of this variable overall as **high**, with a standard deviation of **0.79** and a relative importance of **83.6%**.

These findings reflect participants' satisfaction with motivation in terms of instructional approach, presentation, and ease of understanding in improving **listening, speaking, reading, and writing skills**, making learning more gradual, manageable, and effective in enhancing motivation for learning language skills.

Testing the Study Hypotheses:

This section focuses on examining **e-learning platforms** represented by (**e-learning platform design X1** and **electronic platform features X2**) and their impact on motivation for acquiring and learning English language skills through testing the **main hypothesis** of the study.

Hypotheses of the study:

The study hypothesis can be formulated in the following main hypothesis:

“There is a statistically significant effect at the significance level (0.05) of e-learning platforms, with their dimensions (e-learning platform design and electronic platform features), on improving motivation for learning and acquiring English language skills.”

From this main hypothesis, the following sub-hypotheses were derived:

1. **There is a statistically significant effect at the significance level (0.05) of e-learning platform design on improving motivation for acquiring and learning English language skills.**
2. **There is a statistically significant effect at the significance level (0.05) of the characteristics of e-learning platforms on improving motivation for acquiring and learning English language skills.**

To test the main hypothesis and its derived sub-hypotheses for determining and measuring the effect of e-learning platforms on enhancing motivation for acquiring and learning English language skills, **Pearson Correlation Coefficient (R)** was used to examine the significance of relationships between variables. To determine the proportion of variance in the dependent variable explained by the independent variable, the **Coefficient of Determination (R Square)** was used.

Furthermore, to identify the impact of e-learning platforms and their parts on improving and enhancing motivation for acquiring and learning English language skills, **Simple Regression** analysis was employed. In addition, **Multiple Regression** analysis was used to identify the direct effects between the independent variables and the dependent variables.

Studying E-Learning Platforms and Their Relationship to Improving Motivation for Acquiring English Language Skills Using Pearson Correlation:

In this section, e-learning platforms (with their different parts) and their relationship to improving motivation toward acquiring English language skills were examined using the **Pearson Correlation Coefficient**. **Table (20)** below presents the Pearson correlation coefficients and the corresponding statistical significance for each coefficient.

Table (20): Pearson Correlation Coefficient for the Relationship Between E-Learning Platforms and Motivation for Learning Language Skills

No.	Variable	Motivation for Learning English Language Skills				
		Code	N	Pearson Correlation(R)	Coefficient of Determination(R ²)	Statistical Significance
1	E-Learning Platform Design	X1	90	0.756	0.572	**0.001
2	E-Learning Platform Features	X2	90	0.744	0.554	**0.001
	E-Learning Platforms	X	90	0.750	0.563	**0.001

**** Significant at the 0.01 level of significance.**

From Table (20) above, the following can be observed:

1) Electronic Platform Design and Its Relationship with Motivation to Learn English Language Skills:

The data presented in the above table indicate that the value of the Pearson correlation coefficient is **(0.756)**, while the statistical significance value is **(0.001)**. Since the significance value is lower than the significance level **(0.05)**, the correlation in this case is statistically significant, indicating a significant relationship between **electronic platform design** and **motivation toward acquiring and learning English language skills**.

Moreover, since the correlation coefficient is positive, this reflects a **positive relationship**, meaning that the greater the efficiency of electronic platform design, the greater the enhancement of motivation toward acquiring English language learning skills.

It is also evident that the **coefficient of determination (R²)** is **(0.572)**, which means that **57.2%** of the variance or differences in the dependent variable (**motivation to learn English language skills**) can be explained by the independent variable (**electronic platform design**).

2) Electronic Platform Features and Their Relationship with Motivation to Learn English Language Skills:

The data shown in the table also indicate that the Pearson correlation coefficient equals **(0.744)** and the statistical significance value is **(0.001)**. Since the significance value is less than the significance level **(0.05)**, the correlation is statistically significant, demonstrating a significant relationship between **electronic platform features** and **motivation toward acquiring and learning English language skills**. As the correlation coefficient is positive, this indicates a **direct positive relationship**, meaning that as the features of electronic platforms improve, learners' motivation toward acquiring English language learning skills also increases.

Furthermore, the **coefficient of determination (R^2)** equals **(0.554)**, indicating that **55.4%** of the variations in the dependent variable (**motivation to learn English language skills**) are explained by the independent variable (**electronic platform features**).

Regarding E-learning Platforms as a Whole:

The data in Table (20) show that the Pearson correlation coefficient for e-learning platforms overall is **(0.750)**, with a corresponding significance value of **(0.001)**. Since this value is lower than the significance level **(0.05)**, the relationship is statistically significant, indicating a **strong correlation** between **e-learning platforms** and **motivation toward acquiring and learning English language skills**. Because the correlation coefficient is positive, this relationship is direct; in other words, greater attention to platform design, presentation methods, and interactive tools leads to increased motivation and sustained enhancement of writing, listening, and speaking skills, making learning easier and more effective.

Additionally, the **coefficient of determination (R^2)** is **(0.563)**, which means that **56.3%** of the variance in the dependent variable (**motivation to learn English language skills**) is explained by variance in the independent variable (**e-learning platforms**), while the remaining **43.7%** may be attributed to other variables or factors.

Accordingly, the analysis of the relationship between the independent variable (**e-learning platforms**) and the dependent variable (**motivation to learn English language skills**) reveals a **strong, statistically significant relationship** at the **0.05** significance level. Platform design, including presentation methods and ease of use, appears to be among the strongest determinants of enhancing motivation for acquiring and learning English language skills. Each dimension of the platforms is closely associated with the level of motivation toward language learning. Therefore, improving any aspect of e-learning platforms whether in terms of design or features would have a substantial and vital role in enhancing motivation toward acquiring and learning English language skills.

Measuring the Impact of E-learning Platforms on Enhancing Motivation to Acquire and Learn English Language Skills Using Simple Regression Analysis:

In this section, each part of e-learning platforms **electronic platform design (X1)** and **platform features (X2)** was examined independently to measure its effect on enhancing motivation for acquiring and learning English language skills using **Simple Regression Analysis**. This was done to determine the role or effect of e-learning platforms (as an independent variable) on motivation to learn and acquire English language skills (as a dependent variable), as well as to determine the proportion of variance in the dependent variable explained by the independent variable.

1) Measuring the Effect of Electronic Platform Design on Motivation to Acquire and Learn English Language Skills Using Simple Regression Analysis:

A **Simple Linear Regression** analysis was employed to determine the effect of **electronic platform design** (as an independent variable) on **motivation to learn English language skills** (as a dependent variable) by fitting a regression model of the dependent variable on the independent variable. The model was successfully fitted, and to test the significance of the fitted model, **Analysis of Variance (ANOVA)** was employed. Based on the data presented in the following table, the **F-statistic** value was **(F = 346.511)** with a statistical significance level of **(P-value = 0.001)**, indicating that the fitted model is (statistically significant).

Table (21): Analysis of Variance (ANOVA) Test and Selected Statistics Related to the Regression Model

Pearson Correlation Coefficient (R)	R Square Coefficient of Determination	Std. Error of the Estimate	F-Test Statistic	P-value (Statistical Significance)
0.756	0.572	0.124	346.511	0.001**

**** Statistically significant at the 0.01 significance level.**

As shown by the data presented in the previous table, the **Standard Error of the Estimate**, also referred to as the **estimation error**, which represents a measure of the accuracy of the predicted values, equals **(0.124)**. This is a relatively small value, indicating the adequacy and goodness of the model used for prediction.

The results in the table also indicate the values of the **Pearson correlation coefficient** and the **coefficient of determination**, where the Pearson correlation coefficient reached **(0.756)** and the coefficient of determination reached **(0.572)**. This means that **57.2%** of the variance in the dependent variable (**motivation to learn and acquire English language skills**) is explained by variation in the independent variable (**electronic platform design**).

To test the significance of the regression coefficient in the fitted model for regressing the dependent variable (**motivation to learn English language skills**) on the independent variable (**electronic platform design**), the **T-test** was employed, and the results are presented in **Table (22)**. The test statistic recorded a value of **(T = 58.860)**, with a corresponding statistical significance value of **(0.001)**, indicating the significance of the

regression coefficient. This means that the independent variable (**electronic platform design**) has a statistically significant effect on the dependent variable (**motivation to acquire and learn English language skills**).

Table (22): Results of Estimating the Regression Coefficients of the Independent Variable on the Dependent Variable

	Regression Coefficients (B)	Std. Error of the Estimate	Standardized Regression Coefficients (Beta)	T-Test Statistic	P-Value (Statistical Significance)
(Constant)	0.128	0.70		12.345	0.001**
Electronic Platform Design	0.754	0.019	0.756	58.860	0.001**

**** Statistically significant at the 0.01 significance level.**

The statistical results reported in the previous table indicate that the sign of the regression coefficient in the fitted model is positive (**+0.754**). This means that for every one-unit increase in the level of **electronic platform design**, an improvement of **0.754** is expected in enhancing **motivation to learn English language skills** among students in English departments.

This indicates that the role and effect of **electronic platform design** (as an independent variable) on enhancing **motivation to acquire and learn language skills** (as a dependent variable) is **positive and direct**. In other words, as the values of **electronic platform design** increase, the values of **motivation to learn and acquire language skills** also increase. Accordingly, the fitted regression model takes the following form:

$$Y=0.128+0.754X1$$

Results of Testing the First Sub-Hypothesis:

The results support the acceptance of the **first sub-hypothesis**, which states that there is a **statistically significant effect** at the significance level (**0.05**) of **electronic platform design** on **motivation to learn and acquire English language skills**.

2) Measuring the Effect of Electronic Platform Features on Motivation to Acquire and Learn English Language Skills Using Simple Regression Analysis

A **Simple Linear Regression** analysis was employed to examine the effect of **electronic platform features** (as an independent variable) on **motivation to learn English language skills** (as a dependent variable) by fitting a regression model of the dependent variable on the independent variable. The model was successfully fitted, and to test the significance of the fitted model, **Analysis of Variance (ANOVA)** was used. Based on the data presented in the following table, the **F-test statistic** reached (**F = 280.389**) with a statistical significance level of (**P-value = 0.001**), indicating that the fitted model is (statistically significant).

Table (23): Analysis of Variance (ANOVA) Test and Selected Statistics Related to the Regression Model

Pearson Correlation Coefficient (R)	Coefficient of Determination (R Square)	Std. Error of the Estimate	F-Test Statistic	P-value (Statistical Significance)
0.744	0.554	0.138	280.389	0.001**

**** Statistically significant at the 0.01 significance level.**

As shown by the data presented in the previous table, the **Standard Error of the Estimate**, also referred to as the **estimation error**, which measures the accuracy of the predicted values, is (**0.138**). This is a relatively small value, indicating the adequacy and goodness of the model used for prediction.

The results presented in the table also show the values of the **Pearson correlation coefficient** and the **coefficient of determination**, where the Pearson correlation coefficient reached (**0.744**) and the coefficient of determination reached (**0.554**). This means that **55.4%** of the variance in the dependent variable (**motivation to learn and acquire English language skills**) is explained by variation in the independent variable (**electronic platform features**).

To test the significance of the regression coefficient in the fitted model for regressing the dependent variable (**motivation to learn English language skills**) on the independent variable (**electronic platform features**), the **T-test** was employed, and the results are presented in **Table (24)**. The test statistic recorded a value of (**T = 52.994**), with a corresponding statistical significance value of (**0.001**), indicating the significance of the regression coefficient. This means that the independent variable (**electronic platform features**) has a statistically significant effect on the dependent variable (**motivation to acquire and learn English language skills**).

Table (24): Results of Estimating the Regression Coefficients of the Independent Variable on the Dependent Variable ($\hat{\beta}_0, \hat{\beta}_1$)

	Regression Coefficients (B)	Std. Error of the Estimate	Standardized Regression Coefficients (Beta)	T-Test Statistic	P-Value (Statistical Significance)
(Constant)	0.016	0.80		10.219	0.001**
Electronic Platform Design	0.743	0.019	0.744	52.994	0.001**

** Statistically significant at the 0.01 significance level.

The statistical results presented in the previous table indicate that the sign of the regression coefficient in the fitted model is positive (**+0.754**). This means that for every one-unit increase in the level of **electronic platform features**, an improvement of **0.754** is expected in enhancing **motivation to learn English language skills** among students in English departments.

This indicates that the role and effect of **electronic platform features** (as an independent variable) on enhancing **motivation to acquire and learn language skills** (as a dependent variable) is **positive and direct**. In other words, as the values of **electronic platform features** increase, the values of **motivation to learn and acquire language skills** also increase. Accordingly, the fitted regression model takes the following form:

$$Y = 0.016 + 0.754X_2$$

Results of Testing the Second Sub-Hypothesis:

The results support the acceptance of the **second sub-hypothesis**, which states that there is a **statistically significant effect** at the significance level (**0.05**) of **electronic platform features** on **motivation to learn and acquire English language skills**.

3) Studying E-learning Platforms and Their Effect on Motivation to Learn English Language Skills Using Multiple Regression Analysis

In this section, the independent variables that have a direct relationship with the dependent variable (**motivation to learn English language skills**) were identified, with the aim of determining which independent variables exert a direct effect on the dependent variable. To identify these variables and evaluate the effect of each, a **Multiple Regression** model was fitted for **motivation to learn language skills (Y)** on the independent variables intended for analysis, which are as follows:

Table (25): Independent and Dependent Variables of the Study

Code	Variables	
X ₁	Electronic Platform Design	Independent Variables
X ₂	Electronic Platform Features	
Y	Motivation to Learn English Language Skills	Dependent Variables

Multiple Linear Regression analysis was employed to achieve the intended objective of this method. This technique is used to identify the independent variables that have a direct effect on **motivation to learn English language skills**, while controlling for the influence of other variables, as well as to determine which variables exert the strongest effect.

To test the main hypothesis, multiple linear regression was applied to examine the effect of the independent variable (**e-learning platforms**) on the dependent variable (**motivation to learn English language skills**) among English department students under study. The following stages and tables present the results of this test.

Stage Two: Fitting the Multiple Regression Model

Based on the above, a regression model was fitted for **motivation to learn language skills (Y)** on the independent variables (X) included in the study. The significance of the multiple regression model was tested, i.e., the corresponding statistical hypothesis was examined as follows:

$$H_0: \beta_1 = \beta_2$$

$$H_1: \beta_1 \neq \beta_2$$

To test the above statistical hypothesis, the **F-test (ANOVA)** was used, and the results are presented in **Table (26)**. The test statistic recorded a value of (**F(2,87) = 3011.89**) with a statistical significance level of (**0.001**). This result indicates the rejection of the null hypothesis (H_0) and the acceptance of the alternative hypothesis (H_1).

This means that the independent variables, collectively or at least one of them, have a statistically significant effect on the dependent variable (**motivation to learn English language skills**). Accordingly, the fitted model is (statistically significant).

Table (26): presents the ANOVA results to assess the model's goodness-of-fit

Model	Sum of Squares	D.f	Mean Square	F-test	P-value
Regression	54.214	2	27.107	3011.89	0.001**
Residual	0.784	87	0.009		
Total	54.998	89			

**** The results are statistically significant at P <0.01**

From Table (26) above, it exposes that the probability value (0.001) is less than the significance level (0.05). Accordingly, it can be concluded that the model is statistically significant and can be used for hypothesis testing.

Table (27): Summary measures for the regression model of the dependent variable on the independent variables.

Pearson Correlation Coefficient (R)	Coefficient of Determination (R Square)	Standard Error of the Estimate (Std. Error)
0.750	0.563	0.295

The results presented in the above table indicate the values of the Pearson correlation coefficient and the coefficient of determination. The Pearson correlation coefficient was recorded as (**0.750**), while the coefficient of determination was (**0.563**). This means that **56.3%** of the variance in the dependent variable (**motivation to learn English language skills**) is explained by the variance in the independent variables (**electronic platform design X1 and electronic platform features X2**) combined within the fitted regression model.

Table (28): Results of regression analysis for the impact of electronic platforms on the quality of motivation for learning and acquiring English language skills.

Source of Variance	B	Standard Error	Beta	T-value	P-value	(R)	R (Square)
Constant	0.18	0.055		11.532	0.001**		
Electronic Platform Design	0.549	0.055	0.553	9.924	0.001**	0.756	0.572
Electronic Platform Features	0.446	0.056	0.447	8.014	0.001**	0.744	0.554
						0.750**	0.563

**** The results are statistically significant at P <0.01**

From Table (28) above, it is evident that the variables (**platform design and platform features**) included in the model have a significant effect within the regression model, as the probability value for these variables is (**0.001**), which is lower than the significance level (**0.05**).

The regression analysis results revealed **statistically significant effects** at the **0.05** significance level for the dimensions of the independent variable **e-learning platforms**, represented by (**platform design and platform features**), in explaining the total variance occurring in the dependent variable (**motivation to learn English language skills**). The independent sub-variables (**electronic platform design and electronic platform features**) demonstrated statistical significance, as all probability values were found to be below (**0.05**), indicating that the dimensions of e-learning platforms namely **platform design** and **platform features** contribute substantially to explaining the dependent variable.

The results further showed that the variable **platform design** recorded the highest standardized effect ($\beta = 0.549$), followed by the dimension **platform features**, which recorded a standardized effect of ($\beta = 0.446$). This indicates variation in the relative importance of the dimensions of **brain-compatible e-learning platforms**, with a notable superiority of **platform design** as a principal determinant.

Table (29): Effect size measures for the independent variables and the overall model fit.

variables	T-test	P-value	Effect size (η_p^2)	Effect
Electronic Platform Design	9.924	0.001**	1.336	Large Effect Size
Electronic Platform Features	8.014	0.001**	1.242	Large Effect Size
The general model	$R^2 = 0.563$		$f^2 = 1.288$	Large Effect Size

** The results are statistically significant at $P < 0.01$

The results shown in the table above indicate that the final model composed of the two independent variables (electronic platform design and electronic platform characteristics) possesses a high predictive ability. It is observed that the coefficient of determination for the model as a whole reached (0.563), meaning that 56.3% of the variance in the dependent variable is explained by the model, which is considered a positive indicator of the model's adequacy, while the remaining 43.7% may be attributed to other variables.

To estimate the practical significance of the study results, the overall effect size of the model was calculated and found to be (1.288), which represents a very large effect size according to **Jacob Cohen (1988)**¹, based on the Cohen's f^2 squared criterion, where an effect size greater than (0.35) is considered large. This indicates that the independent variables together have high explanatory power in predicting the dependent variable. It was also found that the partial effect sizes Partial Eta Squared (η_p^2) for the independent variables (platform design and platform characteristics) reached (1.336) and (1.242), respectively. These values also indicate a large effect size according to Jacob Cohen (1988), based on the partial η^2 criterion, where an effect size greater than (0.14) is considered large. This confirms that the electronic platform dimensions included in the model (platform design and platform characteristics) possess strong practical significance and high explanatory power for the variance in the dependent variable (motivation to learn English language skills), with a noticeable advantage for the independent variable (platform design).

From an interpretive perspective, the previous results confirm that the independent variable (electronic learning platforms), as a major overarching concept, is built upon effective sub-dimensions that contribute to varying degrees in influencing the phenomenon under study (motivation to learn English language skills). It appears that the dimensions of electronic learning platforms in general particularly the dimension of platform design represent the most influential component among those dimensions, which may reflect the importance of emphasizing and sustaining these dimensions as core elements of brain-compatible electronic learning platforms.

Accordingly, these results support the theoretical framework which views the independent variable (electronic learning platforms) as a multidimensional construct, and that improving students' motivation to learn and acquire English language skills requires focusing on the most influential components, specifically the dimensions of (electronic platform design and electronic platform characteristics), in order to ensure the effectiveness of enhancing students' motivation to learn and acquire English language skills in the English Departments at University of Sabratha.

Thus, the model can be represented as follows:

$$Y = 0.180 + 0.549x_1 + 0.446x_3$$

Results of testing the main hypothesis: Acceptance of the main hypothesis, which states that there is a statistically significant effect at the significance level (0.05) of brain-compatible electronic learning platforms (electronic platform design and electronic platform characteristics) on improving and enhancing students' motivation to learn and acquire English language skills.

Discussion, Conclusions, and Recommendations:

Conclusions and Discussion of the Results:

The study results highlighted the following key points:

First: Regarding to the parts of study

The first part (Brain-Compatible E-Learning Platforms)

The results of the analysis showed that the part of **the effectiveness of electronic platform** characteristics ranked first, with a mean score of (4.24), a standard deviation of (0.78), a relative importance of (84.6%), and a

¹ Cohen, J. (1988). Statistical power analysis for the behavioral sciences (2nd ed.). Lawrence Erlbaum Associates.

very high level. The part of **students' perceptions of electronic platforms** ranked second, with a mean score of (4.13), a standard deviation of (0.79), a relative importance of (82.6%), and a high level.

Generally, the part of **brain-compatible e-learning platforms** was rated at a high level, with a mean score of (4.19), a standard deviation of (0.78), and a relative importance of (83.8%). This indicates the impact of brain-compatible e-learning platforms on motivation to learn English language skills among the students of the English departments targeted in the study. This result also reflects participants' satisfaction with the role of educational platforms in terms of teaching methods, presentation, and ease of understanding in improving listening, speaking, reading, and writing skills, making learning more gradual, manageable, and motivating.

The second part (Motivation to Learn English Language Skills)

The analysis results showed that **the impact of brain-compatible platforms on learning language skills** ranked first, with a mean score of (4.28), a standard deviation of (0.77), a relative importance of (85.6%), and a very high level. The part related to **the role of brain-compatible educational platforms** ranked second, with a mean score of (4.08), a standard deviation of (0.80), a relative importance of (81.6%), and a high level.

Overall, the part of **motivation to learn English language skills** was rated at a high level, with a mean score of (4.18), a standard deviation of (0.79), and a relative importance of (83.6%) from the participants' perspective. This indicates participants' satisfaction with motivation in terms of instructional style, presentation, and ease of understanding in improving listening, speaking, reading, and writing skills, which made learning more gradual and accessible while enhancing motivation to learn language skills.

Second: Regarding e-learning platforms and their relationship with motivation to learn English language skills

1. The analysis results showed a significant positive relationship between both **(electronic platform design and electronic platform characteristics)** and motivation to learn English language skills, where the correlation coefficients reached (0.756) and (0.744), respectively. These relationships were statistically significant, with probability values of (0.001), indicating statistically significant correlations at the significance level of (0.05).

2. The analysis also showed a significant positive relationship between e-learning platforms in general and motivation to learn English language skills among students in the English departments at University of Sabratha, where the correlation coefficient reached (0.750), with a probability value of (0.001), indicating a statistically significant relationship at the significance level of (0.05). Since the correlation coefficient is positive, this reflects a direct relationship, meaning that increased attention to the design and presentation methods of interactive tools on electronic platforms contributes to improved motivation and sustained enhancement of writing, listening, and speaking skills.

The coefficient of determination reached (0.563), meaning that 56.3% of the variance in the dependent variable **(motivation to learn English language skills)** is explained by variation in the independent variable **(e-learning platforms)**, while the remaining 43.7% may be attributed to other factors.

Accordingly, it can be concluded that electronic platforms play a direct and significant role in enhancing motivation to learn English language skills among students in the English departments at University of Sabratha through their dimensions represented by (electronic platform design and electronic platform characteristics), with coefficients of determination of (57.2%) and (55.4%), respectively. Therefore, the dimensions of e-learning platforms have a positive role in enhancing students' motivation to learn and acquire English language skills, with platform design having the strongest effect.

Third: Regarding e-learning platforms and their impact on motivation to learn English language skills (Hypothesis Testing)

1. The analysis results showed that the sub-hypotheses were accepted independently, leading to the conclusion that there is a statistically significant effect at the significance level of (0.05) for both (electronic platform design and electronic platform characteristics) on motivation to learn and acquire English language skills. The independent variables contributed to the variance in the dependent variable through coefficients of determination of (57.2%) and (55.4%), respectively.

2. The analysis results also showed acceptance of the main hypothesis, indicating a statistically significant effect at the significance level of (0.05) of brain-compatible e-learning platforms (electronic platform design and electronic platform characteristics) on improving and enhancing students' motivation to learn and acquire English language skills. The independent variable (e-learning platforms) contributed to explaining variance in the dependent variable (motivation to learn English language skills) through a coefficient of determination of (56.3%), while 43.7% of changes in students' motivation may be attributed to other factors.

3. The analysis further showed that the overall effect size of the model reached (1.288), indicating a large effect size. It was also found that the partial effect sizes Partial Eta Squared (η^2p) for the independent variables (electronic platform design and electronic platform characteristics) were (1.336) and (1.242), respectively, which also indicate large effect sizes. The e-learning platform dimensions included in the model (electronic platform design and electronic platform characteristics) therefore possess strong practical significance and high

explanatory power for variance in the dependent variable (motivation to learn English language skills), with a noted advantage for the independent variable of (electronic platform design).

III. RECOMMENDATIONS:

In view of the analytical and statistically significant findings reached by the study, which revealed the role of e-learning platforms and their impact on enhancing motivation to learn English language skills, the researchers recommend the following:

1. When designing educational platforms, consideration should be given to the brain's cognitive processes by incorporating visual and auditory stimuli and reducing cognitive load, as this enhances the efficiency of the platforms and contributes to the acquisition of English language skills.
2. It is necessary to develop a program within electronic platforms that utilizes immediate feedback, as this can increase and sustain students' motivation to learn English.
3. A specialized training program should be developed for English language instructors to enable them to use e-learning platforms through approaches aligned with how the brain processes incoming information.
4. Future research studies should be conducted on e-learning platforms and their impact on students' motivation to verify the sustainability of motivation over time and the long-term development of students' acquired language skills.

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