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| RESEARCH ARTICLE

Using Statistical Analysis in Educational Research: Methods and Applications in EFL Context

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| ABSTRACT
This article investigates the crucial role of statistical analysis in educational research with particular emphasis on the English as a Foreign Language (EFL) context. Statistical methods and tools are indispensable in transforming raw educational data into meaningful insights that inform evidence-based decision-making in language teaching and learning. The article emphasizes the fundamental importance of statistics in education, highlighting how these methods enable researchers to identify patterns, validate findings, and support pedagogical improvements. In EFL research specifically, statistical analysis addresses the unique challenges posed by diverse learner populations, varied proficiency levels, and multicultural contexts. The article explores key applications of statistical analysis, including understanding learner performance, evaluating teaching methodologies, enhancing the reliability and validity of assessments, and ensuring informed institutional policy decisions. It provides details and purposes and appropriate use of various hypothesis types, including null hypothesis, alternative, substantive, complex, universal, and existential hypotheses, in educational research. The discussion provides details on how to select appropriate statistical techniques based on research design, sample size, and data characterization. A crucial distinction is made between parametric methods (t-tests, ANOVA, Pearson correlation) and non-parametric alternatives (Mann-Whitney U, Kruskal-Wallis, Spearman correlation), with practical guidance on assessing data normality to determine appropriate analytical approaches. The article emphasizes that effective use of statistical tools requires not only technical proficiency but careful research design, appropriate sampling techniques, and awareness of potential analytical errors. Ultimately, this work demonstrates how statistical literacy empowers educators and researchers to enhance teaching practices, curriculum development, and learning outcomes in the EFL context.

| KEYWORDS
statistical analysis, EFL research, hypothesis testing, educational research, parametric methods, data analysis techniques, evidence-based education

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1. Introduction

Statistics can be understood as a social activity that is rooted in human societies, evolving into a set of purposeful and planned behaviors aimed at social management as society advances to a certain stage. Statistical terminology originally refers to the logical analysis of quantitative associations between multiple items. Statistics in education, particularly, includes the application

of a specific statistical method and serves as a key tool for measurable educational administration and research. As a research method, educational statistics involves combining, investigating, and interpreting data collected from the educational practices, adhering to the general principles and techniques of mathematical statistics. The emphasis of educational statistics is on data, making it closely tied to the handling of results from survey and experimental methods (Xinyan, 2023).

In the vibrant field of educational research, the use of statistical analysis has evolved into an indispensable method for revealing patterns, validating results and findings, and consequently making decisions. The primary role of statistical analysis is to provide researchers with varied and valid tools to examine, investigate, and interpret the data they gather, and more importantly, to provide a clear description of the main trends. Statistics transform raw data into a more meaningful insight that helps researchers easily understand and identify the provided patterns, behaviors, and outcomes observed.

English in a foreign-language teaching context has unique prospects as it involves an enormous number of learners coming from varied backgrounds and includes varied teaching pedagogies. This multidimensional context necessitates the use of statistical methods suitable for a vast diversity of learners with varied proficiency levels and sociocultural contexts, to make the right evidence-based decision. Ellis (1991) argued that experimental tools bridge the gap between language research and language learning to more applicable classroom practices, thereby enhancing the use of more advanced EFL teaching methods. Having careful statistical analysis, both researchers and educators can relate classroom realities to theoretical frameworks, enhancing the effectiveness of language learning and teaching and improving learning outcomes.

Moreover, statistics play a crucial role in comparing students' performance and proficiency across various test items, assessing the effects of nonlinguistic factors in language learning, and finally evaluating learners' achievements in language skills (Sapkota, 2012). In EFL studies, the main goal of using statistics is to transform the gathered qualitative data into quantitative data. Quantitative data facilitates researchers and helps them understand and interpret these statistics easily. Additionally, statistical analysis helps create visual presentations for the data in the shape of tables, graphs, charts, cross-tabulations, and frequency distributions. Moreover, these methods effectively condense large datasets into brief summaries, using measures such as main tendencies, to specify certain values and evaluate variability in the data distribution (Sapkota, 2015).

Abdelrasheed et al. (2022) reported that statistical tools, when used properly, can significantly enhance the learning process, the development of teachers as researchers, and, more importantly, be equally beneficial not only in education but also in foreign language teaching.

Statistical methods reveal the connections and relationships between variables, using techniques such as correlation to provide clear insights into their strength, direction, and significance. Furthermore, regression analysis supports the relationship between the dependent and independent variables, helping to clarify predictions and provide a more detailed analysis. Statistics not only describe data, but also play a pivotal role in generalizations, extrapolating findings from data samples to a wider population, making it a crucial element of EFL qualitative research.

Obviously, researchers use statistical analysis to identify any expected relation between their research variables, they try doing this by using statistical techniques like correlation methods to enlighten them with a deeper and better understanding of the direction, strength, and significance of these correlations. Additionally, regression analysis enhances the relationship between the dependent and independent variables, supporting more robust analysis and deeper predictions. Furthermore, statistical tools support generalizations and help researchers to extrapolate findings from sample data to broader populations, making them a vital component of quantitative EFL research.

2. The Importance of Statistical Analysis in EFL Educational Research

It cannot be denied that educational research depends on statistical analysis as a basic tool that provides researchers with the appropriate methods for a systematic interpretation of their studies. Based on Ellis's (1991) observation, practical methods, including statistical techniques, are fundamental to linking research findings to real-world classroom applications, enabling educators to make informed data-driven decisions.

3.Key Applications of Statistical Analysis in EFL Research

3.1. Understanding Learner Performance:

The main usage of statistical analysis in EFL educational research is to identify and comprehend learners' performance. There are many statistical tools that support researchers' efforts to examine patterns in exam scores and intended learning outcomes, offering valuable insights into learners' achievements and the challenges they might face. Brown (1988) referred to the important role of these techniques in identifying trends and relationships among variables, such as the impact of instructional strategies on language proficiency.

3.2. Evaluating Teaching Methodologies and Curriculum Design

Another positive effect of statistical analysis is correlated with its role in assessing and evaluating the efficiency of the instructional methods used in classrooms. Utilizing these tools assists educators in evaluating how different teaching strategies

affect students' learning outcomes. Studies using equation modeling have helped researchers better understand the interconnections between learners' cognitive constructs and their language learning achievement, thereby improving pedagogical practices and informing curriculum development. By leveraging statistical tools, researchers can not only explain data but also contribute to the development of innovative practices that address the distinctive challenges faced by EFL learners. It can be used to identify the difficulties that learners usually face in language acquisition and provide important interventions (Dörnyei, 2007). Additionally, it enhances researchers' ability to interpret large datasets by revealing meaningful patterns, relationships, and major trends in EFL teaching and learning contexts (Mackey & Gass, 2022).

3.3. Enhancing Assessment of Reliability and Validity

A third primary effect of using statistical analysis, as asserted by Dörnyei (2007), is that statistical analysis boosts objectivity and accuracy. When running a statistical analysis, biases and subjectivity are reduced, thereby enhancing the reliability and validity of the research findings. It plays a core role in assuring that all language exams are accurate and fairly assess learners' abilities through minimizing errors and inconsistencies. Moreover, using them enhances reliability and validity of assessments and guarantees their effectiveness in assessing language proficiency. (Brown, 2014).

3.4. Advising Policy and Institutional Decision-Making

In addition to being crucial for adjusting and directing instructional strategies, statistical analysis goes beyond pedagogy to support the development of evidence-based educational policies. Data-driven decision-making remains in high demand in educational contexts where statistical techniques enhance EFL assessment procedures. The implementation of statistical tools enables more informed decision-making to enhance teaching methods, curriculum design, language assessment, and equitable learning opportunities(Pallant, 2020). Using statistical techniques such as t-tests or ANOVA, researchers can compare teaching strategies, such as communicative language instruction and grammar translation, and evaluate their effects on learning outcomes (Mackey & Gass, 2022). Similarly, this can help in forming evidence-based educational policy and making sure resources are distributed efficiently to improve learner outcomes, as emphasized by Sharma (2007). To establish more egalitarian learning settings, researchers might suggest interventions by examining differences among learners, such as gender, socioeconomic background, or previous language experience.

3.5. Improving EFL Education Research through Effective Statistical Analysis

Educational research is an essential component of the development and implementation of evidence-based practices to improve teaching and learning outcomes (Birgili & Aydın, 2020). To achieve this, statistical analysis is a prerequisite for research activities and a condition for professional development, innovation of the teaching process, and improvement of educational practice. Computer literacy, statistical logic, statistical thinking, and the mastery of statistical procedures are crucial skills for effective education research. The application of these skills in research practice is important for selecting and applying appropriate statistical procedures and presenting research results effectively (Ren et al., 2021). The recent rise in research on statistical education has led to an increased desire for students to become acquainted with statistical thinking and data analysis. As a branch of mathematics, statistics is the science or art related to data collection, analysis, and interpretation of results necessary for drawing conclusions and making informed decisions. Furthermore, research in statistics education focuses on students' statistical achievement and attitudes toward statistics, statistical thinking, literacy, language skills, and models. One of the most important topics in statistics education is data analysis and probability, as it plays a crucial role in decision-making about the collection and interpretation of research data.

In summary, statistics empower educators, researchers, and policymakers in education by providing the means to collect, analyze, and interpret data. Whether it's designing research studies, evaluating program effectiveness, assessing student performance, making data-driven decisions, or shaping educational policies, statistics is a crucial tool for evidence-based practices and improved educational outcomes.

4. The Transformative Role of Statistical Analysis in EFL Research

The value of statistical analysis in EFL research lies in its ability to establish conceptual comprehension and provide a strong basis for empirical investigations. By investigating the principles and methodologies underlying statistical tools, researchers contribute to a more sophisticated and knowledgeable approach to language instruction by examining the theories and procedures underlying statistical tools. It also enables comparative research across a variety of linguistic and cultural contexts, which aids in generalizing results and provides insights into various learning environments (Mackey & Gass, 2022).

Based on the previous discussion, this research attempts to clarify the dynamic significance of statistical analysis in enhancing the caliber and equity of English language instruction based on the points mentioned above and by examining the existing literature, frameworks, and approaches. In conclusion, statistical analysis is essential for assessing student involvement, updating and refining curriculum design, enhancing curriculum development, and improving teaching practices. Its capabilities, including descriptive analysis and correlations, play a key role in driving these improvements.

5. Using statistical analysis to investigate hypotheses in EFL

In educational research, statistical analysis is the backbone of research, which assists researchers in investigating any hypothesis rigorously. The researchers, using these complex data sets, derive evocative results. A hypothesis can be structured by carefully designing objectives, selecting appropriate data measurement tools, and sampling techniques (Ravid, 2024; Saprullah et al., 2023). Hypothesis testing involves data analysis, a complex task that can be further divided into conceptual reasoning and low-level execution subtasks (Ding et al., 2025).

5.1. Types of Hypothesis

5.1.1. Null Hypothesis (H0)

The Null Hypothesis is the hypothesis in which the researcher reports that the relationship formed between two variables is insignificant and accidental rather than constant. The null hypothesis proves that there is no actual relationship between the two variables, or there is no actual difference between the two groups in one variable. The Null hypothesis is also named as the statistical hypothesis by various researchers (Gibbons et al., 2007; Leppink et al., 2017; Travers et al., 2017). The Null hypothesis is used when no previous studies have addressed the topic or when there is a conflict or contradiction in the results of previous studies. For example, there is no statistically significant correlation relationship (at a significance level of 0.05) between engaging in classroom activities and English writing skills among foundation program students. Another example: There is no statistically significant difference (at a significant level of 0.01) between the mean scores of male and female students in academic writing among EFL students. In experimental design, the null hypothesis can be formulated as follows: There is no statistically significant difference (at a significant level of 0.01) between the mean scores of students in the control and experimental groups. If the sample size is small or the data are not normally distributed, the researcher will use nonparametric tests. In that case the null hypothesis can be formulated as: There is no statistically significant differences (at significant level of 0.01) between the mean rank scores of students in control group and experimental in critical thinking in pre-test among EFL students.

5.1.2. Alternative Hypothesis (H1 or Ha)

The alternative hypothesis (H1) is the operational statement of the research theory, predicting that a specific relationship or effect exists between the independent and dependent variables. Scientific rigor requires that the null hypothesis be rejected only when the observed data reaches a level of statistical significance - typically a p-value of less than 0.05 - which indicates that the probability of the results occurring by chance is sufficiently low to support the alternative claim (Cohen, 1988). Alternative hypotheses often include phrases such as "an effect," "a difference," or "a relationship." When alternative hypotheses are written in mathematical terms, they always include an inequality (usually ≠, but sometimes < or >). As with null hypotheses, there are many acceptable ways to phrase an alternative hypothesis.

5.1.3. Non-Directed Alternative Hypothesis

A non-directional (or two-tailed) hypothesis simply states that there will be a difference between the two groups/conditions, but does not say which will be greater/smaller, quicker/slower, etc. When the study is correlational, we simply state that variables will be correlated but do not state whether the relationship will be positive or negative, e.g., there will be a significant correlation between variable A and variable B. For example, there is a statistically significant correlation (at a significance level of 0.01) between engaging in classroom activities and academic achievement in the English language. Another example, there are statistically significant differences (at a significance level of 0.01) between the mean scores of males and females in academic resilience.

5.1.4. Directed Alternative Hypothesis

A directional (or one-tailed) hypothesis states which way you think the results are going to go. For example, in an experimental study, we might say, "Participants who have been taught by using active learning strategies will engage in classroom activities more than the students who are taught using traditional strategies. The hypothesis compares the two groups/conditions and states which one will …. have more/less, be quicker/slower, etc.

If we had a correlational study, the directional hypothesis would state whether we expect a positive or a negative correlation, we are stating how the two variables will be related to each other, e.g. there will be a positive correlation between the number of stressful life events experienced in the last year and the number of coughs and colds suffered, whereby the more life events you have suffered the more coughs and cold you will have had". The directional hypothesis can also state a negative correlation, e.g., the higher the number of Facebook friends, the lower the life satisfaction score. For example, there is a statistically significant positive correlation (at a significance level of 0.01) between engaging in classroom activities and academic achievement in the English language. Another example, there are statistically significant differences (at a significance level of 0.01) between the mean scores of males and females in academic resilience in favour of males students.

5.1.5. Substantive Hypothesis

A substantive hypothesis is often called a scientific hypothesis that is logical, testable and able to predict relationships based on prior observations or theoretical understanding of a scientific concept. A substantiated hypothesis is the direct opposite of the null hypothesis and is directly used in order to address the research questions. Substantive hypothesis is mainly used to specify the relationships and nature of the relationship between the variables; these relationships are empirically testable and help researchers to make evident and specific claims on certain relationships (Spanos, 2006 & 2010).

5.1.6. Complex Hypothesis

A Complex Hypothesis can be described as a hypothesis that contains two or more independent or dependent variables that are required to be tested. A complex hypothesis is a multidimensional phenomenon that explores various learning possibilities and derives results using different pedagogical approaches. Complex hypotheses draw on the most influential theoretical frameworks that provide dimensions to educational research and guidance to scholars. A complex hypothesis utilizes multifaceted factors and elaborates interconnected relationships. Complex hypotheses integrate multidisciplinary research, including sociology, psychology, cognitive science, and neuroscience. Complex hypotheses have shaped various well-known theories that are in practice today, for example, the Zone of Proximal Development and Scaffolding (ZPD) hypothesis, the Cognitive Load Theory hypothesis, the multiple intelligences hypothesis, the Growth Mindset hypothesis, and so on. (Anupama, 2018; Guo et al., 2010; Ioannidou, & Erduran, 2021; Wang & Wang, 2024)

5.1.7. Universal Hypothesis

The Universal hypothesis focuses on the fundamental principles of how learners from diverse learning backgrounds, contexts, and cultures learn in educational settings. These hypotheses are the basis for the formulation of educational systems and policies globally. Universal hypothesis encompasses classroom learning to policy making and learning management systems, such as Constructivist learning hypothesis, self-determination theory, multiple intelligence hypothesis, and cognitive load hypothesis. Some of the challenges to universal hypothesis are cultural differences, individual learning attributes, contextual factors, and methodological limitations (Rencüzoğulları & Saka, 2024; Roski et al., 2021; Uljens, 2002).

5.1.8. Existential Hypothesis

The existential hypothesis refers to a profound approach to authenticity in learning. Other hypotheses might be related to knowledge, learning, or skill acquisition; however, the existential hypothesis encourages learners to critically analyze the purpose of human existence, social values, and identity. Existential hypothesis formulates educational frameworks that address human existential concerns and offer relevant solutions (Rumianowska, 2020; Shakeshaft, 2023; Wood et al., 2021).

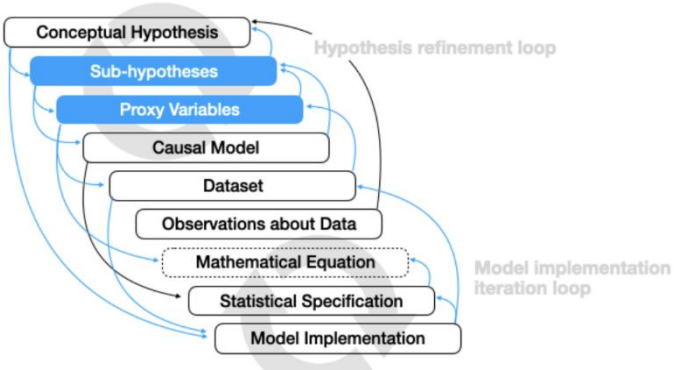
6. Hypothesis testing through statistical analysis

A typical hypothesis-testing process involves making scientific observations, formulating a hypothesis and its objectives, testing the hypothesis, analyzing data, and generating results either to approve or disapprove the hypothesis (Ioannidou & Erduran, 2021). SPSS data analysis tool facilitates researchers in education to work on confirmatory and exploratory data, such as post hoc tests, factor and time series analysis, and planned contrasts (Rahman et al., 2021). Frequently used data analysis tools include t-test, z-test, ANOVA, descriptive analysis test, Kruskal-Wallis-H test, factor analysis test, Mann-Whitney-U test, and bivariate correlation tests, which are most commonly used by researchers in the fields of education and social sciences.

Frequently used research methods consist of experimental research, surveys, correlational studies, and case studies. Descriptive statistics, t-test, ANOVA, factor analysis, bivariate correlation, the Mann-Whitney-U test, and Kruskal-Wallis-H test were frequently used statistical techniques for analysis (Jun et al., 2022; Karadag 2010).

Jun et al. (2022) designed a conceptual model to formulate and test the hypothesis, following the given steps in the model. They found that data collection methods and sampling techniques are among the factors that directly affect the statistical analysis process. They used the linear ballistic accumulator (LBA) model to accumulate a large amount of data and accurate parameter estimation.

Hypothesis testing through data analysis needs researchers' familiarity with the domain of knowledge, their knowledge, and careful selection of research tools and a successful data collection process (Jun et al.,2021). Subsequently, analyzing the data to prove or oppose the hypothesis depends on accurate data analysis. Factors that may hinder accurate data analysis include common errors, inappropriate use of statistical techniques, bias in data sampling, inadequate data, improper selection of research tools, and inaccurate calculations, which can lead to incorrect results and faulty



Jun et al. 2022 hypothesis formalization and process

analysis (Ioannidis, 2018). Thus, investigating a hypothesis through statistical analysis requires researchers to be highly proficient in technical knowledge of statistical methods and the suitability of these statistical tools for the formulated hypothesis. Awareness and proper training can mitigate these issues (Congjin & Aziz, 2025).

6.1. Experimental Design and Analysis

Experimental design and analysis are critical components of scientific research, as they allow researchers to systematically test hypotheses by controlling for potential confounding variables. The design of an experiment refers to the planning and structure of the study, including decisions regarding the selection of participants, interventions or treatments, and methods for data collection. The analysis of data collected from experiments uses statistical techniques to determine the significance and reliability of findings. Furthermore, randomized controlled trials are a common experimental design used in medical research for comparing the efficacy of different treatments. (Blossfeld et al., 2014).In the experimental Design, the sample is small and in many cases is purposively selected. In this case the non-parametric statistical methods should be used (Abdelrasheed, 2024).

6.2. Randomized Controlled Trials

Randomized Controlled Trials are a type of experimental design used to test the efficacy of interventions or treatments. Randomized controlled trials involve randomly assigning participants to either a treatment or control group, with the treatment group receiving the intervention and the control group receiving a placebo or standard of care. This random assignment ensures that any observed differences in outcomes between the two groups can be attributed to the intervention rather than other factors. In addition, blinding is often employed in randomized controlled trials to reduce bias, in which neither the study participants nor researchers know which group they belong to (Lee et al., 2016).

7. Data Analysis Using Suitable Statistical Techniques in EFL research

The appropriate statistical method for analyzing data in various research projects depends on several factors, including the type of research, the research design, the sample size, and the sampling method. If the research design is qualitative (interviews, documents analysis), the researcher should use qualitative data analysis tools. Specialized software such as NVivo, ATLAS.ti, or MAXQDA is used to organize and process large qualitative datasets. However, if the research is quantitative (Questionnaires, tests, Achievement tests), various parametric and non-parametric methods can be used. When the sample size is larger than 30 or randomly selected, and the data is continuous, parametric methods such as the t-test, one-way ANOVA, and Pearson's correlation coefficient can be used. If the sample size is small (less than 30) and the data are selected purposively (non-randomly), and are qualitative, ordinal, or nominal, the researcher should use non-parametric methods such as the Mann-Whitney U test, the Wilcoxon signed-rank test, Spearman's rank correlation coefficient, or the Kruskal-Wallis test.

7.1. Parametric and Non-Parametric Statistical Techniques

Parametric statistical methods are inferential tools used to analyze quantitative data that follow a known probability distribution (often a normal distribution). They rely on estimating population parameters (such as the mean and variance) and are characterized by high statistical power, provided the assumptions of normality, homogeneity of variance, and independence of random samples are met.

Key Parametric Statistical Methods: These methods include various tests depending on the nature of the data and the objective of the study:

- **T-test:** To compare the means of two groups (e.g., t-test for one sample, two independent samples, or two related groups).
    - T-test for one sample: To compare the mean scores of the sample with the mean scores of the population. For example, to test the hypothesis: There are statistically significant differences between the mean scores of the 12^{th}-grade students in Alsaidiah school and the mean scores of the Dhofar Students.
    - T-test for 2 independent groups: to compare the mean scores of 2 independent groups (e.g., males and females, control group and experimental group, Egyptian students and Omani students).
    - T-test for 2 dependent groups: to compare the mean scores of 2 dependent groups (e.g., experimental group in pre-test and post-test).
- **Analysis of Variance (ANOVA):** To compare the means of more than two groups. For example, to compare the mean scores of performances of students according to their specialization (EFL, Mathematics, Sciences).
- **Pearson Correlation Coefficient:** To measure the strength and direction of the linear relationship between two quantitative variables. For example, to test the hypothesis "there is a statistically significant correlation relationship between motivation and well-being among EFL students."
- **Linear Regression Analysis:** To predict the value of a dependent variable based on independent variables.

Non-parametric statistical methods are analytical tests that do not require a normal distribution of data or specific population parameters. They often rely on ranks rather than baseline values. They are used for small samples, nominal/ordinal data, or when there are outliers.

Key non-parametric statistical methods:
-**The Mann-Whitney U test** compares two independent groups when data do not follow a normal distribution, the sample size is less than 30, or the sample was purposively selected. To compare the mean scores of the control group and the experimental group (N less than 30). We use this case especially in experimental design studies with exceptional students.
- **The Wilcoxon signed-rank test** compares two related groups (e.g., before and after). For example, when we compare the mean rank scores of the experimental and the control groups in the pre-test and post-test.
- **Kruskal-Wallis test:** An alternative to ANOVA for comparing more than two independent groups.
- **Friedman test:** Used for comparing more than two related groups.
- **The Chi-Square test** is used to test the independence or good fit of nominal data.

8. Test the normality of the Data

To determine the appropriate statistical method, the researcher must first prepare the data and verify that it is free of missing values. Then he must identify the type of data distribution: is it normally distributed?
Firstly, verifying the absence of missing values: the researcher must ensure that the data file is free of any missing values before conducting the analysis, as this could affect the accuracy of the results. If any missing values are found, the researcher should review the questionnaires that were administered or process those values using an appropriate statistical procedure.
Second: Testing the normality distribution of the data: This step is crucial, as it determines whether the researcher will use parametric or non-parametric statistical methods. There are several ways for verifying the normality distribution of the data, including calculating the kurtosis, skewness, mean, median, and mode coefficients. If the data has a single mode, and the values of the mean, median, and mode are very close to each other or coincide with each other, and the values of the kurtosis and skewness coefficients are very close to zero, then the curve is normally distributed. If the data are multimodal or bimodal, and the mean, median, and mode values are different, and the kurtosis and skewness coefficients are large and far from zero, then the data are considered abnormally distributed.
The Shapiro-Wilk test is the most accurate and effective, especially with small sample sizes. Alternatively, the Kolmogorov-Smirnov test can be used with large datasets. A normality plot can also be used; if the data points cluster around a straight line, then the data are normally distributed.

9. Conclusion

Statistical analysis is an indispensable foundation for rigorous EFL educational research, extending far beyond technical proficiency to encompass careful research design, appropriate hypothesis formulation, and awareness of analytical pitfalls. Its applications, from evaluating teaching methodologies to informing institutional policy providing the empirical basis for continuous improvement in language education. Yet researchers remain vigilant against common errors such as sampling bias, assumption violations, and the conflation of statistical with practical significance. Tools like SPSS and AI-assisted analysis have increased accessibility, but deep conceptual understanding remains non-negotiable.

Looking forward, as educational contexts grow more data-rich and stakeholders demand greater accountability, statistical competence paired with pedagogical wisdom will be essential for translating findings into meaningful improvements. For EFL researchers and educators, mastering these methods is key to advancing knowledge, ensuring equitable assessment, and ultimately enhancing language learning opportunities across diverse contexts worldwide. When applied thoughtfully and ethically, statistical tools become powerful instruments for transforming the quality and effectiveness of English language instruction.

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