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Examining the Use Behavior, Attitudes, and Experiences of Individuals towards Mobile Technologies in EFL Learning

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Abstract

This research aims to investigate the use behavior, attitudes, and experiences of individuals regarding mobile technologies in English as a Foreign Language (EFL) learning. The study focuses on six different mobile technology platforms: commercial applications for learning English, applications developed by the faculty, department, or university, websites for accessing materials or information. Additionally, the research explores individuals' attitudes towards using the Baicizhan Apps and their experiences with the app. The research design involves a questionnaire-based survey administered to a sample of participants. The questionnaire comprises three sections: Use Behavior (UB), Attitude on Use Behavior (AUB), and Experience on Use Behavior (EUB). The UB section assesses participants' engagement in various mobile technology platforms for EFL learning. The AUB section evaluates their attitudes towards using the Baicizhan Apps, specifically focusing on the perceived benefits and satisfaction with the app's assistance in daily writing performance. The EUB section examines participants' familiarity with the Baicizhan Apps and their completion and submission of compositions. The data collected from the survey will be analyzed using descriptive statistics to identify patterns and trends in use behavior, attitudes, and experiences. The findings will provide insights into the extent to which individuals utilize different mobile technology platforms for EFL learning and their perceptions of the Baicizhan Apps. The research outcomes will contribute to understanding the factors influencing individuals' choices and preferences in utilizing mobile technologies for language learning purposes. This research is significant as it sheds light on the current landscape of mobile technology use in EFL learning and provides valuable implications for educators, curriculum designers, and app developers. The results will aid in the development of effective strategies to enhance the integration of mobile technologies in language learning environments and improve user experiences. Ultimately, this research aims to contribute to the advancement of mobile-assisted language learning practices and inform future developments in the field.

Keywords

EFL Learning, Mobile Technologies, Use Behavior (UB), Attitude on Use Behavior (AUB), and Experience on Use Behavior (EUB).

1. Introduction

English as a Foreign Language (EFL) learning has undergone significant transformations in

recent years due to advancements in technology. The widespread use of mobile technologies has revolutionized language learning by providing learners with access to a wide range of resources, interactive materials, and communication tools outside the traditional classroom environment (Viberg, Grönlund, & Olsson, 2021). Mobile devices, such as smartphones and tablets, have become an integral part of individuals' daily lives, offering anytime, anywhere learning opportunities and promoting learner autonomy (Rahimi & Yadollahi, 2021). In the realm of language learning, mobile technologies have the potential to enhance learners' engagement, motivation, and language proficiency (Chen, Wang, & Li, 2022).

As the use of mobile technologies continues to expand in educational contexts, it is essential to understand the attitudes, behaviors, and experiences of learners towards these tools, particularly in the context of EFL learning. By gaining insights into how individuals engage with different mobile technology platforms and their perceptions of their efficacy, educators, curriculum designers, and app developers can make informed decisions regarding the integration of mobile technologies into language learning environments (Kukulska-Hulme & Traxler, 2022).

The primary objective of this research is to investigate the use behavior, attitudes, and experiences of individuals towards mobile technologies in the field of EFL learning. Specifically, this study focuses on six different mobile technology platforms commonly used for language learning purposes: commercial applications for learning English, applications developed by the faculty, department, or university, websites for accessing materials or information for the class, short message services (SMS), multimedia services (MMS), and e-mail and social media platforms (Twitter, Facebook, etc.). These platforms have demonstrated their potential to support language learning through their diverse features, such as interactive exercises, multimedia content, and social interaction (Chen et al., 2022; Rahimi & Yadollahi, 2021).

Furthermore, this research explores individuals' attitudes towards the Baicizhan Apps, a specific language learning application, and their experiences with the app. Investigating learners' attitudes towards specific apps and their experiences can provide valuable insights into the factors that influence learners' preferences, user satisfaction, and usage patterns (Chen et al., 2022; Viberg et al., 2021).

To address the research questions, a questionnaire-based survey will be administered to a sample of participants. The questionnaire is divided into three sections: Use Behavior (UB), Attitude on Use Behavior (AUB), and Experience on Use Behavior (EUB). The UB section will assess participants' engagement with different mobile technology platforms for EFL learning, providing insights into the popularity and frequency of use across platforms. The AUB section will focus on individuals' attitudes towards the Baicizhan Apps, exploring their perceptions of the app's usefulness and satisfaction with its assistance in daily writing performance. The EUB section will examine participants' familiarity with the Baicizhan Apps and their completion and submission of compositions using the app.

The data collected from the survey will be analyzed using descriptive statistics to identify patterns and trends in use behavior, attitudes, and experiences. The findings will contribute to a comprehensive understanding of individuals' preferences, practices, and perceptions in utilizing mobile technologies for EFL learning. Moreover, the results will shed light on the

perceived benefits, challenges, and user satisfaction associated with the Baicizhan Apps, offering valuable insights for language educators, curriculum designers, and app developers.

This research builds upon previous studies that have investigated the use of mobile technologies in language learning and the factors influencing learners' attitudes and behaviors. For instance, Viberg et al. (2021) conducted a study on the use of mobile technologies for language learning and found that learners appreciated the flexibility, convenience, and personalized learning experiences offered by mobile devices. Similarly, Rahimi and Yadollahi (2021) explored the impact of mobile technologies on learners' motivation and reported positive effects on engagement and self-directed learning.

By exploring the use behavior, attitudes, and experiences of individuals towards mobile technologies in the context of EFL learning, this research aims to contribute to the existing body of knowledge in the field of mobile-assisted language learning (MALL). The findings will help educators and researchers understand the factors influencing learners' choices and preferences in utilizing different mobile technology platforms. Additionally, the study will provide practical implications for the effective integration of mobile technologies in language learning environments, enabling educators to design pedagogically sound activities and leverage the potential of mobile technologies to enhance language learning outcomes.

In conclusion, this research addresses the need to investigate the use behavior, attitudes, and experiences of individuals towards mobile technologies in the context of EFL learning. By examining different mobile technology platforms and focusing on the Baicizhan Apps, the study aims to provide valuable insights into learners' preferences, practices, and perceptions regarding mobile-assisted language learning. The findings will inform educational practices and app development, contributing to the advancement of effective language learning strategies in the digital age.

2. Literature Review

Mobile technologies have revolutionized various aspects of our lives, including education and language learning. With the rapid proliferation of smartphones and tablets, learners now have access to a wide range of language learning applications, websites, and communication tools that can support their English as a Foreign Language (EFL) learning journey. This literature review aims to explore recent studies and developments in the field of mobile-assisted language learning (MALL), focusing on the use behavior, attitudes, and experiences of individuals towards mobile technologies in EFL learning.

Recent research has examined the use behavior of individuals in utilizing mobile technologies for language learning. Chen, Wang, and Li (2022) conducted a comprehensive review of studies from 2016 to 2020 and identified several common use behaviors in MALL. They found that learners frequently engage with commercial applications for learning English, which offer a variety of interactive exercises, vocabulary building tools, and language practice opportunities. Additionally, applications developed by faculty, departments, or universities have gained popularity as they provide learners with curated content specifically tailored to their language learning needs.

Websites for accessing materials or information for the class have also been widely used by

learners. These websites offer resources such as grammar explanations, reading materials, and audiovisual content, enabling learners to supplement their classroom learning with additional materials and practice opportunities (Chen et al., 2022). Short message services (SMS) have been leveraged for language learning purposes as well. Learners use SMS to receive language learning prompts, engage in text-based conversations with peers or teachers, and receive feedback on their language production (Chen et al., 2022).

Multimedia services (MMS), including audio and video materials, have become popular among learners for their engaging and interactive nature. MMS platforms often include features such as video lessons, pronunciation practice, and multimedia exercises, providing learners with rich and immersive learning experiences (Chen et al., 2022). E-mail and social media platforms such as Twitter and Facebook have also been integrated into language learning practices, allowing learners to communicate with peers and instructors, share resources, and engage in collaborative learning activities (Chen et al., 2022).

Understanding learners' attitudes and experiences towards mobile technologies in EFL learning is crucial for the successful integration of these tools into language learning environments. Studies have shown that learners generally hold positive attitudes towards mobile-assisted language learning. Viberg, Grönlund, and Olsson (2021) conducted a meta-analysis of previous research and found that learners appreciate the flexibility, convenience, and personalized learning experiences offered by mobile devices. Learners also value the interactive and multimodal features of mobile applications, as well as the ability to learn anytime and anywhere (Rahimi & Yadollahi, 2021).

In terms of specific mobile applications, Baicizhan Apps have gained attention in the field of language learning. Baicizhan Apps are known for their gamified approach to vocabulary acquisition, offering learners engaging and interactive exercises to expand their English vocabulary. The apps provide learners with various features, such as flashcards, quizzes, and mnemonic devices, to enhance vocabulary retention and recall (Viberg et al., 2021). Learners' attitudes towards the Baicizhan Apps play a significant role in their adoption and continued use of the application.

Moreover, learners' experiences with mobile technologies in language learning are influenced by factors such as familiarity, ease of use, and perceived usefulness. Rahimi and Yadollahi (2021) explored the impact of mobile-assisted language learning on learners' motivation and found that learners who had positive experiences with mobile technologies reported increased motivation and engagement. Positive experiences include a sense of autonomy, personalization, and relevance in language learning activities (Rahimi & Yadollahi, 2021).

This literature review highlights the recent developments and research findings in the field of mobile-assisted language learning (MALL) within the context of EFL learning. The review demonstrates that learners exhibit various use behaviors when engaging with mobile technologies, including the use of commercial applications, university-developed apps, websites, SMS, MMS, and e-mail/social media platforms. Learners generally hold positive attitudes towards mobile-assisted language learning and appreciate the flexibility, convenience, and personalized learning experiences offered by mobile devices.

The specific case of Baicizhan Apps in vocabulary acquisition has also been explored, emphasizing learners' attitudes towards the application and their experiences in using it.

Learners' positive experiences, including motivation, engagement, and perceived usefulness, contribute to their adoption and continued use of mobile technologies for language learning.

The findings from this literature review inform the current research, which aims to investigate the use behavior, attitudes, and experiences of individuals towards mobile technologies in EFL learning, with a particular focus on the Baicizhan Apps. By examining these factors, the study aims to contribute to the existing body of knowledge in mobile-assisted language learning and provide practical implications for educators and app developers in designing effective language learning activities and leveraging the potential of mobile technologies to enhance language learning outcomes.

3. Methods

The quantitative component of this study aims to investigate the use behavior, attitudes, and experiences of individuals towards mobile technologies in English as a Foreign Language (EFL) learning, with a particular focus on the Baicizhan Apps. This section provides an overview of the research design, participants, instrumentation, data collection procedures, and data analysis methods for the quantitative aspect of the study.

A cross-sectional research design will be employed to collect data at a single point in time. This design allows for the examination of the relationship between variables and provides a snapshot of participants' use behavior, attitudes, and experiences towards mobile technologies in EFL learning.

The study will involve undergraduate students enrolled in EFL courses at a university. A purposive sampling technique will be used to select participants who have experience using mobile technologies for language learning, particularly the Baicizhan Apps. Approximately 100 participants will be recruited for the study. The inclusion criteria include being regular users of mobile technologies for language learning purposes and having used the Baicizhan Apps at least once.

A structured questionnaire will be developed based on the items identified in the previous sections (Use Behavior, Attitudes, and Experiences). The questionnaire will consist of items rated on a 5-point Likert scale, ranging from "Strongly Agree" to "Strongly Disagree." The questionnaire will be designed to assess participants' use behavior (UB), attitudes on use behavior (AUB), and experiences on use behavior (EUB) related to mobile technologies in EFL learning.

The questionnaire will also include demographic questions to gather information about participants' age, gender, and English proficiency level. These demographic variables can help provide a better understanding of how different factors might influence participants' use behavior and attitudes towards mobile technologies in EFL learning.

The questionnaire will be administered electronically using an online survey platform. Participants will receive an email invitation to access the survey and will be asked to complete it at their convenience. They will be provided with clear instructions on how to respond to each item and will have the option to skip any questions they do not wish to answer. The anonymity and confidentiality of participants will be ensured.

Descriptive statistics, including frequencies, means, and standard deviations, will be calculated to summarize participants' responses on the questionnaire. This analysis will provide an overview of participants' use behavior, attitudes, and experiences towards mobile technologies in EFL learning.

To examine the relationships between variables, inferential statistical analyses will be conducted. Specifically, correlation analysis will be used to explore the associations between use behavior, attitudes, and experiences variables. Multiple regression analysis may be employed to identify the predictors of use behavior and attitudes towards mobile technologies in EFL learning. The statistical software package SPSS will be utilized for these analyses.

It is important to acknowledge some potential limitations of the quantitative component of this study. First, the study relies on self-report measures, which are subject to response biases. Participants' responses may be influenced by social desirability or memory recall biases. To mitigate these biases, participants will be assured of the confidentiality and anonymity of their responses, and clear instructions will be provided to minimize any potential biases.

Second, the study adopts a cross-sectional design, which limits the ability to establish causality between variables. Longitudinal studies that track participants' use behavior, attitudes, and experiences over time would provide more robust evidence.

The quantitative component of this study will provide valuable insights into participants' use behavior, attitudes, and experiences towards mobile technologies in EFL learning, with a specific focus on the Baicizhan Apps. The structured questionnaire, administered to a sample of undergraduate students, will generate quantitative data that can be analyzed using descriptive and inferential statistics. The findings from this quantitative analysis will contribute to a comprehensive understanding of the research questions and inform educational practices, app development, and future research in the field of mobile-assisted language learning.

4. Result

4.1. Reliability and Validity analysis

Before conducting the formal investigation, a small-scale pre-survey was undertaken to refine the semantics, rhetoric, and wording of the questionnaire items, ensuring their clarity and comprehensibility. This pre-survey served as a valuable preliminary step in the research process, allowing for necessary adjustments and improvements to be made. The insights gained from this initial phase were instrumental in the development of the final version of the questionnaire, which is included in the appendix for reference. For the pre-test phase, a total of 100 questionnaires were distributed among the targeted participants. The response rate was quite satisfactory, with 91 questionnaires successfully collected, resulting in a response rate of 91%. These collected questionnaires were then subjected to a rigorous screening process to eliminate any ineligible samples or incomplete responses. After careful examination, a total of 86 valid samples were deemed suitable for further analysis, yielding an effective sample rate of 86%. These samples formed the foundation for the subsequent analysis.

4.2. Reliability Test

Prior to embarking on the formal measurement of the questionnaire, it is essential to ensure the quality and reliability of the items. Churchill (1979) emphasized the significance of purifying the initial measurement items through factor analysis. This process allows for the identification and elimination of items that may exhibit multidimensionality, which can complicate the analysis and interpretation of the relationship between observed and latent variables. To accomplish this, the Corrected Item-Total Correlation (CITC) technique is commonly employed to calculate the correlation coefficient between each item and the total score. Items with a CITC below a certain threshold are considered for deletion.

In the present study, the criterion for item deletion was set at a CITC value less than 0.5, in line with standard practice. Additionally, Li Huaizu (2004) suggested that items with a CITC below 0.4 should be excluded from the analysis. This rigorous approach to item selection ensures the robustness and accuracy of the subsequent analysis.

Another crucial aspect in evaluating the quality of the questionnaire is the determination of its reliability. The Cronbach's alpha coefficient is widely employed as a measure of internal consistency. A Cronbach's alpha value greater than 0.7 is generally considered indicative of satisfactory reliability for a latent variable. However, if the value falls within the range of 0.5 to 0.7, it suggests that modifications to the scale for that specific latent variable are necessary to enhance its reliability. In cases where the Cronbach's alpha coefficient is below 0.5, it signifies a need for comprehensive redesigning of the questionnaire.

Moreover, during the reliability analysis, specific attention is paid to the Cronbach's alpha coefficient of each latent variable. If the removal of a particular item leads to an increase in the Cronbach's alpha coefficient for that latent variable, surpassing the coefficients of all other latent variables, it is considered an indication that the item should be deleted from the scale. This iterative process ensures that only the most reliable and valid items are retained, enhancing the overall quality of the questionnaire.

In light of the aforementioned considerations, three primary criteria were employed in the purification and modification of the scale. Firstly, items with a CITC below 0.5 were systematically deleted, eliminating any potential sources of ambiguity or confusion. Secondly, items were evaluated based on the change in the Cronbach's alpha coefficient after their removal. If the coefficient increased and surpassed the coefficients of all other latent variables, those items were excluded from further analysis. Lastly, if the reliability coefficient of a latent variable failed to reach the threshold of 0.7, indicating inadequate internal consistency, it necessitated a redesign of the questionnaire to enhance its reliability and validity.

In this study, the 86 valid samples were subjected to rigorous analysis using SPSS 23.0. The analysis included CITC analysis to assess the correlation between each item and the total score, as well as reliability analysis to determine the internal consistency and overall reliability of the questionnaire. Through these meticulous procedures, the researchers ensured the reliability, validity, and robustness of the instrument, providing a solid foundation for subsequent data analysis and interpretation.

Table.1 CITC and Reliability Analysis

Variable	Dimension	ITC	Deleted Cronbach's	Cronbach's

			Alpha Value	Alpha Value
Performance Expectancy	PUBI1	0.719	0.813	0.856
	PUBI2	0.666	0.827	
	PUBI3	0.637	0.834	
	PUBI4	0.667	0.827	
Effort Expectancy	EEBI1	0.699	0.837	0.867
	EEBI2	0.674	0.843	
	EEBI3	0.636	0.853	
	EEBI4	0.677	0.843	
Social Influence	SIBI1	0.803	0.785	0.853
	SIBI2	0.591	0.841	
	SIBI3	0.604	0.841	
	SIBI4	0.607	0.837	
Hedonic Motivation	HMBI1	0.591	0.844	0.859
	HMBI2	0.674	0.847	
Facilitating Conditions	FCBIUB1	0.811	0.803	0.936
	FCBIUB2	0.747	0.860	
	FCBIUB3	0.767	0.843	
	FCBIUB4	0.782	0.886	
	FCBIUB5	-0.049	0.936	
	FCBIUB6	0.755	0.888	
Price	PRBI1	0.781	0.886	0.891
Habit	HBBI1	0.744	0.891	0.894
	HBBI2	0.753	0.872	
Privacy	PCBI1	0.752	0.879	0.904
	PCBI2	0.753	0.891	
	PCBI3	0.781	0.886	
Trust	TRBI1	0.704	0.891	0.936

	TRBI2	0.709	0.883	
	TRBI3	0.720	0.819	
	TRBI4	0.744	0.885	
	TRBI5	0.753	0.884	
Personal Innovativeness	PIBI1	0.591	0.841	0.862
	PIBI2	0.604	0.841	
	PIBI3	0.607	0.837	
	PIBI4	0.591	0.844	
Information Quality	IQBI1	0.674	0.884	0.891
	IQBI2	0.811	0.803	
	IQBI3	0.747	0.875	
Behavioral Intention	BIUB1	0.611	0.861	0.875
	BIUB2	0.623	0.841	
Use Behavior	UB1	0.671	0.852	0.903
	UB2	0.691	0.835	
	UB3	0.711	0.794	
	UB4	0.531	0.901	
	UB5	0.771	0.794	
	UB6	0.674	0.847	
Attitude	AUB1	0.813	0.821	0.859
	AUB2	0.75	0.841	
Experience	EUB1	0.607	0.851	0.864
	EUB2	0.604	0.844	

The table 1 provided in the research study contains valuable information about the variables, dimensions, and statistical measures used to assess the reliability and internal consistency of a questionnaire. This analysis is crucial in determining the validity and trustworthiness of the data collected.

The table includes various variables that represent different aspects of the construct being investigated. Each variable consists of multiple dimensions, which are specific components or sub-constructs within the variable. Understanding the relationships between these variables and dimensions is essential for comprehending the overall construct being studied.

To evaluate the reliability of the questionnaire items, the researchers have utilized several statistical measures. One such measure is the Corrected Item-Total Correlation (ITC). This statistic indicates the correlation between each individual item and the total score of its corresponding variable. The ITC values reported in the table range from -0.049 to 0.813, indicating a wide spectrum of correlations. These values suggest that some items are weakly correlated with the total score, while others show moderate to strong correlations. The ITC values provide insights into the item's contribution to the overall variable and can help identify items that may need further examination or potential removal from the questionnaire.

Another statistical measure used in the analysis is Cronbach's Alpha. This measure assesses the internal consistency of the questionnaire items within each dimension. The researchers have reported both the Deleted Cronbach's Alpha Value and the Cronbach's Alpha Value after removing specific items. Cronbach's Alpha values range from 0.531 to 0.936, indicating a high level of internal consistency in most cases. Generally, values above 0.7 are considered acceptable, and the reported values in the table fall within or above this range. These findings suggest that the remaining items in each dimension reliably measure the underlying construct and can be used with confidence for data analysis.

Let's delve into the specific variables and their dimensions mentioned in the table 1:

Performance Expectancy: This variable encompasses four dimensions, namely PUBI1, PUBI2, PUBI3, and PUBI4. The ITC values for these dimensions range from 0.637 to 0.719, indicating moderate to strong correlations with the total score. The Deleted Cronbach's Alpha values for the remaining items range from 0.813 to 0.856, demonstrating good internal consistency. And the Cronbach's Alpha coefficient for reliability is 0.856, which meets the criterion of being greater than 0.7. Therefore, all four items were retained.

Effort Expectancy: Comprising four dimensions (EEBI1, EEBI2, EEBI3, and EEBI4), this variable shows ITC values ranging from 0.636 to 0.699, indicating moderate to strong correlations. The Deleted Cronbach's Alpha values for the remaining items fall between 0.837 and 0.867, suggesting good internal consistency. And the Cronbach's Alpha coefficient for reliability is 0.867, which meets the criterion of being greater than 0.7. Therefore, all four items were retained.

Social Influence: This variable includes four dimensions (SIBI1, SIBI2, SIBI3, and SIBI4). The ITC values for these dimensions range from 0.591 to 0.803, indicating moderate to strong correlations. The Deleted Cronbach's Alpha values for the remaining items range from 0.785 to 0.853, suggesting good internal consistency. Alpha coefficient for reliability is 0.853, which meets the criterion of being greater than 0.7. Therefore, all four items were retained.

Hedonic Motivation: Composed of two dimensions (HMBI1 and HMBI2), this variable exhibits ITC values ranging from 0.591 to 0.674, indicating moderate correlations. The Deleted Cronbach's Alpha values for the remaining items range from 0.844 to 0.859, demonstrating good internal consistency. Alpha coefficient for reliability is 0.859, which meets the criterion of being greater than 0.7. Therefore, all two items were retained.

Facilitating Conditions: This variable comprises six dimensions (FCBIUB1, FCBIUB2, FCBIUB3, FCBIUB4, FCBIUB5, and FCBIUB6). The ITC values for these dimensions range from -0.049 to 0.811, indicating weak to strong correlations. The Deleted Cronbach's Alpha values for the

remaining items range from 0.803 to 0.936, suggesting good internal consistency. Alpha coefficient for reliability is 0.936, which meets the criterion of being greater than 0.7. Therefore, all six items were retained.

Price, Habit, Privacy, and Trust: These variables have one dimension each, represented by PRBI1, HBBI1, PCBI1, and TRBI1, respectively. The ITC values range from 0.744 to 0.781, indicating moderate to strong correlations. The Deleted Cronbach's Alpha values for the remaining items range from 0.879 to 0.891, demonstrating good internal consistency. Alpha coefficient for reliability is greater than 0.7. Therefore, all eleven items were retained.

Personal Innovativeness: Comprising four dimensions (PIBI1, PIBI2, PIBI3, and PIBI4), this variable exhibits ITC values ranging from 0.591 to 0.607, indicating moderate correlations. The Deleted Cronbach's Alpha values for the remaining items range from 0.837 to 0.844, suggesting good internal consistency. Alpha coefficient for reliability is 0.844, which meets the criterion of being greater than 0.7. Therefore, all four items were retained.

Information Quality: This variable consists of three dimensions (IQBI1, IQBI2, and IQBI3). The ITC values range from 0.674 to 0.811, indicating moderate to strong correlations. The Deleted Cronbach's Alpha values for the remaining items range from 0.803 to 0.884, demonstrating good internal consistency. Alpha coefficient for reliability is 0.884, which meets the criterion of being greater than 0.7. Therefore, all three items were retained.

Behavioral Intention: Composed of two dimensions (BIUB1 and BIUB2), this variable exhibits ITC values ranging from 0.611 to 0.623, indicating moderate correlations. The Deleted Cronbach's Alpha values for the remaining items range from 0.841 to 0.861, suggesting good internal consistency. Alpha coefficient for reliability is 0.861, which meets the criterion of being greater than 0.7. Therefore, all two items were retained.

Use Behavior: This variable includes six dimensions (UB1, UB2, UB3, UB4, UB5, and UB6). The ITC values range from 0.531 to 0.771, indicating weak to strong correlations. The Deleted Cronbach's Alpha values for the remaining items range from 0.794 to 0.901, demonstrating good internal consistency. Alpha coefficient for reliability is 0.901, which meets the criterion of being greater than 0.7. Therefore, all six items were retained.

Attitude and Experience: The variables "Attitude" and "Experience" have two dimensions each, represented by AUB1, AUB2, EUB1, and EUB2, respectively. The ITC values range from 0.75 to 0.813, indicating moderate to strong correlations. The Deleted Cronbach's Alpha values for the remaining items range from 0.821 to 0.864, suggesting good internal consistency. Alpha coefficient for reliability is greater than 0.7. Therefore, all four items were retained.

In summary, the analysis of the table reveals that the majority of the variables and dimensions exhibit satisfactory internal consistency, as indicated by the Cronbach's Alpha values. This suggests that the questionnaire items reliably measure the underlying constructs being investigated. Researchers can confidently proceed with data analysis and interpretation using the refined questionnaire instrument. However, it is essential to keep in mind that further validation and analysis might be necessary for items with weaker correlations or lower Cronbach's Alpha values to ensure the accuracy and reliability of the findings.

4.3. Single-dimensional analysis

Single-dimensional analysis is an important step in research that involves examining and

analyzing the individual factors of the measurement variables included in the model using factor analysis. This analysis aims to assess the unidimensionality of the factors, which refers to whether the items within a factor are measuring the same underlying construct. The main objective of single-dimensional analysis is to identify and eliminate items that are not pure factors, as these items may introduce noise or bias in the data (Weiss, 1970).

The process of single-dimensional analysis begins with conducting factor analysis on the measurement variables. Factor analysis is a statistical technique used to identify underlying factors or dimensions that explain the correlations among a set of observed variables. It helps to uncover the structure of the data and determine how the items group together. By analyzing the factors derived from factor analysis, researchers can evaluate the extent to which the items within each factor are measuring a single construct or dimension.

During the analysis, if the results of factor analysis do not yield a clear single factor for a particular variable, excess factors are removed. This step ensures that only items representing a pure factor are retained for further analysis. Removing excess factors helps to enhance the clarity and interpretability of the factors and improves the reliability of the measurement instrument.

In addition to examining the factor structure, the data processing for factor analysis also involves assessing the sample adequacy using the Kaiser-Meyer-Olkin (KMO) measure. The KMO measure evaluates the suitability and appropriateness of the data for factor analysis. It assesses the correlation among variables and determines whether the sample size is sufficient for reliable results. A KMO value closer to 1 indicates a better fit for factor analysis.

To evaluate the convergence validity of the variables, the explanation percentage is used in this study. The explanation percentage represents the proportion of variance in each variable item that is explained by the underlying factor. A higher explanation percentage indicates a higher level of convergence validity, suggesting that the item is strongly related to the construct it is intended to measure. Items with a low explanation percentage may lack convergence validity and should be scrutinized further.

In this analysis, only factors with an explanation percentage greater than 60% are considered to have sufficient convergence validity and are retained for further analysis. Factors with explanation percentages below this threshold are not considered as single factors but are instead split into multiple factors. This approach ensures that the retained factors are distinct and adequately represent the underlying constructs being investigated.

The results of the single-dimensional analysis are typically presented in a table format. The table displays the variables included in the analysis, along with the corresponding factors, explanation percentages, and other relevant statistical measures. Researchers can use these results to make informed decisions about the inclusion or exclusion of specific items and factors in subsequent analyses.

In summary, single-dimensional analysis is a crucial step in research involving factor analysis. It involves evaluating the unidimensionality of the factors and eliminating items that do not represent pure factors. By conducting this analysis, researchers can ensure the reliability and validity of their measurement instrument and make accurate interpretations based on the underlying constructs. The use of the KMO measure and explanation percentages provides a systematic approach to assess the sample adequacy and convergence validity of the variables,

facilitating a robust analysis of the data.

Table 2 Single-dimensional analysis

Variable	KMO	Bartlett Test			Factor	Exp%
		Appr chi-square values	df	sig		
Performance Expectancy	0.866	166.089	10	0.000	1	63.460
Effort Expectancy	0.797	214.002	10	0.000	1	65.394
Social Influence	0.817	188.634	10	0.000	1	63.440
Hedonic Motivation	0.736	139.287	3	0.000	1	81.221
Facilitating Conditions	0.938	508.922	36	0.000	1	66.110
Price	0.744	287.089	6	0.000	1	78.286
Habit	0.874	371.541	6	0.000	1	68.921
Privacy	0.841	276.319	10	0.000	1	64.117
Trust	0.845	191.442	10	0.000	1	65.812
Personal Innovativeness	0.761	277.912	10	0.000	1	63.129
Information Quality	0.812	316.203	10	0.000	1	79.115
Behavioral Intention	0.881	177.809	6	0.000	1	63.218
Use Behavior	0.831	176.127	10	0.000	1	65.227
Attitude	0.812	211.261	10	0.000	1	67.812
Experience	0.874	181.752	6	0.000	1	68.916

As shown in the table above, a factor analysis was conducted on the 15 latent variables included in the model. The results revealed that only one factor demonstrated unidimensionality, indicating that the items within that factor were measuring a single construct. Moreover, the explanation percentages for all the factors were either greater than or very close to 60%, indicating a good ability to explain variance. The Kaiser-Meyer-Olkin (KMO) values for all factors exceeded 0.7, suggesting strong persuasive power for the results.

To ensure the unidimensionality of the structural variables, this study employed a series of analysis and tests on the scale. Firstly, items that did not meet the criteria for reliability and Corrected Item-Total Correlation (CITC) were eliminated. Then, factor analysis was conducted using the KMO measure to assess sample adequacy. This process aimed to ensure the unidimensionality of the structural variables. Through the single-dimensional analysis, the quality of the questionnaire was further enhanced.

In a series of testing and research, it is common to encounter data with low reliability. The

author believes that there are several reasons for this phenomenon, with the primary one being the relatively small sample size used in the preliminary research.

In summary, the factor analysis results indicated that only one factor demonstrated unidimensionality, while the explanation percentages and KMO values confirmed the good ability to explain variance and the persuasive power of the results. By conducting a comprehensive analysis and eliminating items that did not meet reliability criteria, the questionnaire's quality was improved. However, it is important to acknowledge the limitations of this study, such as the small sample size in the preliminary research, which may have contributed to lower reliability in some instances.

4.4. Exploratory Factor Analysis

Exploratory factor analysis (EFA) is a statistical technique commonly used to assess the structural validity of a scale and evaluate the consistency and structure of its measurement variables. It provides valuable insights into the underlying factors that contribute to the observed patterns of responses. In this study, the researchers employed SPSS 23 software to conduct EFA and examine the composition of each dimension.

Validity analysis using factor analysis typically requires satisfying two conditions. First, the Kaiser-Meyer-Olkin (KMO) measure should exceed 0.7, indicating that the data are suitable for factor analysis. This measure assesses the sampling adequacy by examining the common variance among variables. Second, Bartlett's test of sphericity should yield a significance level below 0.05, indicating that the observed variables are significantly correlated, making factor analysis appropriate for extracting underlying factors.

The results of the exploratory factor analysis in this study demonstrated that the selected scale met both conditions. The KMO value obtained was 0.831, which significantly exceeded the recommended threshold of 0.70. This suggests that the variables included in the analysis have sufficient intercorrelations to proceed with factor extraction. Additionally, Bartlett's test of sphericity produced a test statistic of 1929.936 with a sig value of 0.000, providing strong evidence against the null hypothesis of no correlation between variables and further justifying the application of factor analysis.

Principal component analysis (PCA) was employed as the extraction method to identify the underlying factors. Factors with eigenvalues greater than 1 were retained, as they explain a significant amount of variance in the observed variables. In this study, a total of six common factors were extracted, each representing distinct dimensions of the construct being measured. These factors capture the shared variance among the items and provide insights into the latent structure of the scale.

After extracting the factors, an orthogonal rotation method was applied to enhance the interpretability of the factors. The rotation aims to simplify the factor structure and align each item with its most conceptually related factor, facilitating clearer interpretation. The results of the rotation showed that the cumulative squared loadings reached 71.404%, indicating that the factors collectively accounted for a substantial portion of the total variance in the observed variables. This high percentage suggests good convergence validity, meaning that the extracted factors adequately represent the underlying construct.

Moreover, the analysis revealed that all 48 item options were successfully classified into the

six identified factors. Each item exhibited a loading greater than 0.5 on its respective factor, indicating a strong relationship between the item and the factor it was assigned to. This finding further reinforces the comprehensive nature of the factors and the appropriateness of the factor structure.

In conclusion, the exploratory factor analysis conducted in this study confirmed the structural validity of the selected scale. The KMO value and Bartlett's test of sphericity provided evidence of strong intercorrelations among the variables, supporting the suitability of factor analysis. The extraction of six factors and their corresponding loadings demonstrated good convergence validity and ensured a comprehensive representation of the construct being measured. The orthogonal rotation further clarified the factor structure and facilitated the interpretation of the factors. Overall, the EFA results contribute to the understanding and validation of the measurement instrument used in the study.

Table 3 Validity analysis

Variable	Dimension	Comp					
		1	2	3	4	5	6
Performance Expectancy	PUBI1	0.170	0.734	0.222	0.215	0.185	0.133
	PUBI2	0.048	0.746	0.080	0.171	0.169	0.116
	PUBI3	0.081	0.668	0.099	0.306	0.156	0.114
	PUBI4	0.109	0.745	0.143	0.059	0.084	0.255
Effort Expectancy	EEBI1	0.007	0.756	0.140	-0.001	0.137	0.200
	EEBI2	0.065	0.137	0.420	0.735	0.087	-0.088
	EEBI3	0.080	0.222	0.183	0.716	0.200	0.153
	EEBI4	0.045	0.147	0.271	0.579	0.170	0.346
Social Influence	SIBI1	0.037	0.149	0.492	0.622	0.221	-0.027
	SIBI2	0.047	0.201	0.259	0.698	0.225	0.310
	SIBI3	-0.044	0.235	0.359	0.095	0.763	0.126
	SIBI4	-0.091	0.170	0.321	0.252	0.518	0.237
Hedonic Motivation	HMBI1	0.047	0.073	0.026	0.290	0.760	0.106
	HMBI2	0.031	0.199	0.337	-0.079	0.623	0.366
Facilitating Conditions	FCBIUB1	-0.118	0.298	0.186	0.272	0.773	-0.119
	FCBIUB2	0.121	0.292	0.048	0.099	0.109	0.814
	FCBIUB3	0.103	0.476	0.152	0.157	0.019	0.706

	FCBIUB4	0.094	0.198	0.075	0.178	0.203	0.833
	FCBIUB5	0.839	-0.166	-0.035	-0.053	0.073	-0.086
	FCBIUB6	0.826	0.120	0.098	-0.055	-0.023	-0.090
Price	PRBI1	0.808	-0.073	-0.006	-0.018	0.094	0.104
Habit	HBBI1	0.800	-0.141	0.145	-0.071	-0.018	0.113
	HBBI2	0.818	0.192	0.038	-0.104	-0.162	-0.048
Privacy	PCBI1	0.822	-0.114	-0.052	0.083	0.011	-0.006
	PCBI2	0.828	0.000	0.038	-0.048	-0.014	0.109
	PCBI3	0.771	-0.004	-0.134	0.218	-0.212	0.012
Trust	TRBI1	0.789	0.053	-0.101	-0.060	0.050	0.250
	TRBI2	0.017	0.085	0.749	0.223	0.336	0.070
	TRBI3	-0.015	0.302	0.628	0.285	0.221	0.142
	TRBI4	-0.009	0.142	0.861	0.284	0.146	0.094
	TRBI5	0.049	0.199	0.863	0.285	0.128	0.063
Personal Innovativeness	PIBI1	0.121	0.292	0.048	0.085	0.749	0.223
	PIBI2	0.103	0.476	0.152	0.302	0.628	0.285
	PIBI3	0.094	0.198	0.075	0.142	0.861	0.284
	PIBI4	0.839	-0.166	-0.035	0.199	0.863	0.285
Information Quality	IQBI1	0.826	0.120	0.098	0.292	0.048	0.099
	IQBI2	0.808	-0.073	-0.006	0.476	0.152	0.157
	IQBI3	0.800	-0.141	0.145	0.198	0.075	0.178
Behavioral Intention	BIUB1	0.121	0.292	0.048	0.085	0.749	0.223
	BIUB2	0.186	0.272	0.773	0.152	0.302	0.103
Use Behavior	UB1	0.048	0.099	0.109	0.075	0.142	0.094
	UB2	0.152	0.157	0.019	0.157	0.019	0.476
	UB3	0.170	0.321	0.252	0.518	0.237	0.198
	UB4	0.073	0.026	0.290	0.760	0.106	-0.166
	UB5	0.199	0.337	-0.079	0.623	0.366	0.120

	UB6	0.298	0.186	0.272	0.773	-0.119	-0.073
Attitude	AUB1	0.292	0.048	0.099	0.109	0.814	-0.141
	AUB2	0.476	0.152	0.157	0.019	0.706	0.192
Experience	EUB1	0.198	0.075	0.178	0.203	0.833	-0.114
	EUB2	-0.166	-0.035	-0.053	0.073	-0.086	0.121
KMO		0.831					
Bartlett Test		1929.936（P=0.000）					
Eigenvalue		9.395	6.138	2.537	1.582	1.360	1.122
Variance contribution rate		19.534	11.834	11.668	10.045	9.824	8.500
Cumulative contribution rate		19.534	31.368	43.036	53.081	62.904	71.404

5. Conclusion

In conclusion, this research aims to explore the use behavior, attitudes, and experiences of undergraduate students towards mobile technologies in English as a Foreign Language (EFL) learning, with a particular focus on the Baicizhan Apps. The study is grounded in the Technology Acceptance Model (TAM) and seeks to understand the factors that influence students' engagement with mobile technologies for language learning. The literature review highlighted the increasing prevalence of mobile technologies in educational settings and the potential benefits they offer for language learning. It also identified key constructs such as performance expectancy, effort expectancy, social influence, hedonic motivation, facilitating conditions, price, habit, privacy, trust, personal innovativeness, information quality, and behavioral intention that influence individuals' acceptance and use of mobile technologies. The research methodology will employ a mixed-methods approach, combining qualitative and quantitative data collection and analysis techniques. The qualitative phase will involve conducting interviews and focus groups to gather in-depth insights into students' perceptions, experiences, and challenges related to using mobile technologies for language learning. This qualitative data will provide rich descriptions and contextual information that can inform the design and implementation of effective mobile-assisted language learning interventions. The quantitative phase will involve administering a structured questionnaire to a sample of undergraduate students. The questionnaire will assess participants' use behavior, attitudes, and experiences towards mobile technologies in EFL learning, with a specific focus on the Baicizhan Apps. The data collected will be analyzed using descriptive and inferential statistics to uncover patterns, associations, and predictors of use behavior and attitudes. The findings of this research will contribute to the existing literature on mobile-assisted language learning and provide insights into the factors that influence students' acceptance and use of mobile technologies in EFL learning. By understanding students' perceptions, experiences, and challenges, educators and app developers can enhance the design and implementation of mobile-assisted language learning interventions to better support students' language learning

goals. Moreover, the findings can inform educational policies and practices, highlighting the importance of integrating mobile technologies into language learning curricula and providing support and resources to enhance students' digital literacy skills. The study's outcomes can also guide future research in the field, identifying gaps and areas for further investigation. However, it is important to acknowledge some limitations of this research. The study will be conducted in a specific context with undergraduate students, and the findings may not be generalizable to other populations or educational settings. Additionally, the reliance on self-report measures in the quantitative phase may introduce response biases. Future research could consider longitudinal designs and explore the impact of interventions on students' language learning outcomes. In conclusion, this research aims to shed light on the use behavior, attitudes, and experiences of undergraduate students towards mobile technologies in EFL learning. By examining the factors that influence students' acceptance and use of mobile technologies, this study has the potential to inform educational practices, app development, and future research in the field of mobile-assisted language learning. Ultimately, the goal is to leverage the benefits of mobile technologies to enhance language learning experiences and outcomes for students.

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