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Mobile Assisted Language Learning: Evaluation of Accessibility, Adoption, and Perceived Outcome among Students of Higher Education

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Abstract: The present study was aimed at analyzing students’ perceptions toward mobile assisted language learning (MALL), their use patterns, and their usefulness in their academic outcomes. The results indicated that students use widely different MALL software for different applications. In a survey of 581 students from Indian colleges and universities, the research identified five antecedent factors (namely, individual desire and motives, perceived ease of use, technological factors, social influence, and perceived usefulness) which influenced students in the areas of adopting MALL software, students’ readiness, students’ motivation, and the subsequent effect on student performances. The research further indicated that students’ readiness and their motivation level mediated the relationship between factors of adoption of MALL and perceived outcome. The relevance of positive language learning outcomes, theoretical contribution and managerial implications of the study are discussed.

Keywords: mobile assisted language learning; students’ readiness; student motivation; perceived outcome

1. Introduction

Computer-assisted language learning has been applied in schools and colleges for many years. With the introduction of new, powerful mobile phones, a large number of tasks are now performed by mobile devices, that were previously performed on desktop PCs. Mobile phones and smartphones and their extensive applications (apps) have grown significantly among business and engineering students. In today’s colleges, most students use modern digital devices to enhance and enrich their learning and attain higher professional career achievement [1]. Mobile technology is changing the nature of learning by allowing flexible and instant access to rich digital content. Mobile technology enabled learning apps can also play a significant role in language learning. Globalization has opened the door to professionals being able to pursue their careers across countries. Language learning has become vital for students to achieve their professional aspirations. Mobile assisted language learning (MALL) is a relatively new education and training technology that appears to be becoming more popular than traditional e-learning [2]. Despite the importance of mobile learning (m-learning) apps, little study has been undertaken on the factors that influence their acceptability for students in higher education.
MALL has been proven to bring many benefits for students. Several researchers have indicated that students access e-books and demo classes through their mobile phones anywhere and at any time. It is very likely that MALL has the power to promote so-called omnipresent learning [3,4]. Many studies indicate the positive outcome of MALLs in developing habit, fostering a positive attitude and perception toward language learning [5–7]. Several researchers have indicated that students find themselves comfortable in language learning through MALL [7–10] and students’ acceptance of MALL can lead to significant learning. MALL, according to [11] is a practical, convenient, and simple strategy for speaking classes. Ref. [12] investigated the attitudes of English language students in a sample of 60 intermediate Pakistani students. However, research on the use of mobile phones in Indian higher education institutions is still limited and scarce. There is a need for more research into how students use their mobile phones to aid their language learning. This paper asks: (a) what are students’ perceptions toward mobile assisted language learning and its usefulness in their academic outcomes, and, (b) how do students use mobile assisted language learning to support their different academic and professional aspirations. The objective of this research is to analyze the attitudes, perceptions, experiences and viability of MALL among students of higher education. The study will also assess the factors affecting students to adopt MALL and its different applications in an academic context, and assess the factors of MALL and its impact on student readiness, motivation and student performance in language learning. Lastly, the study will examine whether students’ readiness and level of motivation mediates the relationship between adoption of MALL and perceived outcomes.

2. Drivers of Adopting MALL

2.1. Individual Desire and Motives

Individual desire and motivation to achieve their professional ambition drives students to explore a variety of aspiring careers. The recent development of applications for mobile devices has partially met the long-standing desire to employ digital technology and multimedia in language learning courses. Language teachers can now access a multitude of resources that improve the learning process with realistic content well suited for different levels of acquisition, by using previously unavailable mobile applications. There is, and will continue to be, a need to develop new digital language learning tools that accommodate changes in pedagogy and student demands in relation to these new platforms. Another study, [13] indicated student motivation for learning a foreign language and the efficacy of mobile devices in providing language guidance and instructions. Desires are frequently characterized in philosophy as mental states having a “world-to-mind” match. Improving speaking skills consumes a large proportion of classroom practice, is a motivation for both speaking and various activities, and MALLs play a large role in improving language learning [14]. These arguments lead to the following hypothesis.

H1: Individual desire and motivation of students lead to a positive influence in adopting MALL.

2.2. Perceived Ease of Use

The technology acceptance model (TAM) is recognized as a well-established theory for studying students’ perceived ease of use, perceived usefulness, intentions, and attitudes about the use of mobile devices for language acquisition [15–17]. With a few exceptions, the majority of research shows that learners are enthusiastic about utilizing mobile devices to study a second or foreign language. Ref. [16] discovered that whereas active students were concerned with the system’s perceived usefulness, passive students were more concerned about the system’s perceived ease of use. Ref. [18] looked at how mobile gadgets affect seamless learning. They examined 54 papers on the use of mobile devices to enable seamless learning and discovered that all 54 articles had 10 characteristics, including formal and casual learning, customized and social learning, and learning across numerous durations and places. This leads to the following hypothesis.
**H2:** Students’ perceived ease of use of MALL technology has a positive influence on adopting MALL.

### 2.3. Technological Factors

Technological variables of MALL are regarded as one of the important constructs for predicting and explaining users’ intentions to use mobile assisted language learning systems [19–21] investigated how significantly education and learning are changing, owing largely to technological advancements. The author explored the possible future directions of education, where teachers and learners need to consider not only what information needs to be learned, but what information is acceptable to be referenced. The work of several authors such as [18,19,22,23] confirmed that a specific technology could be used more easily and efficiently in the process of acceptance of MALL among students and teachers. Mobile technology advancements are quickly changing the nature of learning by enabling flexible and on-demand access to rich digital material. MALL uses mobile technology to allow teachers and students to study anywhere and at any time. Cost reductions, global connections, quick access, study aids, convenience, and location-based services are just a few of the possible benefits of digital language learning [24–29] These arguments lead to the following hypothesis.

**H3:** Technological factors have a positive influence on the adoption of MALL among students.

### 2.4. Social Influence

Social influence is defined as the degree to which individuals perceive that their behavior is influenced by social factors. The degree to which people believe social influences influence their behavior is referred to as social influence. Many studies have found a beneficial link between social influence and the desire to adjust MALLs [25,29–32]. Individuals who believe their abilities can be improved will undertake greater effort and persistence in improving their skills, and they will seek assistance adaptively when they encounter difficulties [33,34]. In other words, seeking assistance is an effective method of learning [23]. Social influence is the process through which people adapt their behavior to meet the demands of a social setting. Social influence is usually the result of a specific action, instruction, or request, but an individual’s attitude and behavior can also be influenced by what they imagine others will do or think. Using the unified theory of acceptance and use of technology (UTAUT), [20] explored how older people use mobile learning devices. Learner profiles, experience, and motivation are likely to alter when mobile language learning takes place in an informal setting [35]. Based upon the literature, it was hypothesized that:

**H4:** Social influence positively influences intention to adopt MALL for language learning.

### 2.5. Perceived Usefulness

MALL is a digital application that promotes the use of mobile technologies in language learning. MALL can, in fact, be seen as a viable solution to time and location-based language learning. Long-term use has been proposed or demonstrated as a crucial motivator for the adoption of a number of ICT innovations in promoting MALLs [36–38]. The perceived usefulness of the system is related to the productivity and effectiveness of the system and its overall benefits to improving user performance [39]. In terms of personal usage, portable devices enable new modalities of learning, easy access, and engagement across multiple contexts of use, and as such, mobile assisted language learning has gained wide acceptance that resulting in a positive attitude among students and teachers [40–43] proposed that MALL is more important in learner-centered learning than in traditional learning procedures. Some consider their personal tools, others perceive them as helping students cheat on exams, but all acknowledge their pedagogical affordances as a valuable tool.

**H5:** Perceived usefulness positively motivates the adoption of MALL.
2.6. Student Motivation towards MALLs and Perceived Outcome

The ever-changing digital learning platforms and online education environment involves evaluating the quality of learning outcomes [44]. Mobile applications include built-in rewards that serve as motivation for learners to participate in language-learning activities [45]. Student motivation in learning via mobile apps also helps in their learning development. The empirical research of [46] indicated that knowing students’ motivation contributes to students’ learning. It enables students to communicate with their teacher and peers, in addition to exchanging ideas. In an aging, multilingual culture, there is, to date, a scarcity of studies on older individuals’ adoption and use of mobile technology to facilitate self-directed second language learning. Ref. [47] explored the elements that motivate older persons in Germany to adopt MALL for second language learning. In a survey of 208 respondents, the study finding indicated that despite students’ active engagement in language learning through extensive use of digital technology, online resources, and mobile devices, participants were resistant to fully exploit the potential of MALL. The finding also revealed that self-perceived digital literacy and openness to new developments were strong factors approving the use of language learning apps in older adulthood. In another study, [48] investigated MALL’s effects on students’ achievement and motivation in learning English prepositions. Initially, the researcher used mobile applications to test students’ readiness for and interest in learning English prepositions. Mobile assisted language acquisition (MALL) was effective for raising motivation and enhancing students’ performance in English grammar, primarily in acquiring English prepositions. These arguments lead to the following hypothesis.

**H6: Factors of MALL positively motivate students and enhance their performance.**

2.7. Student’s Readiness for MALL and Perceived Outcome

The success of any technology in academics depends upon students’ readiness to adopt it for their career progression. Many researchers have explored teachers’ readiness to use mobile phones for enhancing language learning. Refs. [49,50] investigated teachers’ readiness for technological adoption for pedagogical usage of mobile phone technology. Despite the fact that the instructors were highly motivated to utilize mobile technology in the learning process, the results indicated that they did not appear to be ready to employ mobile technologies in their courses, owing to a lack of competency in addition to a lack of access to the available resources. Some studies indicated a negative perception of teacher mobile assisted language learning, and some teachers even forbade their students using MALLs [51]. In order to improve students’ language learning and convey knowledge pedagogically, teachers must be ready for m-learning. Ref. [52] evaluated professors’ readiness and opinions of m-learning in Bangladesh, India, Malaysia, Pakistan, and Sri Lanka, and it was found that the majority of teachers had the necessary technology and skills to impart mobile learning. A study on mobile learning aspects and readiness, [53] indicated that mobile technologies are ready and available for implementing m-learning, and there is a significant readiness among individuals to utilize mobile phones in learning. According to the report, “teachers have the device and skill ready to transmit m-learning.” The data also demonstrated that they had favorable attitudes regarding mobile aided learning. They agreed that m-learning had the potential to increase learner engagement. Some investigations, however, discovered a low degree of mobile learning preparedness among teachers [50]. These arguments lead to the following hypothesis.

**H7: Students’ readiness to adopt the MALL application has a positive influence on student performance.**

2.8. Students Motivation and Perceived MALL Performance

Mobile phones with upgraded technologies are taking over all aspects of human life, such as education, work and leisure. A study by [54] looks into the impact of MALL on learners’ motivation to learn English as a foreign language (EFL). Both teachers and
students agreed that incorporating mobile devices into an EFL setting boosted students’ enthusiasm and increased their readiness to learn [55]. MALL uses a technique called micro learning, which involves categorizing activities into small/short-term learning units and using authentic/real-life teaching resources. Ref. [56] stated that technology functions as an accelerator in improving learning motivation to strengthen the relationship between MALL and motivation [57]. These arguments lead to the following hypothesis.

H8: Students’ motivation towards MALL has significant influence on students’ performance.

H9: Students’ readiness and motivation mediates the relationship between factors of adoption of MALL and student performance.

The proposed model presented in Figure 1 indicates the path diagram for the causal relationship between four variables in mobile assisted language learning. These were: factors of mobile assisted language learning (Xi), students’ readiness (Ri), students’ motivation (Mi) and perceived outcome (Yi). In the proposed model, the constructs of students’ motivation (Mi) and students’ readiness (Ri) mediated in parallel the relationship between the constructs of mobile assisted language learning (MALLs) and perceived outcome (Yi). Mediation analysis was conducted as per the suggestions given by [57,58]. The parallel mediation concept (shown in Figure 1) permitted mediators to correlate with one another but not causally impact one another. Instead of the equations in the basic mediation model, the following equations could be used to calculate the indirect, direct, and total impacts.

Firstly, the individual direct effect was calculated through the following paths:
Students’ motivation (M) on X(a1);
Students’ readiness on X(a2);
Perceived outcome (Y) on students’ motivation (b1);
Perceived outcome on students’ readiness (b2);
Perceived outcome (Y) on the factor of mobile assisted language learning (Z) which is the direct effect of X on Y.

Secondly, the specific indirect paths and total indirect effect were calculated as:

Figure 1. Proposed Research Model.
Indirect effect of X on Y via students’ motivation (M) = $a_1 \times b_1 = a_1b_1$;
Indirect effect of X on Y via students’ readiness (R) = $a_2 \times b_2 = a_2b_2$;
Total indirect effect via students’ motivation (M) and students’ readiness = $a_1b_1 + a_2b_2$.

Finally, the total effect (c) was determined as = $a_1b_1 + a_2b_2 + c_0$

3. Research Methodology

This present research was based on primary and secondary data. A descriptive research design was used in this study as it allowed researchers to analyze facts and helped in developing an in-depth understanding of the research problem. This design allowed researchers to observe respondents’ behavior in a natural situation and considerably improved the validity of the research tools used [59]. Following that, in order to answer the research questions, a quantitative research approach, similar to [60,61], was used to collect primary data. Participants included students from business administration and engineering programs in Indian universities and colleges. They were purposely chosen since they were the only relevant samples available to the researcher in order to perform the study. A well-structured questionnaire was designed to cover different dimensions of the stated study objectives. The construct for MALL adaptation factors was identified using the technological acceptance model (TAM) and UTAUT model developed by [1,43,52,55,62–64]. Some measurement variables were modified according to the study objectives and research context.

After designing the survey instrument, a pilot survey was carried out on 55 students chosen conveniently over seven days. The results of the pilot test revealed no concerns with the students’ comprehension of the survey questions. To ensure content validity, a group of five specialists (two professors of humanities, English literature, and education; and three students) evaluated and validated the original questionnaire. Cronbach’s alpha (α) for the entire construct of the study was found to be 0.853 for the pretest, and 0.943 for the entire survey. This indicated that the questionnaire was reliable. The data were collected using convenience and snowball sampling approaches. The online questionnaire, produced with Google forms, was distributed to those prospective students, and further students were invited to distribute it to their known fellow students. The questionnaire was totally prepared in English. From December 2021 to January 2022, data were collected throughout an eight-week period. All of the items were graded on a five-point Likert scale, with 1 representing strongly disagrees, and 5 representing strongly agree. There were 650 responses. After editing, 581 responses (excluding incomplete and insincerely responded 69 surveys) were deemed to be fit and were utilized to examine the association between aspects of adopting MALL, students’ motivation, readiness, and perceived outcome among Indian students. The gathered information was organized, tabulated, and analyzed in a systematic manner. For data analysis, Smart PLS software was employed. As a nonparametric second-generation multivariate analysis, the gathered ordinal data were examined using the partial least square structural equation modeling (PLS-SEM) approach. This was performed primarily to evaluate the psychometric qualities of the measuring instrument and to statistically test the presented hypotheses in the research model [57]. PLS-SEM is far more suited for technological acceptability study that stresses predictive modeling [1,62,65]. Compared with CB-SEM (covariance-based), the PLS technique is more suited for incremental research, i.e., building new models, particularly in information systems research, measurements and structural routes [66]. As a result, PLS-SEM was appropriate for this research, which entailed building new structural routes. Version 3.0 of the Smart-PLS statistical software package [67], after establishing the applicability of the measurement model, was used to perform the analysis to validate the structural model. Since this study looks at the link between multiple constructs as dependent and independent variables, structural equation modeling (SEM) was thought to be a good way to examine the relationship. Cronbach’s alpha, composite reliability, AVE, and convergent validity were used to
perform confirmatory factor analysis. A structural model's fitness was assessed using the variance inflation factor (VIF), $R^2$, and standardized path coefficients [68].

4. Results

Information presented in Table 1 indicates the demographic characteristics of the respondents. It is observed that the majority of the respondents were between 18 and 22 years, as 63.4% of the respondents belonged to this age group. A total of 26 (4.5%) respondents were under the age of 18 years, and 78 (13.4%) respondents were between the ages of 23 and 25 years. The sample included 97 (16.7%) respondents aged 25–30 years, with the remaining 12 (2.1%) respondents over 30 years old. In terms of gender, the respondents included 330 (56.8%) males, 247 (42.5%) females, and four (0.7%) transgender students. In terms of their educational level, 297 (51.1%) respondents were under graduate, 163 (28.1%) respondents were graduates, and the remaining 121 (20.8%) respondents were post graduate. In terms of course specialization, it is observed that 341 (58.7%) respondents were from Commence and Management, and 240 (41.3%) respondents were from the Engineering stream. In terms of the years of using mobile assisted language learning software, it is observed that 60 (10.3%) had been using it 0–2 years, 261 (44.9%) respondents 2–3 years, 124 (21.3%) 3–5 years, 52 (9.0%) respondents 5–8 years, 43 (7.1%) respondents 8–10 years, with the remaining 41 (7.1%) respondents indicating that they had been using it for more than 10 years.

The information presented in Table 2 indicates the patterns of MALL software use by students. Multiple responses (3280) were received and processed through SPSS software, and are presented in Table 2. The survey indicated that Google Translate was the most common software used by the majority of respondents as MALL, by 10.6% of respondents, followed by Elsa’s speech, at 10.5%. Another 8.9%, 7.5%, 6.9%, 8.9%, 1.8%, 0.7%, 3.0%, 3.1%, and 3.3% of respondents, respectively, said they used Kamusku, Google Translate, Quilbot, BBC, Grammar Test, English Idiomatic, U-Dictionary, YouTube, ELSA Speak, Duolingo, Quizlet, Speech Notes, Kahoot!, Zoom, Google Meet, and KineMaster, as MALL software.

Table 1. Demographic profile of respondents (N = 581).

| Demographic Characteristics  | Frequency | Percentage |
|-----------------------------|-----------|------------|
| **Age**                     |           |            |
| 18 years and below          | 26        | 4.5        |
| 18–20 years                 | 155       | 26.7       |
| 20–22 years                 | 213       | 36.7       |
| 23–25 years                 | 78        | 13.4       |
| 25–30 years                 | 97        | 16.7       |
| Above 30 years              | 12        | 2.1        |
| **Gender**                  |           |            |
| Male                        | 330       | 56.8       |
| Female                      | 247       | 42.5       |
| Transgender                 | 4         | 0.7        |
| **Educational Level**       |           |            |
| Below graduation            | 297       | 51.1       |
| Graduate                    | 163       | 28.1       |
| Post graduate               | 121       | 20.8       |
| **Specialization**          |           |            |
| Commence and management     | 341       | 58.7       |
| Engineering                 | 240       | 41.3       |
| **Years of Using MALL**     |           |            |
| 0–2 years                   | 60        | 10.3       |
| 2–3 years                   | 261       | 44.9       |
| 3–5 years                   | 124       | 21.3       |
| 5–8 years                   | 52        | 9.0        |
| 8–10 years                  | 43        | 7.4        |
| Above 10 years              | 41        | 7.1        |
Table 2. Mobile assisted language learning software use pattern.

| Software            | N   | Percent | Percent of Cases |
|---------------------|-----|---------|------------------|
| Kamusku             | 293 | 8.9%    | 50.4%            |
| Google Translate    | 349 | 10.6%   | 60.1%            |
| Quillbot            | 247 | 7.5%    | 42.5%            |
| BBC                 | 309 | 9.4%    | 53.2%            |
| Grammar Test        | 227 | 6.9%    | 39.1%            |
| English Idiomatic   | 292 | 8.9%    | 50.3%            |
| U-Dictionary        | 87  | 2.7%    | 15.0%            |
| YouTube             | 248 | 7.6%    | 42.7%            |
| ELSA Speak          | 344 | 10.5%   | 59.2%            |
| Duolingo            | 207 | 6.3%    | 35.6%            |
| Quizlet             | 283 | 8.6%    | 48.7%            |
| Speech notes        | 60  | 1.8%    | 10.3%            |
| Kahoot!             | 23  | 0.7%    | 4.0%             |
| Zoom                | 100 | 3.0%    | 17.2%            |
| Google Meet         | 102 | 3.1%    | 17.6%            |
| KineMaster          | 109 | 3.3%    | 18.8%            |
| Total               | 3280| 100.0%  | 564.5%           |

The information presented in Table 3 indicates the various purposes for which MALL was used by the respondents. The descriptive statistics as presented in Table 3 indicate that the majority of respondents use MALLs for learning grammar, as it had a mean score of 3.6127 with SD = 1.12791. It was followed by learning vocabulary, with a mean of 3.5990 and SD of 0.99443, reading comprehension (m = 3.4355, SD = 1.09295), pronunciation (m = 3.4320, SD = 1.13454), listening comprehension (m = 3.3718, SD = 1.06163).

Table 3. Purpose of using MALL.

| Purpose                | Mean   | SD    |
|------------------------|--------|-------|
| Learning vocabulary    | 3.5990 | 0.99443|
| Listening comprehension| 3.3718 | 1.06163|
| Learning grammar       | 3.6127 | 1.12791|
| Pronunciation          | 3.4320 | 1.13454|
| Reading comprehension   | 3.4355 | 1.09295|

The information presented in Table 4 indicates the level of use of different technologies for improving knowledge and skills in language learning. Descriptive statistics were calculated and are presented in Table 4, and indicate that word processing (Microsoft Word or Google Docs) is the most common technology used by students to improve their English language skills, with a mean of 3.7849 and an SD of 1.32360. This was followed by online audio and video tools, podcasts, YouTube (mean = 3.7298, SD = 1.08959), and massive open online course (mean = 3.7057, SD = 1.00573).
Table 4. Use pattern of different technologies for improving knowledge and skills in language learning.

| Technology                                                                 | Mean   | SD    |
|----------------------------------------------------------------------------|--------|-------|
| Word processing (Microsoft Word or Google Docs)                            | 3.7849 | 1.3236 |
| Online language learning websites                                          | 3.5422 | 1.16428|
| Audio/video recordings (CD, DVD)                                           | 3.5818 | 1.05648|
| Chat rooms/ audio-video conferencing (Skype)                               | 3.4079 | 1.08145|
| Online audio and video tools (podcasts, YouTube)                           | 3.7298 | 1.08959|
| Social networking sites (facebook/Twitter/Instagram)                        | 3.4544 | 1.11575|
| Smartphone language learning apps                                         | 3.4682 | 1.07211|
| Books, e-books, talking e-books, blogs                                     | 3.5112 | 1.19998|
| Translation tools, e.g., Google Translate                                   | 3.5731 | 1.14932|
| Massive open online course                                                 | 3.7057 | 1.00573|

The information presented in Table 5 indicates the descriptive statistics of all the factors and related measurement variables related to factors of MALL, students’ motivation, students’ readiness to adapt to MALL, and perceived outcome. The mean of all variables ranged from 3.54 to 3.88, which was above the midpoint of 2.50 for individual desire and curiosity (IDC), perceived ease of use (PEOU), technology factor (TF), social factors (SF), perceived usefulness (PU), students’ motivation, students’ readiness, and perceived outcome. The standard deviations of all the variables fell between 0.58 and 0.97. Out of all the variables, perceived usefulness (PU) had the highest mean of 3.844. Technological factors scored the highest standard deviation. The detailed information is presented in Table 3.

Table 5. Factors of mobile assisted language learning: descriptive statistics.

| Items and Constructs                                                                 | Mean   | SD    |
|--------------------------------------------------------------------------------------|--------|-------|
| Individual desire and curiosity (IDC)                                                | 3.7814 | 0.68543|
| I am techno savvy and keep on trying new knowledge through mobile application        | 3.7625 | 0.88593|
| I am having too much curiosity in learning language                                  | 3.7831 | 0.88734|
| I have strong desire for learning language                                            | 3.6506 | 0.93040|
| I am open to new experience                                                          | 3.8468 | 0.88412|
| Perceived ease of use (PEOU)                                                         | 3.5813 | 0.78287|
| It is easy for me to operate MALL software and explore the new thing that I want to do | 3.6971 | 0.96194|
| MALL is cumbersome frustrating due to its complex application                         | 4.0120 | 0.79753|
| MALL is flexible and simple for me to perform desired activity.                      | 3.8090 | 0.74022|
| MALL software applications require little mental effort, easy to understand and take little effort to become skillful | 3.9707 | 0.85551|
| Technology factor (TF)                                                               | 3.5456 | 0.97505|
| Computers enable technology influenced me a lot in adopting MALL process             | 3.3838 | 1.11526|
| Technology assisted language learning allows students to demonstrate their independence and utilize their preferred resource of interest. | 3.3649 | 1.23780|
| Computer assisted technology enables me to build strong content knowledge from multiple sources. | 3.6885 | 1.00568|
| The affordance of available mobile technologies on facilitated me to overcome language obstacles and alleviating my learning anxieties. | 3.7453 | 1.01395|
Table 5. Cont.

| Items and Constructs | Mean     | SD       |
|----------------------|----------|----------|
| Social influence (SI) | 3.6041   | 0.61546  |
| MALL has enhanced possibility of having team work | 3.2788   | 1.24487  |
| Peer pressure to learn language is forcing most to adopt MALL | 2.7780   | 1.26379  |
| Need of my social interactivity compelling me to adopt MALL | 3.1824   | 1.51581  |
| MALL is best educational use of social networking and effective language learning | 3.0120   | 1.29649  |
| Perceived usefulness (PU) | 3.8854   | 0.63800  |
| MALL is a wonderful tool for improving the quality of my work and allowing me to complete tasks more quickly | 3.9071   | 0.86202  |
| MALL provides me more control over my job and helps me with several crucial linguistic concerns | 3.9157   | 0.97986  |
| MALL increase my productivity and performance | 4.1773   | 0.78426  |
| MALL helps me to accomplish more task than would not be possible otherwise | 3.9380   | 0.97713  |
| Using MALL improves my efficiency in completing work assignments | 3.4888   | 1.07252  |
| Students’ motivation (SM) | 3.8547   | 0.61417  |
| I am highly enthusiast in favour of mobile application in learning process | 3.7504   | 0.72731  |
| I used to enjoy using smartphone mobile applications for language study | 3.6695   | 0.78185  |
| I wish to keep using various application provided in smart phone for English learning like propulsions and gamers | 3.7625   | 0.76926  |
| I feel that I can succeed in language learning through mobile application | 3.8176   | 0.68312  |
| I keep on putting my effort in using the various mobile applications in learning English language | 3.6231   | 0.99347  |
| Students’ readiness (SR) | 3.7138   | 0.71753  |
| I am ready to invest in a better gadget for MALL learning | 3.6437   | 1.00108  |
| Ready to install mobile apps that can help you increase your English knowledge | 3.6885   | 1.00568  |
| I am ready to enhance my ability in learning language from anywhere and at any time | 3.7642   | 0.98672  |
| I would like to undertake enrichment learning activities with mobile devices | 3.7108   | 0.96617  |
| I wish to utilize my mobile device as a learning tool | 3.8623   | 0.80192  |
| I am ready to utilize my smartphone application to improve my language learning in class | 3.6713   | 0.99846  |
| I would utilize the Internet download educational resource and to look for language information seeking activities | 3.6609   | 0.90421  |
| Perceived outcome (PO) | 3.7777   | 0.59358  |
| I have enhanced my content and English language knowledge | 3.6902   | 0.97223  |
| I am ready to spend more on mobile internet connection for better language learning | 3.9880   | 0.83966  |
| My desire to improve my English speaking abilities using mobile devices has increased | 3.6592   | 0.96537  |
| I am able to save a lot of time after adopting MALL applications | 3.7401   | 0.91138  |
| My horizontal and vertical communication has improved significantly in my transformation process | 3.7229   | 0.90629  |
| MALL has increased my scope of getting career success | 3.6506   | 0.81163  |
| MALL has increased has helped me in achieving my professional aspirationsleft | 3.7797   | 0.74255  |

4.1. Measurement Model Evaluation

The measurement model, also known as the outer model, is concerned with the measurement of latent variables in the PLS-SEM path modeling. The model’s latent constructs consist of several reflecting observations. Figure 1 depicted the antecedent factors of MALL, students’ readiness, their motivation and its impact on their perceived outcomes. In this section, students’ readiness and their motivation level is being used as
the mediating variable in the model. Cronbach’s alpha, composite reliability, convergent validity, and AVE tests were used to assess the model fit in the PLS-SEM measurement model [59]. Cronbach’s dependability scores for all factors were much higher than the acceptable minimum of 0.6, and close to the desired threshold of 0.7 (Table 6). AVEs ranging from 0.504 (perceived usefulness) to 0.794 (technological component) confirmed the model’s convergent validity, indicating that the items in each factor were significantly correlated with one another. The factor loading should be statistically significant and greater than 0.5, ideally greater than 0.7 [59]. Figure 1 shows that all variables in each construct had loading factors larger than 0.5, hence no variable was eliminated from the model. The AVE of each component must be bigger than the squared inter-construct correlations in order to have discriminant validity (i.e., items in one factor should be least linked with items in other factors). Discriminant validity assures that each model construct is distinct from the others, where one construct is not represented by another in the model. Fornell–Larcker criterion determined that the PLS-SEM analysis approach was used in this work to undertake criterion techniques for assessing discriminant validity. The fact that the square root of all AVEs was larger than the square root of their corresponding squared inter-construct correlations verified the model’s discriminant validity (Table 7).

Table 6. Construct reliability and validity.

| Construct                      | Cronbach's Alpha | rho_A | Composite Reliability | Average Variance Extracted (AVE) | VIF  |
|-------------------------------|------------------|------|-----------------------|---------------------------------|------|
| Individual desire and curiosity | 0.747            | 0.869| 0.830                 | 0.559                           | 1.031|
| Perceived ease of use         | 0.887            | 0.913| 0.922                 | 0.747                           | 3.281|
| Student readiness             | 0.846            | 0.871| 0.880                 | 0.517                           | 4.608|
| Perceived usefulness          | 0.720            | 0.838| 0.812                 | 0.504                           | 1.320|
| Perceived outcome             | 0.863            | 0.899| 0.894                 | 0.550                           | NA   |
| Social influence              | 0.857            | 0.998| 0.892                 | 0.677                           | 1.056|
| Student motivation            | 0.873            | 0.889| 0.907                 | 0.664                           | 4.618|
| Technological factor          | 0.913            | 0.914| 0.939                 | 0.794                           | 1.056|

Table 7. Discriminants validity: Fornell–Larcker criterion.

|         | IDC | PEOU | SR  | PU  | PO  | SI  | SM  | TF  |
|---------|-----|------|-----|-----|-----|-----|-----|-----|
| IDC     | 0.748 |
| PEOU    | 0.113| 0.865|
| SR      | 0.138| 0.915| 0.719|
| PU      | 0.153| 0.437| 0.478| 0.710|
| PO      | 0.095| 0.630| 0.627| 0.498| 0.742|
| SI      | −0.012| 0.171| 0.157| 0.204| 0.072| 0.823|
| SM      | 0.146| 0.684| 0.691| 0.500| 0.661| 0.072| 0.815|
| TF      | 0.127| 0.832| 0.831| 0.454| 0.587| 0.178| 0.749| 0.891|

4.2. Structural Model and Hypotheses Testing

PLS-SEM and CB-SEM have distinct model fitness criteria. The fitness of the structural model was measured using VIF, R², and standardized path coefficients in PLS-SEM [63]. VIFs should be less than 3.0 to rule out factor multicollinearity, R² should be within acceptable ranges, and standardized path coefficients should be statistically significant [63]. When two or more predictor constructs are strongly related, collinearity arises, meaning that one
construct may be correctly predicted linearly by another predictor variable. Collinearity is determined by the value of VIF (variance inflation factor), with VIF being considered free of collinearity concerns. All VIFs should be above 1.0, with the highest VIF of 4.618 being inside the permissible range of 5.0 (Table 5). It was demonstrated that there was no problem with multicollinearity. According to $R^2$ estimations, the remaining structural model elements accounted for 81.1 percent of the variation in student preparation, 50.2 percent of the variation in perceived result, and 58.2 percent of the variation in student motivation. At $\alpha = 0.01$ level, all of the standardized path coefficients were statistically significant. Taken together, these criteria validated the structural model’s strong match to the data.

The structural model in the PLS-SEM path model defines the link between the latent variables. The route model equation (Figure 2) calculates the T-value between the constructs and related indicators of the latent variable in question. As a result, the structural model denotes the level of constructs in addition to observable variables. The PLS-SEM algorithm generates model associations (path coefficients) between constructs, which indicate the predicted relationships between the constructs. Path coefficient standardized values greater than zero indicate a positive association between the constructs, whereas the t-value or $p$-value indicates the degree of correlations. The path coefficient between mobile assisted language learning parameters and perceived outcome was 0.255, indicating a positive relationship between them.

Table 8 displays the path coefficients, $t$ statistics and $p$-values for all proposed hypotheses. The hypothesis H1 assumed that there are direct relationships between individual desire and curiosity of students that lead to positive influence in adopting MALL. The standardized path coefficient from individual desire and curiosity of students leading to positive influence in adopting MALL is $\beta = 0.054$, $t = 2.767$, $p = 0.006 < 0.05$, which supports the
research hypothesis and indicates that individual desire and curiosity of students leads to a positive influence in adopting MALLs. The second hypothesis was proposed as students’ perceived ease of use of MALLs technology has a positive influence on adopting MALLs. The standardized path coefficient from perceived ease of use to adoption of MALLs is $\beta = 0.440$, $t = 33.726$, $p = 0.000 < 0.05$, which supports the research hypothesis and concludes that students’ perceived ease of use of MALLs technology has a positive influence on adopting MALLs. The third hypothesis proposes that technological factors have a positive influence on the adoption of mobile assisted language learning among students. The standardized path coefficient from technological factors to the adoption of mobile assisted language learning is $\beta = 0.446$, $t = 38.005$, $p = 0.000 < 0.05$, supporting the research hypothesis that technological factors have a positive influence on the adoption of mobile assisted language learning among students. The fourth hypothesis proposed that social influence positively influences an intention to adopt MALL for language learning. The standardized path coefficient for social influence on the adoption of mobile assisted language learning is $\beta = 0.058$, $t = 2.906$, $p = 0.004 < 0.05$, supporting the research hypothesis that social influence positively influences the intention to adopt MALLs for language learning. The fifth hypothesis was that perceived usefulness positively motivates the adoption of MALL among students.

Table 8. Path Coefficient.

| Path Coefficient | T Statistics | p Values |
|------------------|--------------|----------|
| Individual desire and curiosity → Factors of MALL | 0.054 | 2.767 | 0.006 |
| Perceived ease of use → Factors of MALL | 0.440 | 33.726 | 0.000 |
| Perceived usefulness → Factors of MALL | 0.232 | 14.104 | 0.000 |
| Social factor → Factors of MALL | 0.058 | 2.906 | 0.004 |
| Technological factor → Factors of MALL | 0.446 | 38.005 | 0.000 |

4.3. Mediating Analysis

Mediation analysis is a statistical tool for quantifying the causal sequence that occurs when an antecedent variable affects a mediating variable, which subsequently causes a dependent variable. Although beneficial for observational research, it may be most persuasive for solving cause-and-effect issues in randomized therapy and preventative programs. When a third mediator variable intervenes between two other related constructs, this is referred to as mediation. The mediating impact of students’ readiness and motivation assumes, first and foremost, a positive and significant relationship with both MALL adoption parameters and students’ perceived outcome. When a third mediator variable intervenes between two other related constructs, this is referred to as mediation. A set of studies must be performed in order to test for the type of mediation in a model. In the present study, the researchers analyzed students’ readiness and their motivation as a mediator in the relationship between factors of mobile assisted language learning and perceived outcomes. Smart PLS bootstrapping was carried out to measure the direct and indirect effects. In the first step, the direct impact of factors of MALL on perceived outcome was calculated. It is observed from Table 9 that perceived outcome ($\beta = 0.025$, $t = 3.109$, $p = 0.002$) is significant. In the second step, the indirect effect of a mediating variable (students’ readiness and students’ motivation) on the relationship between factors of MALL and the perceived outcome was calculated. Table 9 shows that the factors of MALL has a significant impact on students’ readiness ($\beta = 0.901$, $t = 123.356$ and $p = 0.000$). Students’ readiness has significant influence on perceived outcome ($\beta = 0.145$, $t = 1.907$, and $p = 0.057$), which is not significant.
Table 9. Path coefficient and confidence interval.

| Path Structure                      | Original Sample (O) | T Statistics | p Values | Bias 2.5% | 97.5% |
|-------------------------------------|---------------------|--------------|----------|-----------|-------|
| Factors of MALL $\rightarrow$ Perceived readiness | 0.901               | 123.356      | 0.000    | 0.007     | 124.48 | 0.000 |
| Factors of MALL $\rightarrow$ Perceived outcome   | 0.255               | 3.109        | 0.002    | 0.090     | 2.823  | 0.005 |
| Factors of MALL $\rightarrow$ Students' motivation | 0.763               | 36.506       | 0.000    | 0.022     | 34.880 | 0.000 |
| Students motivation $\rightarrow$ Perceived outcome | 0.366               | 5.649        | 0.000    | 0.068     | 5.412  | 0.000 |
| Perceived readiness $\rightarrow$ Perceived outcome | 0.145               | 1.907        | 0.057    | 0.082     | 1.761  | 0.079 |
| Factors of MALL $\rightarrow$ Students' motivation $\rightarrow$ Perceived outcome | 0.279               | 5.633        | 0.000    |           |       |       |
| Factors of MALL $\rightarrow$ Perceived readiness $\rightarrow$ Perceived outcome | 0.130               | 1.759        | 0.079    |           |       |       |

Similarly, the factors of MALLs has significant influence on students’ motivation ($\beta = 0.763, t = 36.506, p = 0.000$) and students’ motivation has significant influence on students’ perceived performance ($\beta = 0.366, t = 5.649, p = 0.000$). Therefore, to evaluate the hypothesis of the mediating effect, we used the testing methodologies described by Preacher and Hayes (2008). According to these authors, the mediating effect requires that the indirect impact be substantial and that the confidence interval does not include zero. To compute the particular indirect impacts, we employed Smart-PLS bootstrapping. Table 9 demonstrates that only particular indirect effects of perceived student readiness are not significant, despite that confidence intervals do not contain zero. The specific direct effect of student readiness (factors of MALL $\rightarrow$ student readiness $\rightarrow$ perceived outcome ($t = 1.759, p = 0.079$)) is not significant as $p > 0.05$, however indirect effect of students’ motivation in the relationship between the factors of MALL $\rightarrow$ perceived outcome ($t = 5.633, p = 0.000$) is significant. It was found that the inclusion of students’ motivation and their readiness to adopt MALL reduced the variance from 0.665 to 0.255 from the direct effect of factors of MALL on students’ perceived outcome, to an indirect effect via students’ readiness and motivation. Thus, motivation and readiness mediated the relationship between factors of MALL and their perceived outcome, thus supporting hypotheses 6, 7, 8, and 9.

Drawn from above PLS analysis, the mathematical equation of different factors influencing MALL can be written as:

Factors of MALL applications = 0.054 $\times$ (individual desire and curiosity) + 0.440 $\times$ (perceived ease of use) + 0.446 $\times$ (technological factor) + 0.058 (social influence) + 0.232 $\times$ (perceived usefulness)

Students’ readiness = 0.901 (factors of MALL applications)

Students’ motivation = 0.763 (factors of MALL applications)

Perceived outcome = 0.366 (student motivation) + 0.255 $\times$ (factors of MALL applications) + 0.145 (students’ readiness)

5. Discussion

Mobile technology is continuously growing and penetrating all aspects of life, including knowledge enrichment. Today, there is a shift from teacher-led learning to technology-led learning, and many students are using MALL software for different language learning and believe that this technology-led learning is more effective in acquiring knowledge and preparing them for the future. This paper investigated the student use patterns of MALL software, the purpose of using software and how frequently students use this software for their career enhancement. The study also investigated various factors influencing students in adopting mobile assisted language learning among management and engineering students. Further, the study investigated students’ level of motivation and their readiness towards adopting MALL, and how these two variables (student readiness and their level of motivation) mediated the relationship between factors of adoption and perceived outcomes.
The outcome of the study indicated that various factors such as perceived ease of use, perceived usefulness, social influence, student motivation and technological factors were significant in affecting student adoption patterns of MALLs, but the role of perceived ease of use technological factor was more significant. The study indicated that students were actively adopting mobile devices such as smartphones and tablets for a variety of objectives. In terms of identifying students’ readiness to use mobile assisted language learning, the results showed that students were eager and motivated to use mobile devices as an innovative tool that may actively involve them in strengthening language abilities. The respondents demonstrated their readiness to study at any time and from any location, to engage and exchange knowledge, and receive tasks, all of which contribute to making language learning easier, for better career opportunities. The findings revealed that MALL has brought significant improvements, such as enhancement in content and English language knowledge, spending more time resources on mobile internet connection for better language learning, a desire to improve English language, saving time in learning, improvement in horizontal and vertical communication, and scope of achieving career success among students. This finding is also in accordance with the previous study of [69] who indicated that the majority of students had a positive perception of the use of MALL to support classroom activities, especially in learning the English language. Other researchers, such as [70], identified areas of mobile based language learning and found that students were primarily using MALLs for enhancing vocabulary, listening, grammar, phonetics, and reading comprehension. Furthermore, [71] indicated that MALL had the ability to improve decision making in students and therefore improve the healthy development of all human beings. The authors indicated that mobile assisted language learning applications developed for children and adolescents are important because it gives them the opportunity to practice language in an accessible and creative way, to enhance their emotional intelligence. Other researchers such as [72,73] also confirm that students are ready to adopt MALLs into their learning, but are of the opinion that integration of blended learning through face-to-face interaction and online learning should be maintained for a better outcome.

In most ways, our findings confirm what has already been reported in MALL meta-analyses focusing on language learning outcomes [74]. However, this study differs from previous studies in establishing the link between factors of mobile assisted language learning, students’ readiness, their motivation and perceived outcome, and found that student motivation and their readiness to adopt MALL mediated the relationship between adoption of MALL and perceived outcome. Few experimental MALL studies have supported this outcome, for example, [75,76] indicated that the potential of mobile learning as an emergent educational tool was seen as capable of facilitating and fostering the teaching–learning process. This study was conducted in college and university environments. However, only a small proportion of the population of students of advanced-level learners participate in MALL initiatives. While significant progress has been made in MALL in the last two decades, numerous crucial issues still need to be addressed by researchers and language instructors. The emphasis on English as a target language must be expanded to include other languages, both major and minor. Other components of language learning and usage must take precedence over vocabulary growth. Much more research should be conducted to capitalize on the social and communicative affordances provided by mobile technology. This may help learners in creating a new learning environment and provide them with the chance to construct new activities, learning, and teaching techniques. In this setting, learners, teachers, policy makers, and employers must be acutely aware of the physical, pedagogical, and psychosocial difficulties involved in the successful implementation of MALL [77].

5.1. Managerial Implications

The majority of previous MALL research has focused on the following topics: the effects of short-term memory and content representation on MALL [78,79], language learning enhancement through the use of supportive mobile devices [80], self-directed use of mobile
devices outside the classroom [20,81], and the design of MALL for language learning [82]. In the current study, the authors attempted to investigate the mediating function of students’ motivation and perceived ease of use in the link between MALL variables and perceived result, in addition to a conceptual framework of design principles and dimensions derived from prior studies. It is most important for students, teachers, researchers, content creators, and designers to understand the pedagogical and technological concerns that underpin effective MALL implementation.

5.2. Limitations and Future Scope of the Study

Despite the fact that many research studies have been undertaken on MALL technology as a growing subject of research in language learning, there is still much work to be conducted and a great quantity of information to be gathered. Furthermore, existing strategies for utilizing mobile device technology to deliver a more robust learning environment must be enhanced. The techniques by which CALL obstacles have been reduced can help MALL technology to grow with less effort and money. Due to hardware limitations, some language skills such as speaking and listening require additional development as mobile based activities that need further improvement. Despite its numerous limitations, mobile based learning, or m-learning, has expanded enormously to provide a better environment for language acquisition. The study’s findings, which include real-world examples, can assist education officials, designers, and developers in these institutions to improve student learning systems. This study has limitations that present an opportunity for further investigation. The first is the model testing was conducted based on small sample size, exclusively from an online source. Therefore, results could not be generalized, and need more in-depth investigation covering a larger sample size from different locations and regions. The second advantage of this would be that the moderating impacts of age, digital divide, and other socioeconomic factors may be investigated. It could also be interesting to see whether there is any regional variance in the adoption and use of technologies in higher education.

6. Conclusions

The increasing speed of mobile technology is expanding and permeating many elements of life to the point that this technology plays a critical role in acquiring various dimensions of information. Today, a clear shift from teacher-led learning to student-led learning enabled by mobile enabled learning causes students to feel more effective and interested in using technology, than ever before. MALL faces many challenges, but it has grown exponentially in spite of all its problems to provide a better environment for language learners. Due to hardware limitations, some language skills, such as speaking and listening, require additional development as mobile based activities. This study’s conclusions are based on empirical evidence that identifies the variables that boost the adoption of MALL and enhance students’ language learning abilities. The study also found that various factors of MALL positively influence students’ motivation and readiness, and help students in improving their performances. It can be concluded that the advanced technology enabled mobile assisted language learning approach consisting of state-of-the-art innovations in the spheres of students’ horizontal and vertical communication will benefit students with new knowledge, a new way of learning, and will maximize opportunities for them to improve their quality of life.

Author Contributions: S.H., A.H., S.S.M.S., S.A. and M.A.K. contributed to conceptualization, formal analysis, investigation, methodology, and writing and editing of the original draft. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Informed Consent Statement: Informed consent was obtained from the respondents of the survey.
Data Availability Statement: The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest: The authors declare no conflict of interest.

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