

Design and Perceived Usability of an Interactive Malay Language eBook among Foreign Learners

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ABSTRACT

This mixed-methods case study reports on the design and perceived usability of *Learn Malay With Rene* (LMWR), an interactive Malay language eBook developed for foreign learners. Guided by the ADDIE instructional design model and the usability principles of Visibility, Ease, Efficiency, and Enjoyment, the study examined learners' perceived usability of LMWR and their experiences with its multimedia and interactive features. Eighteen learners completed a five-point questionnaire, and nine participated in semi-structured interviews. Questionnaire data were analysed using descriptive statistics and one-sample t-tests against the neutral midpoint, supported by reliability analysis (overall $\alpha = .89$). Interview data were analysed thematically using the same usability framework. Results indicated high ratings for Visibility ($M = 4.45$), Ease (item means = 4.17–4.72), Efficiency (overall $M = 4.19$), and Enjoyment (overall $M = 4.63$), with all item means significantly exceeding the neutral midpoint ($p < .05$). Qualitative findings explained these outcomes through clear layouts, intuitive navigation, integrated multimedia, and engaging activities. Minor concerns related to the visibility of some interactive elements and chapter organisation highlighted areas for refinement. Overall, the findings suggest that usability-driven interactive eBooks can provide a practical and engaging resource for Malay language learning beyond the classroom.

Keywords

Interactive eBook; Malay language learning; Usability design; ADDIE; Foreign learners

Introduction

Malaysia continues to attract expatriates and other foreign residents who seek to learn Malay for everyday interaction, social integration, and workplace communication. As reading and knowledge access increasingly shift to digital platforms, language learning resources also need to move beyond static formats and support interactive learning (Sariyan, 2011). Yet most commercial language learning applications are not tailored to Malay as a foreign language. They commonly emphasise isolated drills and offer limited cultural or communicative support for adult foreign learners (Osman & Abdul Rabu, 2022). Many existing print and mobile resources are also fragmented and do not fully prioritise usability for expatriates who need practical language use in real contexts (Baharudin & Md Sadik, 2016).

These limitations suggest the need for researcher-developed digital materials that combine instructional planning with usability design to enhance learner experience (Bevan, 2001; Isnaeni, 2020; Wang & Huang, 2015). Interactive eBooks are a promising format because they can integrate text with multimedia and interactivity such as audio, video, animations, hyperlinks, quizzes, and gamified practice, which may strengthen engagement and comprehension (Colombo, 2014; Hastuti et al., 2018; Lecailliez et al., 2020; Taharim, 2016). However, evidence on their usability for adult foreign learners of Malay remains limited.

To address this gap, the interactive eBook *Learn Malay With Rene* (LMWR) was developed as a digital Malay language learning guide for foreign learners (Mohammad & Mohd Nasir, 2022). LMWR was designed using the ADDIE instructional design model (Arkün & Akkoyunlu, 2008) and guided by the usability principles of Visibility, Ease, Efficiency, and Enjoyment (Wang & Huang, 2015). The purpose of this study is to examine foreign learners' perceived

usability of LMWR across Visibility, Ease, Efficiency, and Enjoyment, and to explore how learners experience its multimedia and interactive features.

Literature Review

Malay Language Learning Resources for Adult Foreign Learners

Studies on Malay language learning among adult foreign learners highlight the need for resources that support authentic communication and culturally meaningful use (Sariyan, 2011; Baharudin & Md Sadik, 2016). Reviews also show that researcher-developed digital resources for Malay language learning remain limited and frequently target single skills rather than integrated learning experiences (Hamzah, 2018; Isnaeni, 2020). Research on expatriate and adult learner populations further emphasises accessibility and user-centred design as important considerations in digital resource development (Osman & Abdul Rabu, 2022).

Instructional Development and Usability Perspectives

Instructional design models provide structured guidance for aligning learning goals, content sequencing, multimedia integration, and evaluation in digital learning materials (Arkün & Akkoyunlu, 2008). Usability research complements this by examining whether users experience a system as learnable, efficient, and satisfying in context (Bevan, 2001; Nielsen, 1993). Wang and Huang's principles (Visibility, Ease, Efficiency, Enjoyment) operationalise usability for mobile and eBook contexts through interface clarity, intuitive interaction, task support, and positive affect (Wang & Huang, 2015). Recent eBook design research has applied these four principles in practice. Moonkum et al. (2025) designed an eBook guided by the principles of Visibility, Ease, Efficiency, and Enjoyment to support ease of use and learning, efficiency, memorability, reduced user errors, and overall user satisfaction.

Interactive eBooks for Language Learning

Interactive eBooks are discussed as multimodal resources that combine text with multimedia and interactivity to support flexible, self-directed learning. Evidence from language learning research indicates that well designed interactive eBooks can support comprehension and engagement, particularly when multimedia and navigation reduce cognitive load and support efficient use (Deligiannis et al., 2020; Hastuti et al., 2018; Norman, 2002; Shamsitdinova, 2020)

Research Questions

The study addressed the following research questions:

1. To what extent do foreign learners perceive LMWR as usable across Visibility, Ease, Efficiency, and Enjoyment?
2. How do foreign learners describe their experiences of Visibility, Ease, Efficiency, and Enjoyment when using the eBook's multimedia and interactive features for Malay language learning?

Methods

Research Design and Framework

This study employed a mixed-methods case study design to examine the instructional design and perceived usability of the interactive eBook *Learn Malay With Rene* (LMWR) among foreign learners, while learners' views on learning support were explored descriptively. Inferential analysis was also included as exploratory support for the descriptive findings. A case study approach was appropriate because the study focused on an in-depth examination of one instructional eBook within its actual learning context.

The study was guided by two complementary foundations. First, the ADDIE instructional design model informed the systematic development of the interactive eBook by ensuring alignment among learning objectives, content organisation, activities, and multimedia integration (Arkün & Akkoyunlu, 2008; Isnaeni, 2020). Second, Wang and Huang's (2015) *Usability Design Principles*, namely *Visibility*, *Ease*, *Efficiency*, and *Enjoyment*, served as the main framework for examining learners' interaction experiences with the eBook interface and features. In this study, these four usability dimensions were treated as perceived measures and were examined through questionnaire responses and interview reflections, focusing on self-reported user experience rather than observational task performance or formal usability testing.

Participants

The study involved 18 adult foreign learners who were expatriates or former expatriates with experience learning the Malay language. Fourteen participants were residing in Iskandar Puteri, Johor Bahru during data collection, while four had returned to their home countries. The participants were selected through purposive sampling, as they met the specific criteria required for the study, namely being adult foreign learners with an interest or prior experience in learning Malay and a willingness to use the LMWR interactive eBook. This sampling approach aligned with the intended users of Malay language learning materials, consistent with previous studies on Malay language learning among foreign learners (Yusoff et al., 2023; Baharudin & Sadik, 2016). Participants were recruited through the researcher's recent classes and alumni contacts, resulting in a purposive sample drawn from an accessible learner network. Participation was voluntary. All participants received an information sheet, provided informed consent, and were assured of anonymity and confidentiality in accordance with institutional ethics procedures.

Research Instruments

Questionnaire

A questionnaire was used to address RQ1 by measuring learners' perceived usability of LMWR across four dimensions: Visibility, Ease, Efficiency, and Enjoyment. The items were based primarily on Wang and Huang's (2015) usability design principles for eBook interfaces, with several items adapted from Elyazgi (2018) at the instrument level. Responses were recorded on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The questionnaire was reviewed for content clarity and relevance and was piloted to refine item wording and suitability before the main data collection. Items related to usage habits and preferred devices were collected for descriptive purposes only and were not included in the main analyses.

Semi-Structured Interviews

Semi-structured interviews were used to address RQ2 by exploring how foreign learners described their experiences of Visibility, Ease, Efficiency, and Enjoyment when using the eBook's multimedia and interactive features. The interview protocol focused on learners' experiences with interface clarity, navigation, integrated multimedia, and engaging activities such as audio, video, interactive links, games, quizzes, and cultural content. Interviews were conducted face-to-face or online, audio-recorded with permission, and transcribed excerpts for thematic analysis.

Instrument Reliability and Data Screening

Internal consistency reliability of the final questionnaire was assessed using Cronbach's alpha based on the study sample ($n = 18$). The overall questionnaire showed high reliability ($\alpha = .89$), with subscale reliabilities of Visibility ($\alpha = .915$), Ease ($\alpha = .950$), Efficiency ($\alpha = .786$), and Enjoyment ($\alpha = .903$). These values supported the use of aggregated scores for the four usability dimensions in the subsequent analyses. Data screening was also conducted before the main analysis, including checks for missing values, outliers, and normality. Shapiro–Wilk tests indicated some deviation from normality, which is common in five-point Likert scale data and small samples. However, composite scores were treated as approximately interval, and one-sample t-tests were considered sufficiently robust for the exploratory analysis in this case study.

Data Analysis

Quantitative Analysis

Questionnaire data were analysed using SPSS to address RQ1. Descriptive statistics, including means, standard deviations, and percentage agreement, were calculated for the questionnaire items under the four usability dimensions of Visibility, Ease, Efficiency, and Enjoyment. Overall mean scores for each dimension were also computed to summarise learners' perceived usability of the interactive eBook. To examine whether each item was rated significantly above the neutral midpoint, one-sample t-tests were conducted using a test value of 3.00. Given the small sample size ($n = 18$), the inferential findings were interpreted as exploratory support for the descriptive results. This wording is aligned with the Results, which report descriptive and one-sample t-test findings by item under the four usability dimensions only.

Qualitative Analysis

Interview transcripts from nine participants were analysed using thematic analysis following Braun and Clarke's (2006) approach. The qualitative analysis addressed RQ2 by exploring how learners described their experiences of Visibility, Ease, Efficiency, and Enjoyment when using the eBook's multimedia and interactive features. A deductive coding frame based on these four usability dimensions guided the initial coding process. Codes were then reviewed, grouped into themes and subthemes, and refined to capture recurring patterns in learners' experiences. Representative quotations were selected to illustrate the themes and to help explain patterns observed in the quantitative findings. This wording is aligned with the Results, where the interview findings are organised under the same four dimensions and used both to address RQ2 and to complement RQ1.

Research Procedure

Participants accessed LMWR through a link shared by the researcher and used their own smartphones, tablets, or laptops. An initial briefing explained the study purpose and introduced the eBook's basic navigation and key features. Participants were not assigned timed tasks and were not observed during use, as the study focused on self-reported perceptions of usability rather than formal usability testing. They explored the eBook independently on their preferred devices before completing the questionnaire for RQ1. After the questionnaire, nine participants took part in semi-structured interviews to address RQ2 by providing deeper reflections on their experiences of Visibility, Ease, Efficiency, and Enjoyment when using the eBook's multimedia and interactive features.

The Instructional Design of the Interactive eBook

The development of the interactive eBook LMWR followed the five stages of the ADDIE instructional design model.

Analysis

At this stage, learners' needs, learning objectives, scope, and target users were identified. Drawing on the researcher's experience in teaching Malay to expatriates, feedback from past and current learners informed the initial design decisions. A review of previous studies also highlighted the limited availability of interactive Malay language eBooks designed specifically for adult foreign learners, reinforcing the relevance of developing LMWR (Daud, 2014; Baharudin & Md Sadik, 2016).

Design

The design phase focused on planning the eBook's content structure, multimedia elements, and interactive features to support beginner Malay language learning. Lessons were organised to support practical communication, while audio, video, quizzes, clickable links, and culturally relevant materials were planned to enhance engagement and contextual

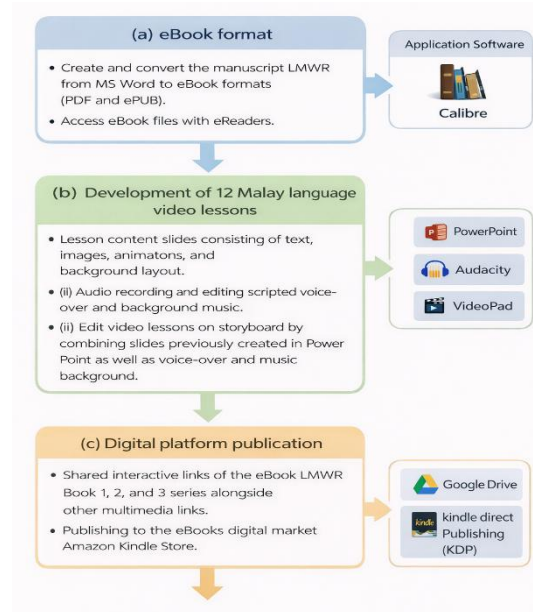
understanding (Saddhono et al., 2020). The eBook was also designed for use across multiple devices to support flexible and self-directed learning.

Development

During the development stage, the planned multimedia and interactive elements were produced and embedded into the eBook. A storyboard guided video production and ensured alignment between content, learning objectives, and multimedia presentation. Prior research emphasises the importance of instructional sequencing and storyboard planning in multimedia learning environments (Arkün & Akkoyunlu, 2008). Interactive components were incorporated to enhance learner engagement and motivation (Sung & Wu, 2017). Figure 1 summarises the production process and software applications used during this phase.

Figure 1

Production Process and Applications Used



Implementation

A small pilot trial was conducted with three expatriate learners to examine layout clarity, navigation, and multimedia interaction. Based on the pilot feedback, minor refinements were made to improve the usability of the eBook, including adjustments to visual presentation and interactive practice activities. After these refinements, the final version of LMWR was shared with the study participants for self-directed use on their preferred devices (Baharudin, 2014; Mohammad & Mohd Nasir, 2022).

Evaluation

The evaluation stage involved the mixed-methods case study with 18 foreign learners. Questionnaire data were collected to examine perceived usability across Visibility, Ease, Efficiency, and Enjoyment, while follow-up interviews with nine participants explored how learners experienced these four dimensions when using the eBook's multimedia and interactive features. This evaluation approach allowed the study to address both RQ1 and RQ2 in a manner consistent with the study framework and reported results (Mohammad & Mohd Nasir, 2022; Osman & Abdul Rabu, 2022).

Intervention and Material Description

LMWR is an interactive Malay language eBook designed as a self-learning resource for foreign learners. Participants accessed the eBook through a shared link and used it on their preferred devices, such as smartphones, tablets, or laptops. The eBook supported common interactive behaviours, including content exploration, menu-based navigation, multimedia interaction, and scrolling. Figures 2–7 present selected interface screenshots illustrating key multimedia and interactive features designed to support Malay language learning.

Figure 2
Main cover

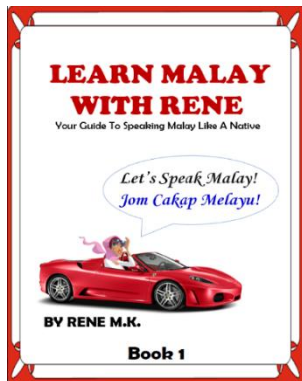


Figure 3
Navigation screen



Figure 4
Clickable links to videos

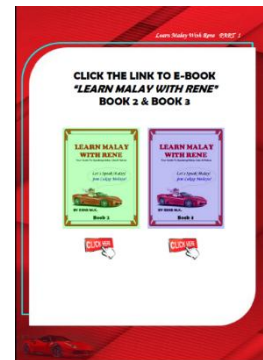


Figure 5
Pronunciation with audio link

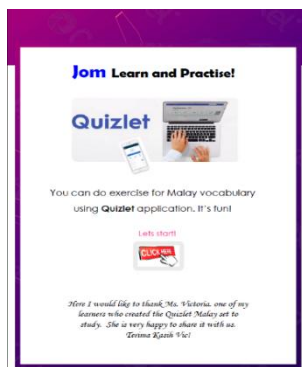


Figure 6
Quizlet link



Figure 7
Chat with video link



Results

Participant Demographics

A total of 18 expatriates participated in the questionnaire survey, with nine participating in semi-structured interviews (Table 1). Among these participants, 47% were from Europe, 21% from Asia, with the remainder coming from Australia, America, and Africa. Regarding proficiency in Malay, 58% were beginners, 21% intermediate, and 16% pre-intermediate. Communication and travel were the primary motivations for learning Malay, with travel being cited by 63% of respondents (Sariyan, 2006; Mohammad & Mohd Nasir, 2022).

Table 1
Background & Demography of Participants

Categories	Total
Continent Origin	Europe: 9, Asia: 4, America: 2, Australia: 2, Africa: 1
Gender	Female: 12, Male: 6
Age	25-35: 3, 36-45: 6, 46-55: 6, 56-75: 3
Education	Master: 6, Degree: 12
Malay language Proficiency	Beginner: 11, Pre-Intermediate: 3, Intermediate: 4
Reasons for learning Malay	Travelling: 12, Resident Permit: 3, Family: 2, Working: 1

Perceived Usability of the Interactive eBook: Visibility, Ease, Efficiency, and Enjoyment

To address RQ1, questionnaire data from 18 participants were used to examine learners' perceived usability of the interactive Malay language eBook across four dimensions: Visibility, Ease, Efficiency, and Enjoyment. Interview data from nine participants were used to complement these findings and provide deeper insight into learners' experiences across the same dimensions.

Quantitative Findings

Visibility

Descriptive Statistical Analysis. Table 2 presents learners' perceptions of Visibility, focusing on layout clarity, on-screen readability, font size adjustment, and the visibility of clickable elements. Overall ratings were high ($M = 4.45$), indicating strong satisfaction with the eBook's visual design. Item means ranged from 4.06 to 4.67, with an overall agreement level of 87.5% and minimal negative responses (4.2%). Learners rated layout clarity the highest ($M = 4.67$, $SD = 0.59$; 94.4% agreement), followed by on-screen text readability ($M = 4.61$, $SD = 0.61$; 94.4% agreement) and font size adjustment ($M = 4.44$, $SD = 0.78$; 88.9% agreement). These results suggest that the visual presentation supported comfortable reading across devices. The lowest mean was recorded for "Clickable elements are visually clear" ($M = 4.06$, $SD = 1.66$; 72.2% agreement), indicating positive perceptions with greater variability, suggesting occasional uncertainty in identifying interactive icons or links.

Table 2
Descriptive Statistics for Visibility Items ($n = 18$)

Item	Mean	SD	% Agreement
The layout is clear and easy on the eyes.	4.67	0.59	94.4%
The text is easy to read on screen.	4.61	0.61	94.4%
The font size adjustment is helpful.	4.44	0.78	88.9%
Clickable elements are visually clear.	4.06	1.66	72.2%

Inferential Statistical Analysis. One-sample t-tests examined whether Visibility ratings were significantly higher than the neutral midpoint (3.00). As shown in Table 3, all items recorded means significantly above 3.00 ($p < .05$), indicating positive perceived visibility. The strongest results were observed for layout clarity ($t(17) = 11.93$, $p < .001$) and on-screen readability ($t(17) = 11.23$, $p < .001$). Font size adjustment was also significantly above neutral ($t(17) = 7.79$, $p < .001$). Although clickable elements recorded the lowest mean ($t(17) = 2.71$, $p = .014$), the rating remained significantly above the midpoint, indicating a specific area for refinement rather than a general visibility concern.

Table 3
One-sample t-tests against 3.00 for Visibility items (n = 18; df = 17)

Item	M	SD	t(17)	p
The layout is clear and easy on the eyes.	4.67	0.59	11.93	< .001
The text is easy to read on screen.	4.61	0.61	11.23	< .001
The font size adjustment is helpful.	4.44	0.78	7.79	< .001
Clickable elements are visually clear.	4.06	1.66	2.71	.014

Ease

Descriptive Statistical Analysis. Table 4 presents learners' perceptions of Ease of use, focusing on navigation, learnability, user readiness, and mobile accessibility. Overall, perceived ease was high, with item means ranging from 4.17 to 4.72 and an average agreement of 86.1%. The highest rated item, "Easy to navigate and use" (M = 4.72, SD = 0.75; 94.4% agreement), suggests the interface was intuitive and simple to operate. "Easy to learn without instructions" scored highly (M = 4.50, SD = 0.86; 88.9% agreement), indicating that learners could explore the eBook independently. "Basic skills sufficient to operate" (M = 4.33, SD = 0.84; 83.3% agreement) suggests that minimal technical proficiency was adequate. The lowest item, "Usable on mobile anytime and anywhere" (M = 4.17, SD = 1.15; 77.8% agreement), remained positive but showed greater variability, reflecting differences in device capability or internet stability.

Table 4
Descriptive Statistics for Ease Items (n = 18)

Item	Mean	SD	% Agreement
Easy to navigate and use	4.72	0.75	94.4
Easy to learn without instructions	4.50	0.86	88.9
Basic skills sufficient to operate	4.33	0.84	83.3
Usable on mobile anytime and anywhere	4.17	1.15	77.8

Inferential Statistical Analysis. One-sample t-tests confirmed that all Ease items were significantly above the neutral midpoint ($p < .001$) (Table 5). The strongest response was "Easy to navigate and use" ($t(17) = 9.70$, $p < .001$), followed by "Easy to learn without instructions" ($t(17) = 7.43$, $p < .001$). "Basic skills sufficient to operate" was also significantly above neutral ($t(17) = 6.72$, $p < .001$). "Usable on mobile anytime and anywhere" remained significantly above neutral ($t(17) = 4.32$, $p < .001$). Overall, learners perceived the eBook as easy to learn and operate, supporting independent use.

Table 5
One-sample t-test Results for Ease Items (Test value = 3.00, n = 18; df = 17)

Item	Mean	SD	t(17)	p
Easy to navigate and use	4.72	0.75	9.70	< .001
Easy to learn without instructions	4.50	0.86	7.43	< .001
Basic skills sufficient to operate	4.33	0.84	6.72	< .001

Usable on mobile anytime and anywhere	4.17	1.15	4.32	< .001
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Efficiency

Descriptive Statistical Analysis. Table 6 summarises learners' perceptions of Efficiency in terms of screen sequencing, functional capability, ease of finding content, mobile access, and chapter organisation. Overall efficiency ratings were positive ($M = 4.19$), with item means ranging from 3.89 to 4.56. "Screen sequence is clear and consistent" scored highest ($M = 4.56$, $SD = 0.92$; 88.9% agreement), suggesting predictable page flow. Learners also agreed that the eBook "Contains expected functions and capabilities" ($M = 4.22$, $SD = 0.81$; 77.8% agreement) and "Provides easy ways to find content" ($M = 4.11$, $SD = 0.83$; 77.8% agreement). Ratings for mobile access were positive but variable ($M = 4.17$, $SD = 1.15$; 77.8% agreement). "Chapter contents are well organised" obtained the lowest mean ($M = 3.89$, $SD = 1.75$; 55.6% agreement), indicating mixed perceptions of chapter organisation.

Table 6
Descriptive Statistics for Efficiency Items ($n = 18$)

Item	Mean	SD	% Agreement
Screen sequence is clear and consistent	4.56	0.92	88.9
Contains expected functions and capabilities	4.22	0.81	77.8
Provides easy ways to find content	4.11	0.83	77.8
Mobile access is available anytime and anywhere	4.17	1.15	77.8
Chapter contents are well organised	3.89	1.75	55.6

Inferential Statistical Analysis. One-sample t-tests indicated that all Efficiency items were significantly above neutral ($p < .05$) (Table 7). The strongest result was for screen sequencing ($t(17) = 7.19$, $p < .001$). Items on functions/capabilities and finding content were also significant ($p < .001$). Chapter organisation showed the smallest effect and greatest variability ($t(17) = 2.16$, $p = .046$) but remained above the midpoint, indicating an area for refinement rather than a major usability weakness.

Table 7
One-sample t-test Results for Efficiency Items (Test value = 3.00, $n = 18$; $df = 17$)

Item	Mean	SD	$t(17)$	p
Screen sequence is clear and consistent	4.56	0.92	7.19	< .001
Contains expected functions and capabilities	4.22	0.81	6.39	< .001
Provides easy ways to find content	4.11	0.83	5.67	< .001
Mobile access anytime and anywhere	4.17	1.15	4.32	< .001
Chapter contents are well organised	3.89	1.75	2.16	.046

Enjoyment

Descriptive Statistical Analysis. Table 8 summarises learners' perceptions of *Enjoyment* when using the interactive Malay language eBook. Overall enjoyment was high ($M = 4.63$), with item means ranging from 4.06 to 4.94 and

standard deviations between 0.24 and 1.55, indicating consistently positive experiences. The highest rated item, “Learning with the eBook was enjoyable” ($M = 4.94$, $SD = 0.24$; 100% agreement), reflects very strong satisfaction with the overall learning experience. Learners also fully agreed that “Vocabulary activities were engaging and fun” ($M = 4.83$, $SD = 0.38$; 100% agreement) and “Cultural topics were interesting to explore” ($M = 4.67$, $SD = 0.49$; 100% agreement), highlighting the contribution of gamified tasks and cultural content to enjoyment. The item “Multimedia content increased motivation” showed a slightly lower but still positive mean ($M = 4.06$, $SD = 1.55$; 77.8% agreement), with higher variability suggesting individual differences in response to multimedia or technical conditions. Collectively, these results indicate that learners perceived the eBook as highly enjoyable, especially due to its games, vocabulary activities and culturally relevant topics.

Table 8

Descriptive Statistics for Enjoyment Items ($n = 18$)

Item	Mean	SD	% Agreement
Learning with the eBook was enjoyable	4.94	0.24	100
Vocabulary activities were engaging and fun	4.83	0.38	100
Cultural topics were interesting to explore	4.67	0.49	100
Multimedia content increased motivation	4.06	1.55	77.8

Inferential Statistical Analysis. A one-sample t-test (test value = 3.00) was conducted to determine whether *Enjoyment* ratings were significantly higher than the neutral midpoint. As shown in Table 9, all four items were significantly above 3.00 ($p < .05$), confirming strong enjoyment of the interactive eBook. The strongest effect was found for “Learning experience with the eBook was enjoyable” ($M = 4.94$, $SD = 0.24$, $t(17) = 34.29$, $p < .001$), followed by “Vocabulary activities were engaging and fun” ($M = 4.83$, $SD = 0.38$, $t(17) = 20.43$, $p < .001$) and “Cultural topics were interesting to explore” ($M = 4.67$, $SD = 0.49$, $t(17) = 14.46$, $p < .001$). Even “Multimedia content increased motivation to learn”, despite higher variability, remained significantly above neutral ($M = 4.06$, $SD = 1.55$, $t(17) = 2.90$, $p = .010$). These inferential results confirm that learners perceived the interactive Malay language eBook as highly enjoyable, with gamified vocabulary activities and cultural elements playing a key role in promoting positive and motivating learning experiences.

Table 9

One-sample t-test Results for Enjoyment Items (Test value = 3.00, $n = 18$; $df = 17$)

Item	Mean	SD	$t(17)$	p
Learning experience with the eBook was enjoyable	4.94	0.24	34.29	< .001
Vocabulary activities were engaging and fun	4.83	0.38	20.43	< .001
Cultural topics were interesting to explore	4.67	0.49	14.46	< .001
Multimedia content increased motivation to learn	4.06	1.55	2.90	.010

Qualitative Findings

To complement the quantitative findings for RQ1, semi-structured interviews with nine learners provided additional insight into how the interactive Malay language eBook was perceived across the four usability dimensions of Visibility, Ease, Efficiency, and Enjoyment (Table 10). Overall, the interview data were consistent with the questionnaire results. Learners generally described the eBook as visually clear, easy to use, functionally efficient, and enjoyable. Clear screen layout, intuitive navigation, integrated multimedia, and engaging interactive activities were commonly identified as

features that supported positive usability perceptions. Detailed thematic findings on learners' experiences across these four dimensions are presented in the RQ2 section.

For Visibility, learners generally described the interface as visually clear and simple. They highlighted readable fonts, balanced colour contrast, and uncluttered screens that helped them focus on the content. Under the clear visual layout theme, learners appreciated distinct icons and logical button placement, noting that *"the visual display and layout make it clear where to click and what to learn."* Readable audio and video icons were described as helpful cues that guided navigation and reduced uncertainty.

Perceptions of Ease centred on accessibility and intuitive navigation. Learners frequently described the eBook as *"easy to access and use with just a simple click,"* valuing direct entry to lessons without complex steps. The user-friendly structure, including consistent toolbars and smooth page flow, was reported to minimise confusion and support self-directed exploration. These accounts suggest that most learners were able to operate the eBook independently with basic digital skills, which aligns with the positive ease-of-use trends observed in the survey data.

For Efficiency, learners emphasised time-saving interaction and functional integration. They valued having audio, video, and text explanations available in one place, explaining that *"it saves time; I don't need to search on YouTube or Google separately."* Under multimedia-supported understanding, participants described how combining text, sound, and visuals helped them grasp pronunciation and vocabulary more quickly and accurately, suggesting that efficiency was experienced as both faster access and more effective learning within the same study time.

Enjoyment emerged as a prominent experiential theme, reflecting emotional engagement and motivation. Learners reported that *"it doesn't feel like studying, it feels like exploring and enjoying,"* particularly when interacting with games, quizzes, tongue twisters, and recording activities. Engaging multimedia tools were associated with fun and curiosity, while culturally relevant topics such as local food, festivals, and everyday greetings were described as *"interesting to explore,"* encouraging repeated use of the eBook.

Overall, these qualitative findings exploratorily indicate that learners perceived the interactive Malay language eBook as visually clear, easy to use, functionally efficient, and enjoyable. Clear visuals, intuitive navigation, integrated multimedia, and culturally rich interactive activities appear to work together to support both functional usability and positive learning experiences in Malay language learning, within the context of this exploratory case study.

Learners' Experiences with the Interactive eBook: Visibility, Ease, Efficiency, and Enjoyment

To address RQ2, qualitative interview narratives (n = 9) were analysed thematically using the four usability experience dimensions of *Visibility*, *Ease*, *Efficiency*, and *Enjoyment* (Table 10). Specific attention was given to learners' experiences when interacting with the eBook's multimedia and interactive features, including audio, video, interactive links, games, quizzes, and cultural content.

Visibility: Experiencing visual clarity during multimedia interaction

Learners described their on-screen experience as visually clear and comfortable while interacting with multimedia content. Readable fonts, balanced contrast, and uncluttered screen layouts helped learners focus on videos, audio buttons, and interactive links rather than the interface itself. Distinct icons and logical placement of buttons guided learners' actions during use, as reflected in comments such as *"the visual display and layout make it clear where to click and what to learn."* A small number of learners also mentioned that some interactive links were less noticeable during initial use on smaller screens, indicating that visibility could vary depending on device context.

Ease: Experiencing simple access and intuitive interaction

Ease was experienced through straightforward access and intuitive interaction with multimedia features across different devices. Learners frequently described the eBook as *"easy to access and use with just a simple click,"* particularly when opening audio and video resources. Learners also emphasised that multimedia links were easy to

locate and activate, allowing them to explore content independently without technical assistance. This experience is further illustrated by one translated interview narrative: *“The video and audio in the eBook are easy to access and well organised, and more detailed explanations can be obtained with just a click.”*

Efficiency: Experiencing time-saving and integrated learning support

Efficiency was experienced as reduced effort and time during learning activities. Learners described how having text explanations, audio support, and video demonstrations available in one place reduced the need to search for external resources, noting that *“it saves time; I don’t need to search on YouTube or Google separately.”* Learners also described efficiency in terms of faster understanding and improved recall within the same study time. Experiences such as *“the videos enhance my memory and learning experience”* and *“my memory becomes stronger”* illustrate how integrated multimedia supported quicker comprehension and retention. A small number of learners suggested that clearer organisation in some chapters could further improve efficiency when locating content.

Enjoyment: Experiencing engagement, playfulness, and cultural relevance

Enjoyment emerged as a prominent experiential theme associated with learners’ interaction with multimedia and interactive features. Learners described the learning experience as enjoyable and not boring, particularly when engaging with games, quizzes, tongue twisters, and culturally relevant content. One learner described the multimedia interaction as *“a vibrant experience, completely different from traditional textbooks,”* while another noted that *“the tongue twisters were particularly fun.”* Learners also highlighted the cultural content and narrative style as contributing to enjoyment, with reflections such as *“your eBook is interesting to read and shows how locals speak every day”* and *“it feels like being in class... storytelling... entertaining.”* These experiences encouraged curiosity, repeated use, and sustained engagement during Malay language learning.

Table 10

Themes and subthemes of learners’ experiences when using the interactive eBook (n = 9)

Theme	Subthemes	Description (experience)	Interview narratives
Visibility	Visual clarity; recognisable icons; layout during use	Visual clarity and recognisable media cues supported learners’ interaction with multimedia content during use.	L2 <i>“The visual display and layout make it clear where to click and what to learn.”</i>
Ease	One-click access; intuitive interaction; cross-device use	Learners experienced minimal effort when accessing audio and video features and navigating multimedia links.	L4 <i>“Easy to access and use with just a simple click.”</i> L6 <i>“The video and audio... are easy to access... and more detailed explanations can be obtained with just a click.”</i>
Efficiency	Time-saving integration; faster understanding	Integrated multimedia reduced external searching and supported quicker comprehension during learning.	L1 <i>“It saves time; I don’t need to search on YouTube or Google separately.”</i> L7 <i>“The videos enhance my memory and learning experience.”</i> L9 <i>“My memory becomes stronger.”</i>
Enjoyment	Playful interaction; cultural relevance; engagement	Interactive and culturally rich multimedia made learning	L3 <i>“A vibrant experience, completely different from traditional textbooks.”</i>

enjoyable and encouraged
continued engagement.

L5 *"The tongue twisters were
particularly fun."* ^
L6 *"It feels like being in class...
storytelling... entertaining."*

Discussions

This study addresses an ongoing need in Malay language education by designing and evaluating an interactive eBook that combines structured instructional development with usability-focused design for adult foreign learners. In a context where Malay learning for foreign speakers still often depends on classes, teacher support, or scattered materials, LMWR offers practical design evidence showing how an interactive eBook can be developed and perceived as usable, engaging, and supportive for beginner learning (Yusoff et al., 2023; Osman et al., 2021). For RQ1, the findings indicate that using ADDIE as a development guide supported a coherent eBook structure, with aligned learning objectives, content sequencing, and multimedia integration. The consistently high ratings across Visibility, Ease, Efficiency, and Enjoyment suggest that the design choices were noticed and appreciated by learners. Applying these four usability dimensions also provided a clear way to interpret the user experience. Learners' comments about readable fonts, uncluttered layouts, simple access, and smooth navigation help explain why visibility and ease were rated highly, and this is consistent with recent usability work on electronic Malay learning materials for foreign speakers (Yusoff & Kasdan, 2023).

Across the results, the four usability dimensions did not function in isolation but worked together as a connected experience. Visual clarity supported navigation and reduced uncertainty, strengthening ease and efficiency. Learners also described efficiency as learning more effectively within the same time because explanations, audio support, and multimedia were located in one place. This aligns with prior interactive eBook research showing that integrated multimedia environments can improve learning efficiency and engagement (Deligiannis et al., 2020), and it is also broadly consistent with more recent e-book research reporting positive effects on learners' reading attitudes and comprehension (Almadhi & Alanazi, 2024). Learners' views on the eBook's practical learning value further strengthen the contribution of LMWR as a self-learning resource. Learners rated the eBook highly as a beginner guide and described it as helpful for vocabulary, greetings and phrases, basic grammar, and daily conversation. Many also indicated that they would keep the eBook as a reference and recommend it to others. This pattern is consistent with digital Malay learning research showing that foreign learners value tools that support vocabulary growth, pronunciation, grammar understanding, accessibility, and learner autonomy (Tamjehi et al., 2023).

A key design implication is that multimedia and interactive elements can be appropriate and motivating for adult foreign learners when the content remains practical and meaningful. In this study, learners responded positively to cartoons, colourful visuals, and game-like activities because these features made the learning experience more engaging and memorable. This is in line with technology-based Malay language learning research showing that digital activities, apps, and online materials can strengthen learner participation among foreign learners (Osman et al., 2021). It is also supported more broadly by recent studies showing that interactive digital reading tools can increase motivation and positive engagement, even though those studies were conducted in non-Malay contexts (Fang et al., 2025; Assylzhanova et al., 2024). At the same time, the findings highlight areas for refinement. Some clickable elements were not consistently obvious, especially on smaller screens, and chapter organisation showed mixed perceptions. These patterns point to practical improvements such as clearer icon cues, stronger visual signposting, and streamlined mobile navigation. Such refinements are important because recent research on digital language-learning materials also highlights the value of formative evaluation during development (Shoozan et al., 2025), while studies in Malay digital-learning contexts remind us that implementation may still be affected by practical constraints such as devices, connectivity, and ease of use (Amiruddin & Kamba, 2025).

Overall, this study suggests that a usability-centred interactive eBook can provide a practical alternative to fragmented resources by combining language content, multimedia support, and culturally meaningful examples in a single accessible platform. LMWR contributes a design-oriented model for developing interactive Malay language materials

that support both cognitive learning processes, such as understanding and recall, and affective engagement, such as interest, enjoyment, and motivation.

Conclusion

This study demonstrates the potential of a structured and usability-focused interactive eBook to support Malay language learning among adult foreign learners. Guided by ADDIE and the usability principles of Visibility, Ease, Efficiency, and Enjoyment, LMWR was developed with alignment between learning objectives, content sequencing, and multimedia interactivity. Learners perceived the eBook as visually clear, easy to use, functionally efficient, and highly enjoyable. They also viewed it as a useful beginner resource for vocabulary, everyday expressions, and basic communication, and many indicated that they would reuse it as a reference and recommend it to others. Although the evidence is exploratory and based on self-reported perceptions, the findings suggest that interactive eBooks designed with clear instructional and usability frameworks can expand meaningful opportunities for Malay language learning beyond the classroom, particularly for expatriates and other adult foreign learners who need flexible and practical learning resources.

Limitations and Future Studies

Several limitations should be acknowledged. First, the study involved a small sample ($n = 18$) within a single case context, and participants were recruited through the researcher's learning networks. This limits diversity of user profiles and reduces generalisability. Second, the study did not include a comparison group using another resource or a non-interactive version of the eBook. Therefore, the findings should be interpreted as evidence of perceived usability and perceived learning support rather than evidence of superiority. Third, the quantitative findings were based on self-report data. Self-report is suitable for capturing perceptions of usability and learning support, but it does not directly demonstrate improvement in Malay language proficiency. Fourth, participants used different devices and internet conditions, and these practical constraints likely influenced how smoothly multimedia loaded and how easily some features were accessed.

Future research can address these limitations by using larger samples across different learner groups, institutions, or countries. Comparative designs that evaluate interactive eBooks alongside print resources, mobile apps, or non-interactive eBooks would provide stronger evidence for relative value. Performance based measures, such as vocabulary, listening, pronunciation, or speaking tasks, would strengthen claims about learning outcomes beyond perceived support. Future studies may also incorporate task-based usability testing, observation, and usage analytics to complement perception data. From a design perspective, further iterations could prioritise clearer clickable cues, improved chapter organisation, lighter media formats, offline friendly access where possible, and simple onboarding guidance, while maintaining the ease and enjoyment valued by adult foreign learners.

Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

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