

Needs Analysis for Developing ICT-Based Interactive E-Modules on Flip Heyzine in English Language Learning in Elementary School

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ABSTRACT

Due to conventional teaching materials that do not match the digital conveniences of learners and the demand of the Kurikulum Merdeka framework, English language learning in Indonesian elementary schools faces persistent challenges. This current study was carried out to analyze the needs as preliminary step for developing ICT-based interactive e-modules through Flip Heyzine in learning English. It used descriptive qualitative design with research subjects that is English teacher of 5 elementary schools and students grade IV-VI numbering 30 people. Questionnaires were distributed, semi-structured interviews were conducted, and ten sessions of classroom observation were held; the data collected were analyzed using descriptive statistics and thematic analysis. The results reveal four major areas of need: the existing quality of traditional pedagogical content is insufficient, students have a significant lean towards using digital and interactive study materials despite teachers having positive attitudes toward ICT adoption but only moderate levels of competency with it, teachers had sufficient access to personal smartphone and mobile data to support Heyzine's browser-based share-link deployment model. Flip Heyzine has full support for all the high priorities features requested by participants; that is somewhat confusing as they used embedded audio, instructional video, interactive quizzes and child friendly visual design. The findings provided strong empirical groundwork for the subsequent construction of Heyzine-based interactive e-modules and also suggested areas for future studies, including expert validation and effectiveness testing within a real-life elementary English learning environment.

Keywords: *needs analysis, ICT-based e-module, Flip Heyzine, English language learning, elementary school*

INTRODUCTION

The remarkable development of Information and Communication Technology (ICT) in particular has had a substantial impact on educational actions, almost none more than the teaching and learning of English as a Foreign Language (EFL). In Indonesia, ICT literacy has been mandated in the implementation of English language teaching during two years or so through Merdeka Belajar curriculum as an effort for creating a digital-utilizer education to promote active, student-centred, and contextually meaningful learning (Primary et al., 2023). However, empirical evidences reveal that the status of ICT implementation in English classrooms; at least when it gets to elementary-level education; is still varied and limited due to a range of pedagogical, technical, and systemic limitations (Aulia Rahmah & Qamariah, 2023; Syahputra, 2022)

Indonesia has specific challenges of learning English at the elementary school level that common instructional materials do not address. Conventional printed textbooks and teacher-

made worksheets, which still dominate classroom materials use in many regions, are reported to often exclude the multimodal and interactive features needed to engage these highly digital media-influenced learners (Manzil et al., 2022; Septiani et al., 2025). Real-life, visually engaging and multimodal learning environments support vocabulary acquisition, listening comprehension and early communicative competence especially for young learners (Pradnyana et al., 2022). Existing materials do not address those needs, which accounts for the low motivation, little skill development and lack of learning outcomes in an elementary English classroom in Indonesia (Primary et al., 2023).

These challenges have prompted consideration of electronic modules (e-modules) as a viable form to replace traditional print content. E-modules have been described as a unit of self-instructional digital learning material that include text, audio, video and graphic interactions in an integrated or cohesive format that addresses one or more learning outcomes (Manzil et al., 2022; Sari & Khaidir, 2023). Flip Heyzine has received increasing academic interest as a web-based platform for interactive e-modules, due to its user-friendly interface and ability to embed multimedia content as well as being compatible across multiple devices. Our flipbook utilizes Heyzine Flipbook, an online tool that allows teachers to generate and distribute interactive digital flipbooks with minimal technical skillsets for a viable and scalable approach towards classroom material design (Perangin-angin et al., 2026; Setiyaningsih et al., 2024). Moreover, the research on Heyzine-based e-modules from different subject areas have obtained high feasibility score in terms of media expert, material expert and linguist perspective like what Munajah & Anggraini (2025) and Pratiwi et al. (2023) conducted their study.

Nonetheless, the creation of any educational material; digital or otherwise; should have a basis on a systematic and empirical needs analysis. Needs Analysis is the first phase in developing language materials which focuses on the gap between learner's present conditions and their desired learning outcomes, covering two sub-dimensions; target needs and learning needs dimension (Pradnyana et al., 2022). Needs analysis in ICT-based material development must not only examine language learning objectives but also the interests of learners with technology, the teachers' preparedness and capacity to implement ICT materials, as well as the infrastructural status within which they are teaching (Sari & Khaidir, 2023). Without this fundamental analysis, there is a considerable danger that well developed materials at any level of technical sophistication will not actually meet needs in the learning environment and then be used little if at all (Primary et al., 2023).

This is an important discussion, however there is clearly a sizable gap in the literature to date. Although the development and validation studies of Heyzine-based e-modules are on the rise (Manzil et al., 2022; Munajah & Anggraini, 2025; Perangin-angin et al., 2026), research with specific focus on pre-development needs analysis toward ICT-based interactive e-modules at Indonesian elementary school level English language learning remains almost non-existent. Most previous research goes straight to design/development even though it would call for a systematic empirical account of the contextual needs, teacher readiness, student idiosyncrasies and infrastructural conditions that should inform material development decisions. This is a methodological gap that affects the transferability and contextual validity of available studies on the development of e-modules based on Heyzine.

This study fulfills the gap in that it begins with a thorough needs analysis phase to inform the development of ICT-based interactive e-modules using Flip Heyzine as part of English language learning at elementary school level. The study aims to: (1) examine the perceived quality of current English teaching materials for both teachers and students; (2) explore digital learning preferences and aspects of interactive learning materials preferred by

students; (3) assess the ICT competence and readiness of teachers towards technology-integrated material use; and finally, (4) identify institutional infrastructure capacity for successfully implementing socioscientific argumentation-based e-module in low-tech, high-tech classrooms. The results of this needs analysis should offer a well-justified empirical foundation for the following prototyping and designing interactive e-modules using Heyzine, which are pedagogically robust, technologically viable, and contextually relevant to the English language learning of Indonesian elementary school students.

METHOD

Research Design

This research used qualitative descriptive method to describe teacher and student need based on internet access capability of teachers as guideline for developing ICT-based interactive e-book using Flip Heyzine in English learning at elementary school. A specific qualitative descriptive design is warranted approach when the primary intent of the study is to get a holistic, contextualized understanding of participants experience, needs and preferences in their natural (Creswell & Creswell, 2022). This design is commonly used in needs analysis studies regarding EFL material development context since it could systematically quantitatively and qualitatively investigate multi-dimensional surprising factors such as pedagogical needs, technological readiness, and infrastructural conditions that may have not be adequately explored if using a quantitative research method alone (Sari & Khaidir, 2023).

Research Setting and Participants

This study was conducted at kec. Wiyung, Surabaya, East Java (ID) Purposive sampling was used to choose who could provide the most relevant and information-rich data in regard to aims of the study at hand (Creswell & Creswell, 2022). Second is the group of participants which was divided into two categories. This category was a sample of 10 English teachers from 5 elementary schools, who were sampled by the criterion that they were actively teaching English at the elementary level with at least two years teaching experience. The other included 30 IV to VI grade students that were selected as representatives of different English proficiency levels and digital device access profiles. The grade range of IV–VI was chosen as this is a stage in which students demonstrate adequate cognitive development to express their educational choices and experiences articulately.

Data Collection Instruments

We used three complementary instruments; for triangulation across sources and methods.

1. Questionnaire

A structured questionnaire was formulated based on these findings and the same were given to both Teacher and Student Participants. Teacher questionnaire items were organised into four dimensions: (1) use and adequacy of current teaching materials, (2) ICT integration practices and barriers overcoming their usage, (3) self-rated ICT competence in using the technology for effective learning, and (4) preferences/expectations regarding certain features of digital learning materials. Student questionnaire topics: (1) digital device ownership and internet access, (2) preferences in learning modality, (3) current English materials being used, and (4) components of interactive digital learning content they want to include The subjects for all items were developed from established frameworks in the needs analysis literature in language material development research (Pradnyana et al., 2022; Sari & Khaidir,

2023) and adapted to the elementary EFL context. The questionnaire employed a 5-level Likert scale for attitudinal items, and a multiple-choice or checklist style for preference and factual items. Prior to administration, content validity of the questionnaire was confirmed based on expert judgment.

2. Semi-structured Interview

Thereafter, semi-structured interviews with a purposively drawn sub-group of 10 teacher participants were conducted to generate rich qualitative data regarding their experiences using current teaching materials, and their needs in relation to ICT integration challenges, as well as the features and usability expectations for a Heyzine-based e-module. Potential questionnaire dimensions were developed into interview protocols which were refined after a pilot session. Interviews lasted 30–45 minutes each and were held in Bahasa Indonesia to facilitate communication and depth of response. All interviews were audio-recorded after obtaining consent from participants followed by transcription of the audio recordings verbatim for analysis.

3. Classroom Observation

Classroom observations of 10 English lessons which took place in order to document actual practice teaching and learning material use patterns behaviors of student engagement, nature and availability of digital infrastructure within the classroom environment. The systematic observation checklist was used to log data on paper according to the characteristics of an observational checklist that focused on research objectives.

Data Analysis

Descriptive statistics for each item and dimension were collected by fully analyzing questionnaire data quantitatively to yield frequency distributions and percentages for main patterns in the needs and preferences of teachers and students. Interview data were qualitatively analyzed via thematic analysis following the six-phase procedure elucidated by (Creswell & Creswell, 2022): becoming familiar with the data, initial code creation, searching for themes, reviewing themes, defining and naming themes, and producing the report. Field notes were analysed through content analysis, whereby field notes were coded against the previously set observational categories. Data were triangulated across the three instruments during the analysis-induction phase to increase trustworthiness, credibility and consistency of data. We did member checking by sending analytical summaries to check the accuracy of interpretations from interview data with two teacher participants.

FINDINGS AND DISCUSSION

Current State of English Teaching Materials

The analysis of needs indicates that most participating school English teachers mainly draw on printed textbooks/ teacher-designed worksheets as their main medium of instruction. All ten (100%) teacher participants responded that they regularly used printed textbooks as a core teaching material and eight teachers (80%) also incorporated teacher-made worksheets into their lessons as seen in Table 1. On the contrary, none of the teachers have used an interactive e-module in their English teaching before, only two (20%) teachers reported sparse use of digital or online media.

Table 1. Teachers' Use of Current English Teaching Materials (N = 10)

Teaching Material Type	Frequency	Percentage (%)
Printed textbook	10	100.0
Teacher-made worksheet (LKS)	8	80.0
PowerPoint presentation	4	40.0
Printed supplementary materials	3	30.0
Digital/online media	2	20.0
Interactive e-module	0	0.0

Note: Multiple responses allowed

In Table 2, teachers also rated how well current materials worked. An overwhelming majority; eight teachers (80%); disagree or strongly disagree that materials in use right now are visually appealing to students, and nine of them (90%) find current resource unhelpful for audio-visual access designed to support language mastery. These impressions align with classroom observation data, which documented that every one of 10 lesson observations involved only printed materials and no audio, video or interactive digital components.

Table 2. Teachers' Assessment of Adequacy of Current Teaching Materials (N = 10)

Statement	SA f (%)	A f (%)	N f (%)	D f (%)	SD f (%)
Current materials are visually engaging	0 (0.0)	1 (10.0)	1 (10.0)	5 (50.0)	3 (30.0)
Current materials support listening skill development	0 (0.0)	0 (0.0)	1 (10.0)	6 (60.0)	3 (30.0)
Current materials include sufficient audio-visual support	0 (0.0)	1 (10.0)	0 (0.0)	5 (50.0)	4 (40.0)
Current materials align with Kurikulum Merdeka	0 (0.0)	3 (30.0)	3 (30.0)	3 (30.0)	1 (10.0)
Students show high engagement with current materials	0 (0.0)	1 (10.0)	2 (20.0)	5 (50.0)	2 (20.0)

Note: SA = Strongly Agree; A = Agree; N = Neutral; D = Disagree; SD = Strongly Disagree; f = frequency

The results of the findings support extensive research into one of the challenges in teaching English in Indonesian elementary schools that is ICT-integrated learning materials, which have become a persistent pedagogical limitation (Syahputra, 2022). Historical focus on transitions between curricula means that the failure of available materials is compounded, as our interview data indicate: seven of the ten teachers were unsure how they could do what kind of materials development in line with Kurikulum Merdeka learning objectives, supporting

Primary et al. (2023) provides a practical perspective on the results of curriculum uncertainty for teachers as they plan their lessons and develop materials. Overarching, the findings from Tables 1 and 2 and classroom observations provide an empirical rationale for developing ICT-based alternative materials in response to the multimodal learning needs that traditional printed resources have been shown to inadequately support.

Students' Learning Preferences

Responses from a student questionnaire confirmed that students prefer digital and interactive learning modalities, and often. As indicated in Table 3, most (90.0%) students (27 out of 30) own or have access to a smartphone; by contrast, very few students (consumption <26.7%) can use laptops or PCs. An important finding here is that only one student (3.3%) reports having no access to any digital device, establishing a solid baseline of availability of devices across the student population.

Table 3. Students' Digital Device Ownership and Access (N = 30)

Device	Frequency	Percentage (%)
Smartphone (Android/iOS)	27	90.0
Tablet	11	36.7
Laptop/PC	8	26.7
No digital device access	1	3.3

Note: Multiple responses allowed

Students Learning Modality Preferences as shown on table 4. Interactive digital content: 19 students (63.3%) Printed textbooks > interactive digital content: 1 student (3.3%) Teacher explanation only:—1 Student (1.7%). This finding captures a core disjuncture between the preferred modality of students and that predominantly engaged with in English lessons, corroborated by classroom observations.

Table 4. Students' Learning Modality Preferences (N = 30)

Learning Modality	Ranked 1st f (%)	Ranked 2nd f (%)	Ranked 3rd f (%)
Interactive digital content	19 (63.3)	6 (20.0)	3 (10.0)
Video-based learning	6 (20.0)	12 (40.0)	7 (23.3)
Gamified/quiz-based learning	4 (13.3)	7 (23.3)	10 (33.3)
Printed textbook	1 (3.3)	3 (10.0)	6 (20.0)
Teacher explanation only	0 (1.7)	2 (6.7)	4 (13.3)

Table 5 further details the specific features students desire in their English learning materials. The three most sought-after features are colorful images and animations (93.3%), interactive quizzes and games (90.0%), and audio pronunciation guides (86.7%), all of which are directly supported by the Flip Heyzine platform.

Table 5. Students' Desired Features in English Learning Materials (N = 30)

Desired Feature	Frequency	Percentage (%)
Colorful images and animations	28	93.3
Interactive quizzes and games	27	90.0
Audio/pronunciation guides	26	86.7
Embedded instructional videos	25	83.3
Self-paced navigation	22	73.3
Progress tracking	19	63.3
Offline/downloadable access	17	56.7

Note: Multiple responses allowed

This was in line with wider literature regarding young learners' digital learning preferences. The research investigating the students in learning English using Heyzine shows that students find easy with this interactive flipbook platform, and they enjoy reading it well because of its visual appeal and ease for navigation as engagement factors (Septiani et al., 2025). Finally, evidence of EFL students' psychological needs and engagement in informal digital learning suggests that when interactive digital platforms meet competence, autonomy, and relatedness needs, learners are more engaged (Zadorozhnyy & Lee, 2026). The strong correlation between expressed student preferences and the inherent capabilities of Heyzine native platform; specifically multimedia embedding, interactive assessment, and cross-device accessibility; provides a strong empirical basis for the selection of Heyzine as platform during development.

Teachers' ICT Competence and Readiness

Table 6 indicates that most teacher participants self-reported basic to intermediate ICT competences. Five teachers (50.0%) considered themselves intermediate competent, using existing digital tools but able to only create material guided by the available tools; three teachers (30.0%) fell into the basic level category. Advanced competence in ICT is reported by just one teacher (10.0%).

Table 6. Teachers' Self-Assessed ICT Competence Level (N = 10)

ICT Competence Level	Frequency	Percentage (%)
Advanced (can create interactive digital materials independently)	1	10.0
Intermediate (can use existing tools; limited material creation)	5	50.0
Basic (can use office and social media applications)	3	30.0
Beginner (minimal digital experience)	1	10.0

Table 7 identifies the barriers that teachers perceive as most inhibiting their ICT integration in English teaching. Limited time for digital material development (80.0%) and insufficient ICT training (70.0%) are identified as the two most prevalent barriers, followed by uncertainty about appropriate platform selection (60.0%).

Table 7. Teachers' Perceived Barriers to ICT Integration in English Teaching (N = 10)

Barrier	Frequency	Percentage (%)
Limited time for digital material development	8	80.0
Insufficient ICT training/professional development	7	70.0
Uncertainty about which platforms to use	6	60.0
Lack of institutional support/guidance	5	50.0
Limited technical skills	4	40.0
Poor internet connectivity at school	4	40.0

Note: Multiple responses allowed

Even with those barriers, the teachers' perception on ICT-based e-module adoption is more positive, as shown in Table 8. This study suggests that 100 % from ten teachers agree or strongly agree to use the ICT integration for stimulating students in learning process, while 90.0 % of teachers are willing to implement if it is provided any e-module with ICT integrated thus encourages students' motivation. Importantly, all ten teachers (100%) gravitate toward user-friendly digital platforms, and nine (90.0%) report that a plug-and-play e-module template would significantly enhance their teaching practice.

Table 8. Teachers' Attitudes and Intentions Toward ICT-Based E-Module Use (N = 10)

Statement	SA f (%)	A f (%)	N f (%)	D f (%)	SD f (%)
ICT integration can increase student motivation	6 (60.0)	(40.0)	0 (0.0)	0 (0.0)	0 (0.0)
I am willing to use an ICT-based e-module if provided	5 (50.0)	(40.0)	1 (10.0)	0 (0.0)	0 (0.0)
I prefer digital platforms that are easy to learn	7 (70.0)	(30.0)	0 (0.0)	0 (0.0)	0 (0.0)
I need training support before using new digital tools	4 (40.0)	(50.0)	1 (10.0)	0 (0.0)	0 (0.0)
A ready-made e-module template would help my teaching	5 (50.0)	(40.0)	1 (10.0)	0 (0.0)	0 (0.0)

Note: SA = Strongly Agree; A = Agree; N = Neutral; D = Disagree; SD = Strongly Disagree; f = frequency

These findings reflect the broader pattern documented in Indonesian EFL research, where teacher readiness and capacity represent critical mediating factors between digital tool availability and effective pedagogical deployment (Lisia et al., 2024; Primary et al., 2023), and where a consistent deficit in experiential exposure, intrinsic motivation, and ICT proficiency has been identified across diverse regional contexts in Indonesia. Click or tap here to enter text. Due to the documented low technical threshold for material creation of the platform (Munajah

& Anggraini, 2025; Pratiwi et al., 2023), this combination of moderate ICT competence, positive adoption attitudes and high preferences for user-friendly platforms directly supports the validity of Flip Heyzine within this context. Such findings also explain that the e-module development projects should be paired with guidance on practical teacher orientation to fill those capacity gaps reflected in tables 6 and 7.

Institutional Infrastructure Support

Table 9 presents the digital infrastructure characteristics of the five schools in our study. The last technology, the LCD projector is found in four schools (80.0%), institutional Wi-Fi networks are only shared by two schools (40.0%) and students have access to school-owned devices only in two schools (40.0%). This result corroborates that availability of hardware by institutions is not sufficient for mass implementation of the learning based on ICTs.

Table 9. Availability of Digital Infrastructure in Participating Schools (N = 5 Schools)

Infrastructure Component	Available (Schools)	Percentage (%)
Computer laboratory	3	60.0
School WiFi network	2	40.0
LCD projector in classrooms	4	80.0
Teacher access to school devices	3	60.0
Student access to school devices	2	40.0

Table 10 presents students' personal internet access profiles, which reveal a markedly different picture from institutional provision. Twenty-five students (83.3%) access the internet via personal mobile data, while home WiFi is available to 12 students (40.0%). Only one student (3.3%) reports no internet access of any kind.

Table 10. Students' Internet Access and Connectivity Profile (N = 30)

Internet Access Profile	Frequency	Percentage (%)
Mobile data (personal smartphone)	25	83.3
Home WiFi	12	40.0
School WiFi	6	20.0
No internet access	1	3.3

Note: Multiple responses allowed

Table 11. Perceived Feasibility of Mobile-Based E-Module Deployment (N = 40)*

Feasibility Indicator	Agree/Strongly Agree f	Percentage (%)
Students can access learning materials via smartphone	37	92.5
Share-link distribution is practical for classroom use	35	87.5
Mobile-accessible e-modules support home learning	34	85.0

Feasibility Indicator	Agree/Strongly Agree f	Percentage (%)
Smartphone-based learning is acceptable in this context	33	82.5

*Combined teacher (N=10) and student (N=30) responses

The infrastructure data from Tables 9–11 point to an important conclusion: while institutional provisioning of devices and connectivity is scarce, extensive ownership of personal smartphones (90.0%, Table 3) and access to mobile data among students (83.3%, Table 10), bodes well for alternative routes to deployment that rely on these personal devices. Heyzine; with its share-link distribution model which only needs a simple browser on any browser-enabled device and no app installs whatsoever; addresses this infrastructure reality most directly and simply (Salim et al., 2023). Table 11 provides evidence for combined responses; these data indicate that only 7.5% of the participants disagree to students accessing learning materials using a smartphone while 87.5% found distributing share-links practical in classrooms.

This finding is in line with previous research indicating the feasibility and accessibility of using an open-access web-based platform such as Heyzine Flipbook in elementary school settings, particularly when schools were not able to provide devices for students (351; (327). However, the variable profile for internet connectivity noted in Table 10 means that e-module design needs to include some data-efficient features and that PDF downloads should be explored to allow context-appropriate learning continuity where intermittent connectivity remains an issue.

Desired Features of the ICT-Based Interactive E-Module

The synthesis of findings across all four preceding dimensions, triangulated with interview and observation data, yields a coherent and prioritized profile of the desired features for the ICT-based interactive e-module, as presented in Tables 12 and 13.

Table 12. Priority Features of the Desired ICT-Based Interactive E-Module (N = 40)*

Feature	Frequency	Percentage (%)	Priority
Colorful, child-friendly visual design	39	97.5	Very High
Embedded audio for pronunciation modeling	38	95.0	Very High
Interactive quizzes and self-check activities	37	92.5	Very High
Embedded instructional video clips	36	90.0	Very High
Vocabulary activities with visual support	35	87.5	High
Self-paced modular navigation	34	85.0	High
Alignment with <i>Kurikulum Merdeka</i> objectives	33	82.5	High

Feature	Frequency	Percentage (%)	Priority
Coverage of four language skills (LSRW)	31	77.5	High
Teacher-adaptable content templates	29	72.5	Moderate
Offline/downloadable access option	26	65.0	Moderate

*Combined teacher (N=10) and student (N=30) responses

Table 13. Mapping of Desired E-Module Features to Flip Heyzine Platform Capabilities

Desired Feature	Available in Heyzine	Implementation Strategy
Embedded audio	✓ Yes	Audio clips uploaded per page for pronunciation modeling
Embedded video	✓ Yes	YouTube/video links embedded directly in flipbook pages
Interactive quizzes	✓ Yes	Google Forms or Quizizz links embedded within pages
Animated/visual content	✓ Yes	Animated GIFs and images supported natively
Share-link distribution	✓ Yes	Direct link sharable via WhatsApp or school LMS
Cross-device smartphone access	✓ Yes	Browser-based; no application download required
Self-paced navigation	✓ Yes	Page-by-page flipbook navigation with bookmarking
Offline access	Partial	PDF download available in premium plan
Teacher-adaptable templates	✓ Yes	Pages fully editable and duplicable in platform editor
<i>Kurikulum Merdeka</i> alignment	✓ Yes	Content structured per learning outcome

Table 12 indicates good convergence among teachers and learners on core features that are desired, with colorful visual design (97.5%), embedded audio for pronunciation (95.0%), interactive quizzes (92.5%) and embedded video (90.0%) being the highest rated as priority. As Table 13 supports, all high-priorities are supported by Flip Heyzine with just an offline access being a partial limitation; addressable via institutional premium subscription or hybrid PDF; digital delivery strategies. Together, these specifications form the empirical foundation for designing the next key phase of this project, namely the e-module development stage: evidence linking survey results to platform selection and content design are transparent and direct. This is in line with the best practice on material development based on needs analysis, which highlights the need for a direct relationship between learner needs that have been identified and

the technical characteristics of the chosen platform process (Pratiwi et al., 2023; Sari & Khaidir, 2023).

CONCLUSION

This research is the preliminary phase of developing ICT based interactive e-modules with Flip Heyzine to be used in learn English on elementary level by conducting systematic needs analysis study. Using questionnaire, interview, and classroom observation data from 10 English teachers in five elementary schools as well as 30 students in grades IV to VI, this has established base-empirical needs (IND) comprise an empirical base for the next stage of development.

Firstly, the results show that the current English teaching materials among the 7 schools investigated in this study are traditional textbooks used by all teachers and teacher-made worksheets used by almost half of them. All of these materials have otherwise been evaluated as underbunked and ill-prepared to serve the multimodal, audio-visual, and interactive learning needs that many 21st -century elementary school students need today, they fall short of the spirit in which Kurikulum Merdeka seeks for technologies to be integrated.

Second, students express consistently high preferences for digital and active modes of learning, with 63.3% identifying interactive digital content as the number one preferred learning mode. The most coveted material features; colorful visual design, embedded audio to model pronunciation, interactive quizzes, and instructional video; align precisely with the capabilities offered through the Flip Heyzine platform, a direct and explicit match between learner need and asynchronous learning solution.

Third, teachers' ICT competence levels are moderately high, but they have a very positive attitude to the use of ICT-based e-modules, and all 10 teachers partially agree with ICT integration into the lesson as it encourages student motivation; they were all showed preference for user-friendly platforms which do not required any advanced skill related to technical issues (Flip Heyzine matches this profile perfectly).

Fourth, while institutional provision of devices and connectivity is limited, students' near-universal access to personal smartphones (90.0%) and high mobile data accessibility (83.3%) provide a realistic but practical way for Heyzine's browser-based share-link deployment model to be available to students in this environment.

A final summary of the findings validated that ICT-based interactive e-module development using Flip Heyzine is pedagogically justified and practically viable for formal language learning in the target school context. The needs specs that delineate the preferences across the four dimensions; especially the priority features mapped in Tables 12 and 13; serve as an open, data-driven design brief defining next development steps. Further research needs to continue on the design process, development and expert validation on e-module production, then empirical testing of the ability to reach out regarding the improvement of students' English language learning outcomes by e-module produced. It is also suggested that this needs analysis is conducted more broadly in different school contexts in regions and socio-economic areas of Indonesia to further enhance transferability of the findings, as well as contributing to the growing body of evidence available for ICT-based development of English-language material at the elementary school level.

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