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PAPER

Designing a Production-oriented Approach-Based Mobile-Assisted Interpreting Learning Module Using Fuzzy Delphi Method

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ABSTRACT

This research addresses a significant gap in the field of interpreting education. While interpreting is widely acknowledged as a complex language skill, it has received minimal attention in educational research. Despite the advancements in language education, mobile-assisted learning has gained popularity as an effective teaching method. However, it remains largely unexplored in interpreting education. This study stands out by introducing a novel mobile-assisted interpreting learning (MAIL) module based on the production-oriented approach, which combines mobile technology with language learning. To ensure the credibility of the module, a fuzzy Delphi method (FDM) involving fifteen experts was employed. This method resulted in a strong consensus on the elements, objectives, content, procedure, and design of the mobile device. Notably, 37 out of the 39 elements received unanimous approval from the experts. The final output is a practical and implementable module called production-oriented approach-based mobile-assisted interpreting learning (POMAIL). It includes a clear flowchart designed for educators and researchers. This research makes a significant contribution to the field of education by providing valuable guidance in mobile-assisted learning and language education. It has the potential to reshape the field.

KEYWORDS

mobile-assisted learning, production-oriented approach, interpreting, language learning (POMAIL), education

1 INTRODUCTION

The sustainable development goals set by UNESCO emphasize that language education contributes to the development of students' language abilities, enhancing their competitiveness in a globalized context [1]. The global education innovation initiative asserts that students can foster cross-cultural communication and collaboration by learning multiple languages [2]. Hence, there are numerous studies on

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language education, some of which focus on various domains of language skills, such as listening, speaking, reading, writing, translation, and interpreting. Interpreting is considered one of the most complex language skills. However, it has only been recognized as a field of academic study in language teaching in recent decades [3]. The past twenty years have seen a growing interest in interpreting studies due to the increasing demand for qualified interpreters in various fields of international affairs [4]. A great many universities and colleges around the world offer courses for language learners to learn interpreting [5]. The interpreting training courses are designed as assisted courses to enhance language skills and develop future interpreters in various countries, including China, America, and Iran [4, 6, 7]. For language learning, a significant amount of research has been conducted to investigate teaching and learning modules or methods in the development of language skills, including listening, speaking, writing, and reading. However, very few studies have focused on interpreting learning in dimensions such as interpreting teaching, content design, and learning methods [6], leaving many gaps for interpreting learning research.

As technology develops, the past decade has witnessed a growing number of digital learning modules being created. Among these, mobile-assisted language learning (MALL) is a newly developed module that has been proven to be effective in enhancing students' language skills [8–13]. The recent systematic review articles on MALL report that the primary areas of focus in MALL research are listening, speaking, reading, writing, grammar, and vocabulary [9, 10, 14, 15]. Yet, little research has been specifically conducted on using MALL for interpreting learning. And surprisingly, no MALL module has been designed or developed for interpreting education.

This study attempts to fill the gap by designing a module for MAIL. However, a problem arises with the MALL. Though literature shows the efficiency of MALL in language teaching, including enhancing language skills, boosting learner motivation, and increasing learner performance, it faces the challenge of a lack of pedagogical guidance. [16] pointed out that teachers tend to lack comprehensive instructions in mobile-assisted learning modules that address technical issues more than pedagogical issues. [17] emphasized the challenges teachers face when integrating MALL into classroom teaching. To address this issue, the objective of this study is to develop a novel MALL module that utilizes the production-oriented approach (POA), specifically the production-oriented mobile-assisted interpreting learning module. The POA is added as pedagogical instruction and guidance for MAIL. Past research has demonstrated the benefits of the POA for improving efficiency in language teaching, particularly in English teaching, through numerous empirical studies [18–20]. The output-driven hypothesis, which emphasizes the use and application of language rather than input [20], was considered to be well-suited for interpreting as a language skill [6, 21, 22]. POA can be perfectly incorporated into MALL with its clear teaching procedures of motivating, enabling; and assessing. Before class, instructors motivate learners by presenting the target task using mobile tools, such as videos. During class, learners can follow the process of enabling and assessing with the assistance of mobile devices. After class, both learners and instructors continue to enable and assess learning through mobile platforms.

To date, there is rarely any research that combines the POA and MALL, let alone in interpreting learning. This study is unique and innovative as it aims to construct a module called production-oriented approach-based mobile-assisted interpreting learning (POMAIL). The module is based on the POA and incorporates expert consensus on its elements and constructs. It serves as valuable guidance and reference for language educators in interpreting teaching and mobile-assisted learning. With a new approach guided by mobile-assisted learning, this module has the potential to revolutionize the landscape of language education, especially in the field of interpreting. The POMAIL module, with its expert-validated components, represents a pioneering contribution that has the potential to redefine language education practices. By offering a unique and promising approach to interpreting education, this research has the potential to inspire a new era of pedagogical possibilities, establishing a precedent for future advancements in the field of interpreting education.

2 THEORETICAL BACKGROUND

This section focuses on introducing the two main theoretical foundationns of the POMAIL module, namely MALL and production-oriented approach.

2.1 Mobile-assisted language learning

Mobile-assisted language learning has evolved from computer-assisted language learning (CALL) and mobile learning (ML), and has developed into a sophisticated field of education over the last decade [23]. It differs from CALL as it is based on personal and portable devices, and it mirrors ML for its focus on flexibility, contextualized learning, and active participation of the learner. [24] claims that MALL shares so many common characteristics with ML that it is believed to be best understood as belonging to ML rather than being independent from it. Mobile learning literature has identified this concept as important, regardless of the specific content. [25] identified 11 principles for designing mobile learning modules, several of which seem relevant to language learning. These principles include blending mobile and non-mobile technologies, allowing time for exploration of mobile technologies, implementing mobile learning for individual and collaborative use, and encouraging the use of learners' own mobile devices [26]. Drawing a conclusion on ML principles from a review of eight universal principles, four of which are apparently connected to MALL: equitable use ("deliver content in the simplest possible format"), flexible use ("package content in small chunks"), tolerance for error ("scaffold and support situated learning methods"), and climate ("push regular reminders, quizzes, and questions to students"). Consequently, MALL could be considered part of ML, or, in other words, a specific content area within mobile learning.

[27] defines MALL as the use of mobile technology in language learning. Mobile technology includes portable devices ranging from MP4 players and smartphones to laptops and tablets. Students in MALL do not always have to sit in the classroom and can engage in language learning whenever and wherever they want. This type of learning can be both formal and informal [24, 27]. In other words, MALL can occur both inside and outside of the traditional classroom setting [24]. [23] viewed MALL as a progression along the spectrum of teacher-driven versus learner-driven learning. There could be self-directed learning by learners in informal settings, or teacher-driven learning in formal classroom settings, or even a blended learning mode that occurs both inside and outside the classroom [23]. The current study designed a mobile-assisted learning module that combines formal and informal language learning.

The last decade has witnessed flourishing and advancing research on MALL. It is now a widely adopted learning method in most countries worldwide, across various educational settings, to teach and learn language through mobile devices [15]. A systematic review article [15] reported that a majority of studies have asserted the effectiveness of language teaching in achieving language goals and improving language skills and learner performance. Another review article [24] finds that many studies have focused on physical issues such as the selection of devices, the design of functionalities, and technical issues. It also identified other studies that highlighted pedagogical issues for language learning. These studies recommend future research on innovative pedagogical guidance that utilizes mobile devices in language learning, going beyond the mere duplication of paper-based or computer-based learning [24]. This study filled a gap by adopting an innovative pedagogical approach, known as the POA, to design a MALL module that goes beyond simple replication of traditional paper-based or digital computer-based learning.

2.2 Production-oriented approach

The POA is a pedagogy that has been vigorously developed, particularly in China, over the last decade. Proposed by Chinese linguist Wen Qiufang, this approach is developed by combining the strengths of the second language acquisition theories in Krashen's input hypothesis, Swain's output hypothesis, and Long's Interactive Hypothesis [28]. Therefore, the POA pedagogy aims to address the issue of the disconnect between learning and application in language learning by utilizing output-driven and input-enabled hypotheses [29]. After a decade of revising based on empirical studies, the POA has been fully developed into a pedagogical system (see Figure 1).

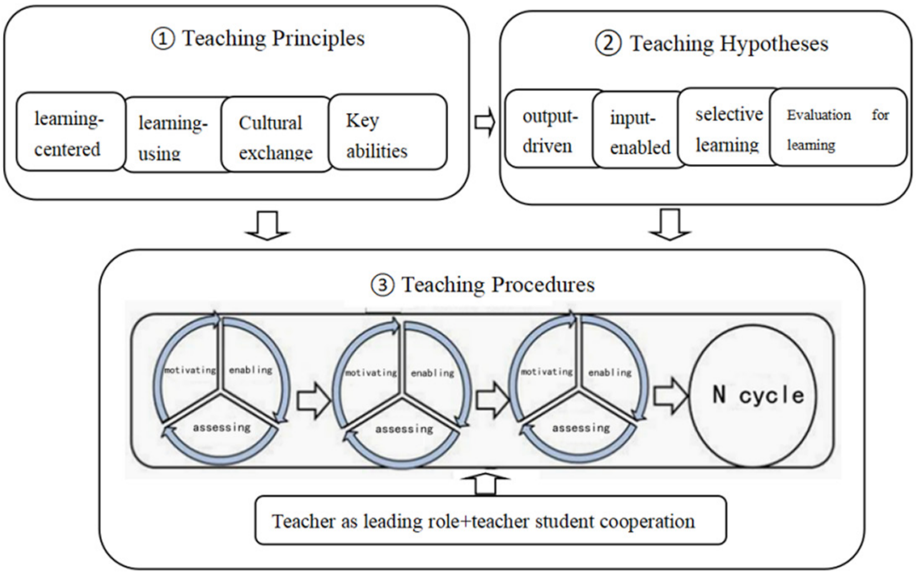

Fig. 1. The POA system [20]

The POA system is based on four teaching principles that focus on the learning process, target learning to use, incorporate cultural exchange as the content demand, and emphasize key abilities as the personal outcome. Following the principles, four hypotheses were highlighted: output-driven, input-enabled, selective learning, and evaluation for learning. The teaching procedure of motivating, enabling, and assessing is conducted based on the principles and hypotheses under the guidance of the instructor. In other words, learners are motivated through output tasks in the motivating phase. They are then enabled to achieve the output by using their input language skills. The assessment process is carried out following the presentation of learners' output activities.

The POA pedagogy encourages English learners to learn English for genuine purposes, such as problem-solving. It is targeted at meeting the social needs of language use in the workplace, where communication is primarily facilited through productive activities such as speaking, writing, interpreting, and translating. Receptive activities such as listening and reading are seen as mediators rather than the ultimate learning goals [20]. Hence, this method aims to develop learners' productive language skills, with receptive skills serving as the enablers [20]. In this study, interpreting is considered a productive language activity that aligns with the aim of a practice-oriented approach.

To date, a growing body of research has confirmed the effectiveness of a process-oriented approach in language teaching and learning through empirical studies and case studies. A review study [30] proves it to be an effective pedagogical method for improving language skills in all domains. In terms of interpreting, [6] and [31] applied the practice-oriented approach in an interpreting course and found it to be a very effective method in improving learners' interpreting skills and boosting learner motivation in the process. However, [31] pointed out that the POA could be developed if integrated with modern digital learning methods. Therefore, this study combined the use of a process-oriented approach with MALL in the interpreting learning course to develop a new module for interpreting learning.

This study innovates the mobile learning module by incorporating the POA into mobile-assisted learning. This groundbreaking move has the potential to transform how interpreting is taught and learned. The POA provides a clear, output-driven learning process. It serves as a valuable guide for both mobile learning instructors and learners, addressing the challenge of integrating mobile learning into traditional classroom settings. Additionally, it enhances the practicality of mobile learning. This approach places a strong emphasis on practical and effective application, encouraging learners to actively engage in interpreting tasks and real-world scenarios rather than passively absorbing theory. By aligning this approach with mobile-assisted learning, we harness the power of technology to create a dynamic and interactive learning experience. In addition, the POA provided MALL with a concrete theoretical foundation for language learning, thus contributing to a more robust and coherent framework for mobile learning and interpreting pedagogy. In an era characterized by rapid technological advancements, it is imperative to ensure that mobile-assisted learning is not merely a tool but a pedagogical philosophy. This integration of the POA and MALL creates a powerful synergy as the technology enhances the practical application of language learning, thereby fostering more profound language acquisition. This combination of the POA and MALL not only improves the practicality of the study but also strengthens its theoretical foundations. Furthermore, the POMAIL module itself represents a novel contribution to the field. Its design, objectives, content, and procedures have been meticulously tailored to address the specific needs of interpreter education. With the consensus of fifteen experts in the field, this module has been carefully crafted to meet the highest standards of effectiveness and practicality. It provides a structured pathway for learners and educators alike to leverage the advantages of mobile technology in their quest for interpreting proficiency.

3 RESEARCH OBJECTIVES

The purpose of this study is to design a module for MAIL that is based on a POA. This module will be developed using the fuzzy Delphi technique. Therefore, the objectives of the research are to validate the module elements and constructs through expert consensus and develop a prototype of POMAIL for future application in the relevant field. Therefore, the research question is: What are the experts' opinions on the elements and constructs of the POMAIL module?

4 METHODOLOGY

This study adopted the fuzzy Delphi method (FDM) to determine the elements and constructs of the POMAIL module through experts' consensus. Fifteen experts participated in the FDM. Five individuals were interviewed in the initial stage of data collection to determine the constructs of the FDM questionnaire. The FDM questionnaire aims to obtain consensus on the design of the POMAIL module, specifically its elements and constructs. It consists of four parts: the module objectives, module contents, mobile device design, and procedure design. A triangular fuzzy number and the defuzzification process were used for the analysis of the data in the consensus of each construct of the module.

The FDM was chosen for this study because of its unique suitability for validating the constructs and elements of the proposed POMAIL module. Firstly, the FDM is well-known for its flexibility, making it particularly adept at handling complex and multifaceted research questions [32]. In this study, where numerous constructs and elements related to the POMAIL module were sought to be validated, this flexibility was invaluable. The FDM allows for navigating the intricate web of expert opinions, accommodating a wide range of responses and perspectives. This provides a comprehensive view of the experts' consensus [32–34]. Secondly, the FDM is an iterative process that promotes collaboration and consensus-building among experts. This collaborative aspect was instrumental in the research, considering the diverse backgrounds and experiences of the fifteen experts involved. Through feedback and discussion, the FDM not only validated the constructs but also encouraged experts to refine and enhance their collective understanding of the POMAIL module. The dynamic nature of this method facilitated a rich exchange of ideas, ultimately leading to a stronger, more well-rounded module. Furthermore, the FDM is an excellent tool for handling ambiguity and uncertainty in expert opinions. By incorporating a certain level of uncertainty, the FDM offers a more precise depiction of the expert consensus. This approach acknowledges the various perspectives and recognizes the possibility of multiple valid interpretations.

The FDM is an improved and modified version of the fuzzy theory and the classical Delphi technique, designed to incorporate human preferences into decision-making [32]. Based on articles related to FDM, [32] proposed a new framework that consists of four stages for the FDM process. These stages include FDM input preparation, application for screening, forecasting, and final decision (output). This study follows these stages in conducting the fuzzy Delphi method.

The FDM input preparation mainly involves conducting a literature review and conducting a semi-structured expert interview. Firstly, the researcher reviewed the relevant literature on mobile-assisted learning (MALL) and the pedagogy of autonomy (POA) to establish a strong theoretical foundation for the subsequent design process. Next, a semi-structured interview was conducted to gather suggestions from five experts who have expertise in the related field. Consequently, a questionnaire was developed, reviewed by two experts, and ultimately finalized for FDM. In the meantime, a panel of fifteen experts was selected based on specific criteria as described in the following section.

The next step is the screening, during which the questionnaire is distributed to the participants and collected by the researcher. This is followed by aggregation and defuzzification to determine the necessity of the iteration process.

In the third stage, the fuzzy values collected in the second phase are used for subsequent aggregation, where the results are utilized for forecasting or prediction purposes.

The final stage is the output of the final decision. The expert consensus is analyzed and formed into a prototype of the POMAIL module. The following sections will discuss the detailed methodology of the fuzzy Delphi method.

4.1 Participants

According to [35], a minimum sample size of 10 experts is required to achieve a strong consensus among experts in fuzzy Delphi studies. Therefore, a panel of fifteen experts was purposely selected for the FDM, including five experts for semi-structured interviews. [36] emphasized the selection criteria for FDM experts, which include having more than five years of experience in the related field and a strong academic degree. This study followed this criterion for the selection of the fifteen experts. Table 1 displays the demographic information of the participants in this study. These 15 experts all possess high academic degrees above a master's, and they have expertise in the related field of the module with more than a decade of working experience. They are from three higher education institutions in China, which provides a broader perspective for the expert view. The panel for the semi-structured interview includes five experts who are professionals in FDM and MALL. They also possess extensive knowledge of the production-oriented approach.

Table 1. Experts' demographic information

Category	Item	Frequency
Gender	Male	5
	Female	10
Level of education	PhD	9
	Masters' degree	6
Work experience	More than 20 years	8
	16 to 20 years	5
	10 to 15 years	2
Position	Professor	5
	Associate professor	8
	Lecturer	2
Field of expertise	Curriculum and pedagogy	15
	Mobile-assisted Language Learning	10
	Production Oriented Approach	8
	Fuzzy Delphi Method	5
Institution	Gannan Normal University	5
	Science and technology College of GNU	5
	Gannan Science College	5

4.2 Instrument validity and reliability

Two instruments were utilized for the FDM, including semi-structured interviews with the first panel of experts and the FDM questionnaire. The semi-structured interviews were conducted individually, face-to-face, with five experts. The interviews were then transcribed and sent to the respondents for validation. The interviews were subsequently thematically analyzed using the coding process. The emergent themes were then integrated into constructs in the design of the module and formed the basis for the fuzzy Delphi questionnaire.

Based on the interview, the questionnaire was constructed and sent to three experts for review to ensure its validity. The revised questionnaire was developed using a five-point scale to capture linguistic preferences. It consists of four dimensions: module objectives, module contents, mobile device design, and procedure design. Finally, the questionnaire was sent to the fifteen experts for the fuzzy Delphi method.

4.3 Data analysis

The data collected from the FDM questionnaire is analyzed using the triangular fuzzy number technique and the defuzzification process. The linguistic Likert scale was converted to a fuzzy scale using triangular fuzzy numbers (see Table 2). The triangular fuzzy number is formed by providing three fuzzy values: m_1, m_2, and m_3. The value of m_1 represents the minimum value, m_2 represents the medium value, and m_3 represents the maximum value. The three values form a triangular mean graph, as shown in Figure 2.

Table 2. Fuzzy scale used for this study

Strongly Disagree	1	(0.0,0.1,0.2)
Disagree	2	(0.0,0.2,0.4)
Partially agree	3	(0.2,0.4,0.6)
Agree	4	(0.4,0.6,0.8)
Strongly agree	5	(0.6,0.8,1.0)

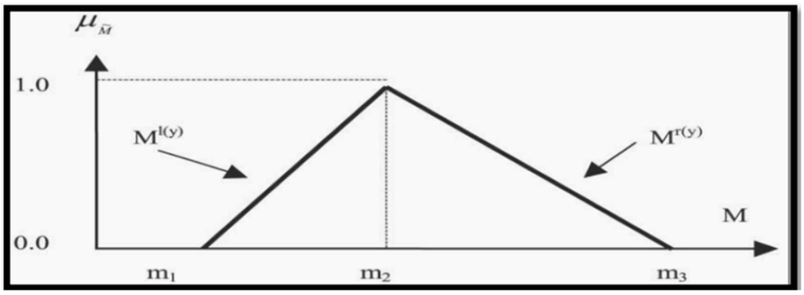

Fig. 2. The mean triangle graph in FDM

According to Cheng and Lin [37], the triangular fuzzy number should satisfy two conditions: firstly, the threshold value (d) should be below or equal to 0.2. The threshold value (d) is determined using the following formula:

$$d(\tilde{m},\tilde{n}) = \sqrt{\frac{1}{3}\left[(m_1 - n_1)^2 + (m_2 - n_2)^2 + (m_3 - n_3)^2\right]}$$

Secondly, an agreement among the group of experts that exceeds 75% is considered acceptable [38]. The defuzzification process determined the fuzzy score value (A) using an α-cut value of 0.5 [38, 39]. If the fuzzy score value (A) is equal to or greater than 0.5, the measured item is considered cons acceptable; if it is less than 0.5, the measured item is rejected. The fuzzy score value (A) is calculated based on the following formula:

$$A = (1/3)*(m_1 + m_2 + m_3)$$

The data was analyzed using a coded Microsoft Excel software called Fuzzy Delphi Analysis v2.0 (Engine Calculation), developed by [40]. The threshold value (d), percentage of experts' consensus, and defuzzification value will be calculated to determine expert consensus.

5 RESULTS

The FDM questionnaire consists of four parts: module objectives, module contents, mobile device design, and procedure design. In the fuzzy Delphi technique, the accepted item should meet the following conditions: triangular fuzzy numbers 1) Threshold value (d) ≤ 0.2 2) percentage of experts consensus > 75% defuzzification process 3) Fuzzy score (A) ≥ α – cut value = 0.5. The findings for each part are described in the following sections.

5.1 Expert consensus on teaching objectives design

The teaching objectives for the POMAIL module in the questionnaire consist of eight items, as shown in Table 3. Table 3 presents the threshold value (d), the percentage of expert consensus, fuzzy score, and item position results. The results in Table 3 show that all eight items have met the conditions for expert consensus in the fuzzy Delphi method. Therefore, all the objectives for the module design can be accepted. The ranking reveals that the experts' most-emphasized objectives are improving learners' interpreting skills for oral expression and enhancing their self-directed learning skills. Based on the ranking of the items, the design will prioritize the objectives.

Table 3. Result of the teaching objectives design consensus

No.	Objectives	Threshold Value (d)	Percentage of Experts Consensus, %	Fuzzy Score (A)	Expert Consensus	Ranking
1	Improve listening skills for interpreting	0.163	93%	.720	ACCEPTED	4
2	Improve memorizing skills for interpreting	0.190	87%	.707	ACCEPTED	6
3	Gain note-taking skills in interpreting	0.196	87%	.693	ACCEPTED	8
4	Enhance oral expression in interpreting	0.130	93%	.747	ACCEPTED	1
5	Learners can felxibly adapt or respond on the spot	0.163	93%	.720	ACCEPTED	4
6	Enhance learners' cooperative ability	0.171	93%	.707	ACCEPTED	6
7	Gain profession knowledge of interpreting	0.149	93%	.733	ACCEPTED	3
8	Improve learners' self-directed learning skills	0.119	100%	.747	ACCEPTED	1

5.2 Expert consensus on the content design

The next step is to design the content for the module. Since the module is focused on interpreting as a language skill, it is specifically designed for a 16-week bilingual interpreting course. The content design focuses on two main parts. The first part consists of six topics that focus on interpreting skill training. The second part also includes six topics, which cover mock interpreting practice. Finally, a summative evaluation is conducted as a final test. It is worth noting that the content design is based on both a formative evaluation of the 12 topics and a summative evaluation conducted during the last week. The results of the expert consensus are shown in Table 4. It is clear from the table that all 13 items were accepted with a high percentage of experts' consensus. All content has a threshold value less than 0.2, and the fuzzy score value (A) is all more than 0.5. The ranking shows that the most prioritized content is note-taking training; therefore, more class time will be dedicated to this topic.

Table 4. Result of the module content design consensus

No.	Content	Threshold Value (d)	Percentage of Experts Consensus, %	Fuzzy Score (A)	Expert Consensus	Ranking
1	Introduction	0.136	100%	.733	ACCEPTED	2
2	Get the key words	0.152	100%	.707	ACCEPTED	4
3	Get the gist	0.152	100%	.693	ACCEPTED	5
4	Memory training	0.171	93%	.680	ACCEPTED	9
5	Note taking skills	0.119	100%	.747	ACCEPTED	1
6	Interpreting numerals	0.171	93%	.680	ACCEPTED	9
7	Interpreting Public speaking	0.171	93%	.680	ACCEPTED	9
8	Interpreting for Reception	0.147	100%	.680	ACCEPTED	9
9	Tour and visit Interpreting	0.171	93%	.680	ACCEPTED	9
10	Interview Interpreting	0.152	100%	.693	ACCEPTED	5
11	Interpreting for conferences	0.152	100%	.693	ACCEPTED	5
12	Interpreting for Press Conference	0.147	100%	.720	ACCEPTED	3
13	Final tests	0.174	93%	.693	ACCEPTED	5

5.3 Expert consensus on the mobile device design

The devices used in the POMAIL module can be smartphones, laptops, or tablet computers. The tool and application used for this module are the Chaoxing Learning application. Learners can engage in various learning activities on their mobile devices, including massive open online courses (MOOC), discussing, peer-assessment, self-assessment, assignments, resource sharing, and online tests. Furthermore, the teacher can evaluate learners' performance on mobile devices using the feature of academic analysis for learners. The aforementioned functions are included in the questionnaire for mobile device design. The results presented in Table 5 show that seven out of the eight items have reached expert consensus above 75, with a threshold value of less than 0.2. Whereas the "online test" item has a threshold value of 0.228, which is greater than 0.2, and the percentage for expert consensus is 27%, which is significantly lower than 75%. Therefore, this item should be rejected, while the other seven items can be accepted for the device design.

Table 5. Result of the module device design consensus

No.	Items	Threshold Value (d)	Percentage of Experts Consensus, %	Fuzzy Score (A)	Expert Consensus	Ranking
1	MOOC Learning	0.190	80%	.667	**ACCEPTED**	6
2	Online discussion	0.190	93%	.680	**ACCEPTED**	4
3	Peer-assessing	0.152	100%	.693	**ACCEPTED**	2
4	Self-assessing	0.149	93%	.653	**ACCEPTED**	7
5	Assignments	0.196	87%	.680	**ACCEPTED**	5
6	Resource sharing	0.163	93%	.720	**ACCEPTED**	1
7	Performance analysis	0.174	93%	.693	**ACCEPTED**	2
8	**Online tests**	**0.228**	**27%**	**.613**	**REJECTTED**	**8**

5.4 Expert consensus on the procedure design

The last part of the FDM questionnaire is the procedure design. This design follows the production-oriented approach with the teaching procedure of "motivating, enabling, and assessing." Therefore, the procedure is designed around these three phases. Mobile learning is utilized in every phase, incorporating various activities through the Chaoxing Learning application. The procedural constructs are listed in Table 6. The results show that all eleven items have more than 75% expert consensus, but item 2 has a threshold value greater than 0.2. Consequently, item 2, "provide production blueprint with videos for motivating," should be rejected, while the remaining ten items can be accepted for the procedure design. In addition, the different rankings for each phase reveal that the teacher should prioritize the items that are ranked first. For instance, the assessing phase consists of items 7 to 11. The ranking indicates that the previously prioritized methods are "teachers' assessment." Regarding assessment preferences, although online assessment ranks higher than face-to-face assessment, they both have an expert consensus percentage of 93%, indicating that both assessment methods are equally important.

Table 6. Result of the module procedure consensus

No.	Procedures	Threshold Value (d)	Percentage of Experts Consensus, %	Fuzzy Score (A)	Expert Consensus	Ranking
1	Motivating by describing the production blueprint	0.147	100%	.720	ACCEPTED	2
2	Motivating by production videos presentation	0.209	80%	.653	REJECTED	10
3	Enable students by knowledge teaching.	0.163	93%	.667	ACCEPTED	7
4	Enable students by classroom practice	0.171	93%	.680	ACCEPTED	5
5	Enable students by MOOC learning	0.147	100%	.720	ACCEPTED	2
6	Enable students by skills training	0.136	100%	.733	ACCEPTED	1

(Continued)

Table 6. Result of the module procedure consensus *(Continued)*

No.	Procedures	Threshold Value (d)	Percentage of Experts Consensus, %	Fuzzy Score (A)	Expert Consensus	Ranking
7	Assess students' production activity by peer-assessment	0.190	87%	.667	ACCEPTED	7
8	Assess by self-assessment	0.163	87%	.640	ACCEPTED	11
9	Assess by teacher's assessment	0.152	87%	.707	ACCEPTED	4
10	Assess through online platform	0.171	93%	.680	ACCEPTED	6
11	Assess in classroom	0.163	93%	.667	ACCEPTED	7

5.5 The POMAIL module framework

Based on the FDM questionnaire results, the researcher, with the guidance of three experts, has developed a framework for the POMAIL module. Figure 3 shows the flowchart of the module. The mobile devices are used in all three steps of the module. Before class, students use mobile phones to access MOOCs shared by the teacher, who selects the resources based on expert suggestions. During class, students use mobile phones for online discussions on the MOOC review, guided by the instructor. Most of the classroom time is devoted to face-to-face communication for skill training, production presentations, and assessment. After class, further assessment is required to be done on the Chaoxing Learning application. Meanwhile, students are expected to complete specific assignments on the application. This step then follows the motivating-enabling-assessing procedure in the POA. In other words, the instructor will motivate the learners by providing a clear target for each class, which is a production activity for interpreting. Learners will be enabled to accomplish the production activity through MOOC learning, classroom training, and post-class self-directed learning. The final step of assessment will be done both face-to-face and online, using teacher assessment, peer assessment, and self-assessment methods.

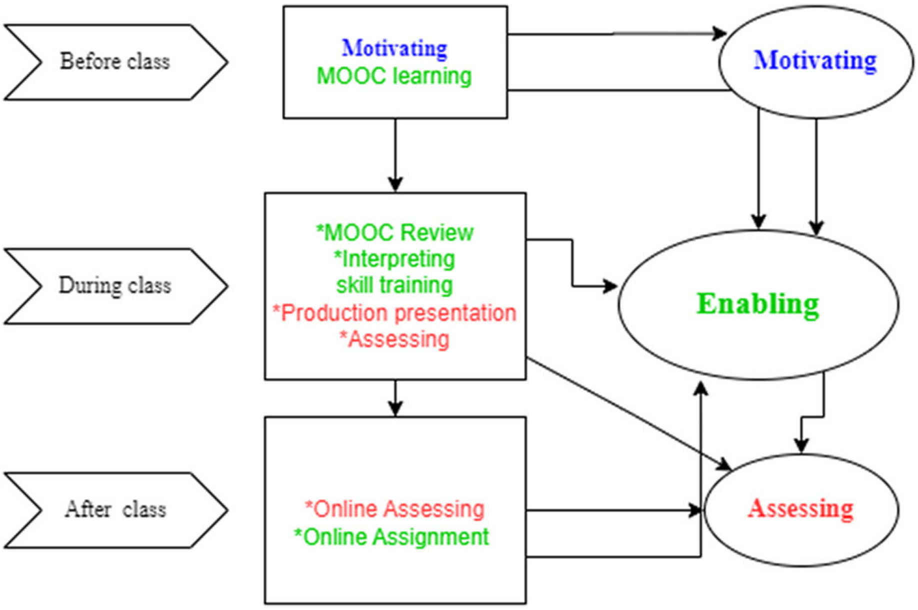

Fig. 3. The flowchart of the POMAIL module

6 DISCUSSION

In this study, four constructs were determined for the design of the POMAIL module based on the POA using the FDM. The four constructs were initially determined after conducting a semi-structured interview with five experts. The experts suggested a "why-what-how" flowchart design for the module constructs. "Why" means "Why design this module?", which, in other words, refers to the teaching objectives. Therefore, the objectives are considered the pivotal premise for a pedagogical module. Hence, the research first formulates the objectives as a benchmark for the following constructs. "What" refers to the content of the module. Therefore, the second crucial aspect is the content design, which forms the core of the module's design. "How" signifies the approach to delivering the content and achieving the objectives. In this study, the "how" dimension is composed of two elements: the teaching procedure and the design of the mobile-assisted device. As a result of the expert interview, four constructs with 39 constituent elements were determined, and 37 of them were agreed upon by a panel of fifteen experts. The proposed elements of the module will be discussed in this section.

Experts agree that the objectives of an interpreting course should focus on developing learners' interpreting skills and 21st-century skills. The interpreting skills include listening, memorizing, note-taking, and re-expression skills [5]. Hence, the primary teaching objectives are directed towards developing these interpreting skills. The second part of the objectives focuses on developing learners' personal abilities in cooperative learning, self-directed learning, adaptability, and professional knowledge. These abilities are some of the key skills required for society and the workplace in the 21st century [41–43]. 21st century skills are divided into three main areas [41]. The first area encompasses learning and innovation skills such as critical thinking, problem-solving, collaboration, communication, creativity, and innovation [41]. In this study, the objective is to improve learners' cooperative learning by enhancing their collaboration and communication. The learners' working on a production activity may develop their problem-solving skills. The second area is digital literacy skills, such as information literacy, media literacy, and information and communication technologies (ICT) literacy [41, 44]. The POMAIL module design utilizes mobile devices to achieve the learning objective, which, to some extent, may enhance learners' ICT literacy skills. The third area encompasses career and life skills such as initiative and self-direction, productivity and accountability, flexibility and adaptability, and social and cross-cultural interaction [41, 45]. In this study, the module mainly focused on self-direction, flexibility, and adaptability as its objectives. Overall, experts agree that the module aims to develop learners' academic ability in interpreting and enhance their 21st century skills. This will prepare language for the demands of society and the workplace. This objective aligns with [46], which emphasizes the need for improved curriculum and teaching methods to foster 21st century skills.

Regarding the content design, the experts agreed upon dividing it into two sections for interpretation, as it is a more practical language skill. The first section primarily focuses on skill training, while the next section involves interpreting practicum for various career occasions. According to [47], teaching interpreting involves developing learners' exceptional language skills in comprehension and production, which must be practiced through a significant number of exercises and drills. Therefore, the content design follows the construction rules of interpretation by first developing learners' fundamental interpreting skills and then progressing to practicum mock interpretation activities. The practicum interpretation design has identified six common scenarios for the interpreting profession: public speaking, tours and visits, receptions, interviews, conferences, and product launch events. These topics are chosen first because they are common and second because they are not difficult for beginner interpreters. In addition, learners can use their mobile devices to access additional resources on those topics. In general, the content is designed based on the principles of construction interpretation and caters to the needs of language learners in a mobile-assisted learning environment.

As for the design of mobile devices, this study primarily utilizes the Chaoxing Learning application as an auxillary tool for interpreting learning. The experts agreed on using the seven functions of the Chaoxing Learning application: MOOC learning, online discussion, resource sharing, peer assessment, self-assessment, assignments, and performance analysis. MOOC learning is used before class to help learners acquire interpreting skills. Online discussion is used in class to facilitate the free expression of opinions on MOOC learning or any ideas related to classroom teaching. Resource sharing is when the instructor shares information or resources for the production-interpreting activity. Peer-assessing and self-assessing are used after class presentations to provide additional assessment beyond the initial face-to-face assessment. Assignments are given to learners to complete specific interpreting exercises after class. The performance analysis is a smart data analysis conducted by the Chaoxing system to provide a comprehensive evaluation of each student's performance. This analysis serves as a convenient evaluation tool for both instructors and students.

The final construct is the procedure design. Experts have a high consensus on the procedure for implementing the POA, which involves motivating, enabling, and assessing. As far as the constituent elements are concerned, 10 out of 11 elements have been agreed upon by the experts. In the motivating phase, according to Wen [20], the instructor motivates learners by providing a blueprint of the production activity. This helps learners have a clear understanding of what they are going to accomplish and present after the enabling process. The FDM questionnaire shows that experts are more inclined to agree that the instructor's description of the production activity is more motivating than a video presentation. This is because the instructor's explanation is more explicit and can motivate the learners better. Experts agreed on various ways to enable learning through MOOCs, including knowledge teaching, skill training, and classroom practice. This enabling phase maximizes the benefits of both online learning and face-to-face teaching, providing a diverse range of resources for interpreting knowledge and ample opportunities for in-person interpreting practice to enhance language skills. Regarding the assessment phase, experts agreed on evaluating learners' performance in production interpreting activities using multiple methods, including assessment by the instructor, peers, and the learners themselves. This can be done through face-to-face communication and online typing. The omnidirectional assessment provides learners with comprehensive feedback on their reflections. While face-to-face assessment provides learners with the opportunity for real-time communication and immediate feedback, online assessment offers introverted learners who may be hesitant to speak in front of the class the chance to express their assessments by typing on their mobile devices.

The four constructs, along with their constituent elements, have received a large consensus from the fifteen experts. Findings from the FDM indicate that the POA design is a crucial instructional guide for the implementation of mobile-assisted learning. This approach provides instructors with clear guidance on how to effectively utilize mobile devices both inside and outside the classroom. This module takes full advantage of both face-to-face communication and online convenience. Consequently, it can not only promote MALL but also enhance learners' life skills, such as collaboration, communication, and self-direction.

7 CONCLUSION

This study discusses the findings of a FDM in determining the constructs and elements of a POA-based mobile-assisted interpreting module. The results show that a panel of fifteen experts reached a general consensus about the four constructs and their constituent elements. In other words, the experts agreed with the design of the teaching objectives, teaching content, teaching procedures, and mobile device design of this POMAIL module targeting an interpreting course. This study has made several contributions to educational research. Firstly, it addresses the issue of a lack of clear pedagogical guidance for mobile-assisted learning by introducing the POA to the mobile learning mode. In this approach, instructors are provided with specific direction and guidance on how to effectively use mobile devices in language teaching. Secondly, it opens up a new area of language learning for the MALL by focusing on the language skill of interpretation. Interpreting as a language skill has been seldom researched compared to other language skills. To date, no module has been designed for MALL for interpreting [6, 10, 22]. Thirdly, this module not only aims to improve learners' language skills in interpreting but also further develops their 21st-century skills. It offers new insights for language educators in developing learners' life skills. Finally, this study can serve as a guide for lecturers, instructional designers, and language researchers in designing mobile-assisted learning for other subject areas.

Although the findings of the study have many benefits for educational research, they are not without limitations. These limitations include the following aspects:

First of all, due to the geographical and resource limitations of the researcher, the module design only received consensus from experts in China, which may restrict the concept to the Chinese context. Therefore, this study may not be applicable to other contexts. Future studies in other countries and contexts are recommended.

In addition, the module proposed in this study, although approved by a panel of experts, is merely a new conceptual module that needs to be tested and supported by real-world empirical evidence. Therefore, future research may apply this module to educational settings to evaluate its usability and effectiveness in interpreting education.

8 DECLARATIONS

"The authors certify that this paper is original and has not been previously published." "and is not being considered for publication elsewhere at the moment."

9 REFERENCES

[1] S. FUND, "Sustainable development goals," Available at: https://www.un.org/sustainabledevelopment/inequality, 2015.

[2] N. R. Council, *Education for Life and Work: Developing Transferable Knowledge and Skills in the 21st Century.* National Academies Press, 2012.

[3] A. M. De Groot, “A complex-skill approach to translation and interpreting,” *Benjamins Translation Library,* vol. 37, pp. 53–70, 2000. https://doi.org/10.1075/btl.37.06gro

[4] D. Russell and K. Takeda, “Consecutive interpreting,” *The Routledge Handbook of Interpreting,* pp. 96–111, 2015.

[5] H. V. Dam, “Consecutive interpreting,” *Handbook of Translation Studies,* vol. 1, pp. 75–79, 2010. https://doi.org/10.1075/hts.1.con2

[6] X. Guo, “An empirical research of teaching English/Chinese interpreting on production-oriented approach,” *International Journal of Social Science and Education Research,* vol. 3, no. 7, pp. 39–45, 2020.

[7] D. Russell, “Effective strategies for teaching consecutive interpreting,” *International Journal of Interpreter Education,* vol. 2, no. 1, p. 10, 2010.

[8] D. Kim, D. Ruecker, and D.-J. Kim, “Mobile assisted language learning experiences,” in *Computer-Assisted Language Learning: Concepts, Methodologies, Tools, and Applications*: IGI Global, 2019, pp. 1059–1077. https://doi.org/10.4018/978-1-5225-7663-1.ch050

[9] J. Yang, “Mobile assisted language learning: Review of the recent applications of emerging mobile technologies,” *English Language Teaching,* vol. 6, no. 7, pp. 19–25, 2013. https://doi.org/10.5539/elt.v6n7p19

[10] K. Karakaya and A. Bozkurt, “Mobile-assisted language learning (MALL) research trends and patterns through bibliometric analysis: Empowering language learners through ubiquitous educational technologies,” *System,* vol. 110, p. 102925, 2022. https://doi.org/10.1016/j.system.2022.102925

[11] R. Li, “Effects of mobile-assisted language learning on EFL/ESL reading comprehension,” *Educational Technology & Society,* vol. 25, no. 3, pp. 15–29, 2022.

[12] C. Puebla, T. Fievet, M. Tsopanidi, and H. Clahsen, “Mobile-assisted language learning in older adults: Chances and challenges,” *ReCALL,* vol. 34, no. 2, pp. 169–184, 2022. https://doi.org/10.1017/S0958344021000276

[13] X. Lei, J. Fathi, S. Noorbakhsh, and M. Rahimi, “The impact of mobile-assisted language learning on English as a foreign language learners’ vocabulary learning attitudes and self-regulatory capacity,” *Frontiers in Psychology,* vol. 13, p. 872922, 2022. https://doi.org/10.3389/fpsyg.2022.872922

[14] J. Burston and K. Giannakou, “MALL language learning outcomes: A comprehensive meta-analysis 1994–2019,” *ReCALL,* vol. 34, no. 2, pp. 147–168, 2022. https://doi.org/10.1017/S0958344021000240

[15] I. Inawati, C. M. Marbun, and B. W. Pratolo, “A systematic review on mobile assisted language learning in English language teaching,” *Eltin Journal: Journal of English Language Teaching in Indonesia,* vol. 11, no. 2, pp. 131–138, 2023. https://e-journal.stkipsiliwangi.ac.id/index.php/eltin/article/view/3786

[16] F. Rosell-Aguilar, “State of the app: A taxonomy and framework for evaluating language learning mobile applications,” *CALICO Journal,* vol. 34, no. 2, pp. 243–258, 2017. https://doi.org/10.1558/cj.27623

[17] N. Alghamdi, “EFL Teachers’ perceptions on the implementation of mobile-assisted language learning in Saudi Arabia during COVID-19: Challenges and affordances,” *Journal of Language Teaching and Research,* vol. 13, no. 1, pp. 92–100, 2022. https://doi.org/10.17507/jltr.1301.11

[18] W. Qiufang, “The production-oriented approach: A pedagogical innovation in university English teaching in China,” in *Faces of English Education*: Routledge, 2017, pp. 91–106. https://doi.org/10.4324/9781315205618-7

[19] R. Ellis, “The production-oriented approach: Moving forward,” *Chinese Journal of Applied Linguistics,* vol. 40, no. 4, pp. 454–458, 2017. https://doi.org/10.1515/cjal-2017-0027

[20] Q. Wen, “The production-oriented approach to teaching university students English in China,” *Language Teaching,* vol. 51, no. 4, pp. 526–540, 2018. https://doi.org/10.1017/S026144481600001X

[21] H. Yujie, “A study on interpreting teaching based on the ‘Production-oriented approach’,” *Translation Teaching and Research,* pp. 57–67, 2021.

[22] X. Linjiang, “Practice exploration of the ‘Production-oriented approach’ facilitating interpreting: A case study of college English interpreting course,” *English Square,* vol. 33, pp. 107–110, 2022.

[23] F. Cakmak, “Mobile learning and mobile assisted language learning in focus,” *Language and Technology,* vol. 1, no. 1, pp. 30–48, 2019.

[24] G. Stockwell and P. Hubbard, “Some emerging principles for mobile-assisted language learning,” *The International Research Foundation for English Language Education,* vol. 2013, pp. 1–15, 2013.

[25] A. Herrington, J. Herrington, and J. Mantei, “Design principles for mobile learning,” 2009.

[26] T. Elias, “Universal instructional design principles for mobile learning,” *International Review of Research in Open and Distributed Learning,* vol. 12, no. 2, pp. 143–156, 2011. https://doi.org/10.19173/irrodl.v12i2.965

[27] T. M. Miangah and A. Nezarat, “Mobile-assisted language learning,” *International Journal of Distributed and Parallel Systems,* vol. 3, no. 1, p. 309, 2012. https://doi.org/10.5121/ijdps.2012.3126

[28] Q. F. Wen, “Output-driven hypothesis and reform of English professional skills curriculum,” *Foreign Language World,* vol. 2, pp. 2–9, 2008.

[29] L. Xing and M. Puteh, “A literature review of production-oriented approach in English teaching: Retrospect and prospect,” *Eurasian Journal of Applied Linguistics,* vol. 9, no. 1, 2023.

[30] Y. Y. F. “A systematic review of production-oriented approach: 2015–2020,” *Overseas English 2021,* vol. 17, 2021.

[31] X. Guo, “An empirical research of teaching English/Chinese interpreting on production-oriented approach,” *International Journal of Social Science and Education Research*, vol. 3, no. 7, pp. 39–45, 2020.

[32] N. A. M. Saffie and K. A. Rasmani, “Fuzzy delphi method: Issues and challenges,” in *2016 International Conference on Logistics, Informatics and Service Sciences (LISS)*, 2016, pp. 1–7. https://doi.org/10.1109/LISS.2016.7854490

[33] F. M. Zain, S. N. Sailin, M. Kasim, A. M. Abdul Karim, and N. N. Zameri, “Developing an augmented reality immersive learning design (AILeaD) framework: A Fuzzy Delphi approach,” *International Journal of Interactive Mobile Technologies (iJIM),* vol. 16, no. 11, pp. 65–90, 2022. https://doi.org/10.3991/ijim.v16i11.30063

[34] K. Naser, S. Alamassi, Z. Shana, J. Yousef, and S. H. Halili, “Designing of a flipped STEM classroom engineering-based module: Fuzzy Delphi approach,” *International Journal of Interactive Mobile Technologies (iJIM),* vol. 17, no. 10, pp. 4–29, 2023. https://doi.org/10.3991/ijim.v17i10.38217

[35] M. Adler and E. Ziglio, *Gazing Into The Oracle: The Delphi Method and its Application to Social Policy and Public Health.* Jessica Kingsley Publishers, 1996.

[36] J. A. Gambatese, M. Behm, and S. Rajendran, “Design’s role in construction accident causality and prevention: Perspectives from an expert panel,” *Safety Science,* vol. 46, no. 4, pp. 675–691, 2008. https://doi.org/10.1016/j.ssci.2007.06.010

[37] C.-H. Cheng and Y. Lin, “Evaluating the best main battle tank using fuzzy decision theory with linguistic criteria evaluation,” *European Journal of Operational Research,* vol. 142, no. 1, pp. 174–186, 2002. https://doi.org/10.1016/S0377-2217(01)00280-6

[38] J. Murray and J. Hammons, “Delphi: A versatile methodology for conducting qualitative,” *Personnel Psychology,* vol. 28, no. 4, pp. 563–575, 1995. https://doi.org/10.1353/rhe.1995.0008

[39] W. Sun, H. Chen, H. Tang, and D. Wu, “Unsupervised image change detection based on 2-D fuzzy entropy,” in *2010 International Conference on Computational Intelligence and Security*, 2010, pp. 248–252. https://doi.org/10.1109/CIS.2010.60

[40] S. N. A. Mohamad, M. A. Embi, and N. Nordin, "Determining e-portfolio elements in learning process using fuzzy delphi analysis," *International Education Studies,* vol. 8, no. 9, pp. 171–176, 2015. https://doi.org/10.5539/ies.v8n9p171

[41] B. Trilling and C. Fadel, *21st Century Skills: Learning for Life in Our Times*. John Wiley & Sons, 2009.

[42] S. Graham, "Preparing for the 21st century: Soft skills matter," Huffington Post, *Diakses Tanggal,* pp. 22–11, 2016.

[43] C. Dede, "Comparing frameworks for 21st century skills, harvard graduate school of education," *Consultado el,* vol. 2, 2009.

[44] I. K. Suartama, P. Setyosari, S. Sulthoni, and S. Ulfa, "Development of an instructional design model for mobile blended learning in higher education," *International Journal of Emerging Technologies in Learning (iJET),* vol. 14, no. 16, pp. 4–22, 2019. https://doi.org/10.3991/ijet.v14i16.10633

[45] Y. Ariyanto, B. Harijanto, and A. N. Asri, "Analyzing student's learning interests in the implementation of blended learning using data mining," *International Journal of Online and Biomedical Engineering (iJOE),* vol. 16, no. 11, pp. 153–160, 2020. https://doi.org/10.3991/ijoe.v16i11.16453

[46] A. J. Rotherham and D. T. Willingham, "21st-century' skills," *American Educator,* vol. 17, no. 1, pp. 17–20, 2010.

[47] G. Ilg and S. Lambert, "Teaching consecutive interpreting," *Interpreting,* vol. 1, no. 1, pp. 69–99, 1996. https://doi.org/10.1075/intp.1.1.05ilg

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