Investigating the Effectiveness of Game Development for Educators

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Abstract

Mobile Assisted Language Learning (MALL) has become a popular topic recently due to the rapid development of mobile devices. The objective of this study is to revalidate game principles via MALL and to obtain consensus and expert opinions on the principles. The study employs the Fuzzy Delphi technique to collect responses from nine English Language specialists. The triangular fuzzy numbering method was used to analyze the data, and the 'defuzzification' process was used to determine each variable's position (ranking). According to the findings, the response and expert consensus on the game principles scale is satisfactory

Keywords Mobile Educational Game Principles; Expert Consensus; Fuzzy Delphi Method; MALL

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1.0 Introduction

The need for a more intriguing approach to teaching the English language where content can be acquired naturally and enjoyably has led to the use of Mobile Assisted Language Learning (MALL). MALL has successfully been used in teaching and learning all language skills, providing an alternative approach to meet the learners' diverse needs (Franciosi, 2017; Warschauer & Healey, 1998). The technology could enhance learners' English language proficiency as it brings forth an array of opportunities and resources that could be used in the classroom or independently at their own time and pace of learning. With all these potentials, MALL has prompted the development of mobile educational games consisting of audio, animation, interactive images and projections, which could enhance interactivity and collaboration between educators and learners, making learning more fun, exciting and compelling. Many studies have found that mobile games could empower learning and serve as a powerful approach to enhancing learners' language skills (Alowayr & McCrindle, 2016). Mobile games offer learners a more enriching independent learning experience as devices like smartphones and tablets allow language learning to occur anytime and anywhere conveniently. This autonomous learning potential could captivate learners and optimize learning as they could self-edit their work and chart their progress (Luís, 2016).

One intriguing mobile educational game is the digital game (Ganapathy et al., 2016). Digital games trigger a thrill as learners are not pressured and are somewhat unconscious of the learning process. Most games are fun-based and are not created using appropriate principles that assist in developing a game appropriate for language acquisition. The appropriate principles for developing online second language learning activities concerning grammar, adjectives and parts of speech via MALL have yet to be explored. Hence, the call to revalidate the online game development principles serves as the motivation for this particular study. While there are several types of research on the effectiveness of game-based learning principles in foreign contexts (Husheng Pan, 2017; Kashif Ishaq et al., 2022; Kornwipa POONPON et al., 2021, Ricardo Casan Pitarch, 2018), only a small number of researches in this area have recently emerged in Malaysia.

2.0 Mobile-Assisted Language Learning (MALL)

In order to ensure the successful integration of MALL in language learning, several aspects have to be considered for long-term learning benefits. Even though learners are excited to use the mobile application, they must also be aware of the pedagogical benefits. Teachers must ensure that technology is integrated so learners know how it assists them in learning activities (Thomas & Munoz, 2016). Another study by Wishard (2015) believes that learners will be interested to learn when learning consists of goals that learners have to reach. Politi (2017) claims that when applying the mobile learning application, learners must be allowed to explore, use and get to know the application over time. Technology in itself brings no benefits or cannot do miracles. To encourage continuous participation, there is a need to supervise or monitor and encourage learners to utilize the MALL application after the class

time (Brown, 2014). When learners can use the devices independently, it will nourish their curiosity, improve their skills and fluency and eventually help them learn. Slavuj et al. (2015) stress that learners require training to empower their learning. Even though learners are excited to use the mobile application, they must also be aware of the pedagogical benefits. Teachers must ensure that technology is integrated so learners know how it assists them in their learning activities (Thomas & Munoz, 2016).

Learners can use technology positively when they know the pedagogical values. Students must have an "epistemological belief" (Chwo et al., 2016, p. 348) to improve their attitude and maturity and critical thinking skills. Games that are tied to the syllabus should not be boring. They should be entertaining. After all, the hidden factor that brings success to gamification is fun (Largo et al., 2016). Fun results from brain acceptance deriving from the learning experience that places learners under no pressure in playing the game, and they are unconscious of the learning that takes place. The excitement is due to certain elements that target our cognitive behaviour and arrange our body systems for specific surroundings. Positive feelings should be considered in any learning environment, and learners' engagement and motivation will be enhanced if they perceive the learning environment as valuable. To encourage fun learning, the activities should include a series of challenges, rewards and a feedback system (Elorriaga et al., 2016). The rewards and challenges will motivate students to learn while having fun. The feedback mechanism will assist learners in understanding their errors and drawing lessons from them. The creation of games requires considerable preparation. Over time, research over trial and error will assist educators in empowering game-based learning.

Promoting a relaxed and safe learning environment is vital, especially when learners fear certain subjects. With MALL, learners believe that they unconsciously can learn something under less pressure (Bazzaza et al., 2016). Once they notice that an application improves their grades, they will use and gain benefits from it (Davis, 1989). More studies find that when learners perceive an approach is good, it would be used as a practical after-class activity (Thomas & Munoz, 2016; Welsh et al., 2015; Yen et al., 2016). A supportive learning environment can make a big difference in the classroom environment in improving learners' self-esteem and pursuing their goals.

MALL penetration continues to evolve, making it an "all-in-one device". Two studies report on the convenience of the multitasking device as learners can simultaneously participate in various learning activities can receive course information, notes and exercises almost instantly (Tagoe & Abakah, 2014; Zou & Li, 2015). Learners also acknowledge the ability to store more data in one device (Welsh et al., 2015). According to Pew Research, the "all-in-one" device allows learners to connect through social networking, purchase online items, receive entertainment, play games, and music, and take and exchange pictures (Lenhart, Ling, Campbell, & Purcell, 2010). Therefore, learners can manage their hectic university life more efficiently with the "all-in-one device."

Besides convenient learning through the "all-in-one-device," learners can complete their assignments efficiently with the help of technological features from mobile devices. Thomas & Marco (2016) reports that 80-90% of respondents frequently use the calculator, Internet,

calendar and clock/timer, whereas 70-75% of respondents use educational apps, play music and send/receive texts, while approximately 60% report using the video, download apps and e-mail. He concludes that although learners benefit from the features, they favour more advanced features.

Even though MALL renders many advantages, some teachers feel that it puts their profession at stake. This group of teachers is categorized as the instrumental group who are uncertain how MALL can assist them (Montrieux et al., 2015). Another study by Zamani-Miandashti and Ataei (2015) reports that teachers have an extra workload and need more time to review learners' exercises and respond to their numerous texts. Other predicaments that they face in MALL include: insufficient technology training and technical education (O'Sullivan-Donnell, 2013), MALL is not tied to the syllabus and only used for a short period for the purpose of journal publication (Chwo et al., 2016), can be complicated and needs a lot of technical knowledge and cost (Tai, 2012), it can be dull as it is bound to education purposes (Leee & Lim, 2014), it causes distractions to learners (Marklund & Taylor, 2016) and teachers are not given enough time to implement MALL (Montrieux et al., 2015). Regardless of what the constraints are, teachers' grievances remain essential to be solved for the success of MALL.

2.1 Consideration for the Improvement of MALL

One way to allay teachers' fear of using MALL is by giving sufficient training and professional development. Several studies reveal that sufficient training and professional development will draw teachers closer to MALL and use it meaningfully (Kukulska-Hulme, 2016). Besides sufficient training and professional development, a thorough planning is necessary prior to the integration of MALL. Chwo et al. (2016) add several other important guidelines for a successful integration of MALL in this framework: 1) professional training and development of MALL must signify how it can enhance learners' performance, 2) proposed planning for MALL must come with an allocation to possibly integrate the technology, 3) to acknowledge and reward academic staff who work to integrate MALL strategy, 4) to address and solve any arising issues pertaining to MALL that come from teachers and students and 5) to provide technical assistance to continuously support application development and maintenance. A similar perspective has been expressed by Montrieux et al. (2015), who believe capable and reliable technical staff help materialize MALL integration.

Even while the literature on MALL environments provides strong support for their advantages, there are a few drawbacks that need to be noted. First off, because these environments were designed and implemented differently in different experiments, the generalizability of the results might be constrained. To improve the reliability and comparability of outcomes, future research should aim for standardized methods and rigorous methodology.

MALL environments are promising, but the necessary technology to create them can be expensive and technically challenging. Widespread adoption presents difficulties, especially in educational contexts with limited resources. When assessing the efficacy of

these environments, future studies could investigate more accessible and affordable alternatives or take scalability difficulties into account.

Self-report measures are frequently used in MALL environments to evaluate user experience and learning outcomes. Self-report measures are prone to biases and may not accurately reflect the whole scope of the learning process, despite the fact that they can still offer insightful information. An objective evaluation of MALL experiences might be made possible by the inclusion of objective metrics like performance reviews.

The majority of studies in this field have concentrated on immediate learning benefits and short-term results. There is not many long-term research that have been done to look at how MALL affects information retention, transferability, and real-world application. To better educate educational practices, future study should look into the viability and long-term effects of MALL methodologies.

2.2 The Role of Educators for a Successful Integration of MALL

For successful integration, teachers, researchers and software developers must develop long-term learning materials that align with the syllabus. Their expertise will enable them to produce the best approaches (Chwo et al., 2016). Kukulska-Hulme et al. (2015) in their study propose a pedagogical framework for teachers, including 1) teacher wisdom - teachers' experience, teaching plan and effective strategy, 2) device features – to include multimodality, seamlessness, authenticity and group work in the activities, 3) language dynamic – to include a range of communication platforms and 4) learner mobility – to consider the venue, time, contexts, cultures and learning objectives. Teachers need to understand the benefits and drawbacks of MALL with explicit pedagogical aims (Politi, 2017).

Collaborative participation among educators will lessen the workload and further enhance the development of the material selection. Other considerations are necessary; for example, the game activities must be challenging and fun enough to capture learners' attention (Ebrahimzadeh & Alavi, 2016).

The use of MALL should come with a reliable teaching methodology. Teachers have to be aware that technological tools are not educators but only serve as educational gadgets. Above all, it is not just about using sophisticated mobile features but understanding how they can beneficially reach learners in the most practical way. Teachers have to deliberately think of what they want learners to learn, and the learning outcomes will be among many steps to consider in their teaching.

2.3 Previous Studies on Game Development

Table 2.1:Previous work on Game Development

Previous work on Game Development Scale **No**	**Author**	**Study title**	**Year**	**Analysis/methodology**

1	B K Ng et al.,	Educational mobile game for learning English words	2020	Exploratory Factor Analysis (EFA)
2	Kashif Ishaq et al.,	Serious game design model for language learning in the cultural context	2022	Exploratory Factor Analysis (EFA)
3	Ricardo Casan Pitarch	An approach to Digital Game-based Learning: Video-games Principle and Applications in Foreign Language Learning	2018	Exploratory Factor Analysis (EFA)
4	Kornwipa POONPON et. al.,	Design and Evaluation of a Game-based Language Learning Web Application for Language Learners in Thailand	2021	Exploratory Factor Analysis (EFA)
5	Husheng Pan	Research on Design and Development of Mobile Serious Game under Mobile Learning Environment	2017	Exploratory Factor Analysis (EFA
6	Zhenyu Yang	A Study on Self-efficacy and Its Role in Mobile-Assisted Language Learning	2020	Exploratory Factor Analysis (EFA)
7	Harwati Hashim et. al.,	Mobile-assisted language Learning (MALL) For ESL Learners: A Review of Affordances and Constraints	2017	Exploratory Factor Analysis (EFA)

3.0 Methodology

This study employs the Fuzzy Delphi Method specifically (FDM). FDM was chosen because it is a novel technique for obtaining the agreement of experts prior to making a final decision. Through a literature review, the elements of the study questionnaire are developed in two phases for this study. This study includes two phases of the formation of the questionnaire's elements. In the first phase, the researcher conducts a literature review to identify the elements necessary for developing online second-language games. After collecting all the data, the researcher creates an expert questionnaire. Seven points Likert scale questionnaire is distributed to nine specialists with specialized knowledge and analyzed using the Fuzzy Delphi (FDM) method.

Table 3.1: List of experts

Expert	Field of expertise	Institution
1 Senior Lecturer with a PhD	English Language	Ministry of Education
1 Professor 1 Senior Lecturer with a PhD		Private university
1 Senior Lecturer with a PhD		Teacher Training College
3 Senior Lecturers 2 Senior Lecturers with PhD		Public university

3.1 Fuzzy Delphi Steps

Table 3.2: Fuzzy Delphi steps

Step	Formulation
1. Expert Selection	• The report features the opinions of 9 specialists. For this reason, we convened an expert panel to weigh in on the importance of the assessment parameters on the factors to be evaluated with linguistic variables. Definitions of issues that could arise, etc., with the work.
2. Determining linguistic Scale	• All the linguistic variables are converted into the number of fuzzy triangles in this procedure (fuzzy triangular numbers). As part of this change, we are also incorporating fuzzy numbers into translating linguistic variables (Hsieh, Lu and Tzeng, 2004). To express the values m1, m2, and m3 as a triangular fuzzy number, it is written as follows (m1, m2, m3). If m1 is set to 1, it represents the smallest possible number, m2 is a rational number, and m3 is the most significant number. To translate linguistic variables into fuzzy numbers, Fuzzy Scale is generated with the help of a Triangular Fuzzy Number.
3. The Determination of Linguistic Variables and Average Responses	• After consulting the designated expert, the researcher is obligated to transform all numerical data into Fuzzy scales. This is generally accepted as recognizing each response (Benitez, Martin & Roman, 2007).
4. The determination of threshold value "d"	• The significance of the threshold value in establishing the level of consensus among specialists (Thomaidis, Nikitakos & Dounias, 2006). The formula for calculating distances for fuzzy integers of the form m = (m1, m2, m3) and n = (m1, m2, m3) is as follows: $d(\bar{m}, \bar{n}) = \sqrt{\frac{1}{3}[(m1 - n1)^2 + (m2 - n2)^2 + (m3 - n3)^2]}$

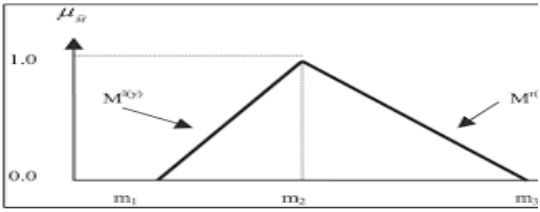

Figure 1: Triangular fuzzy number

5. Identify the alpha cut the aggregate level of fuzzy assessment	•	A fuzzy number is assigned to each item if there is agreement among experts (Mustapha & Darussalam, 2017). The method for determining and evaluating fuzzy values is as follows: Amax = 4m1 + 2m2 + m3
6. Defuzzification process	•	For this procedure, we use the formula Amax = (1) 4 (a1 + 2 am + a3). Whether the researcher opts for the Average Fuzzy Numbers or the average response, the resulting score will be between zero and one (Ridhuan et al., 2014). As such, three different formulas can be used to describe the procedure: I A = 1/3 * (m1 + m2 + m3), (ii) A = 1/4 * (m1 + 2m2 + m3), and (iii) A = 1/6 * (m1 + 4m2 + m3). The median value for '0' and '1' is the a-cut value, and the a-cut value is 0.5 because a-cut = (0 + 1) / 2 = 0.5. The item will be discarded if the resulting A value is less than the -cut value = 0.5, which denotes a lack of expert consensus. Bojdanova (2006) suggests an alpha cut value of greater than 0.5. Tang and Wu (2010), who argued that the -cut value should be greater than 0.5, lend credence to this view.
7. Ranking process	•	Elements are defined using defuzzification values, with the highest-priority element being the most decisive factor in the positioning process as determined by consensus among experts (Fortemps & Roubens, 1996)

3.2 Sampling procedure

The analysis employs purposeful sampling. Since the researcher's objective is to obtain expert consensus on a predetermined topic, the methodology is appropriate. According to Hasson, Keeney, and McKenna (2000), purposeful sampling is the most acceptable Fuzzy Delphi Method strategy. Nine experts participated in this study. Table 3.1 lists the experts who have agreed to participate. The specialists were chosen based on their qualifications and areas of expertise. If all the specialists involved in this analysis are the same, five and ten professionals are required. Depending on the degree of consistency, the minimum number of Delphi experts ranges from 10 to 15 individuals (Adler & Ziglio, 1996). The study only involves opinions from nine language experts. Hence, the generalization of the findings should be evaluated within the confines of the setting of the study.

3.3 Expert criteria

Booker and Mc Namara (2004) define experts as those who have earned their credentials, training, experience, professional membership, and peer recognition through diligence and commitment (Nikolopoulos, 2004; Perera, Drew & Johnson, 2012). According to (Cantrill, Sibbald, & Buetow, 1996; Mullen, 2003), an expert is a person with knowledge and expertise in a particular subject or field. Expert selection is a crucial factor to consider in Fuzzy Delphi studies. Concerns such as the legitimacy, validity, and dependability of the study's findings may be questioned if the expert selection is performed poorly and based on criteria (Mustapha & Darusalam, 2017). According to Kaynak and Macauley (1984), research specialists must represent or know about the topic or issue under investigation. Based on a stringent set of criteria, the researcher selects experts with at least seven years of experience which are relevant to their field of expertise and the study.

3.4 Instrumentation

The Fuzzy Delphi research instrument was developed by the researcher utilizing existing literature on the topic. Researchers can create questionnaire items based on the literature, pilot studies, and experience (Skulmowski, Hartman, & Krahn, 2007). In order to develop questions for the Fuzzy Delphi technique, they utilized research literature, expert interviews, and focus group techniques (Mustapha & Darussalam, 2017). In addition, Okoli and Pawlowski (2004) argue that a review of relevant literature should precede the development of research items and content. Therefore, researchers compiled the essential principles of game development on language learning from published works. Using a 7-point scale, a list of expert questions is then compiled. The 7-point Scale was adopted because the greater the number of scales utilized, the more precise and flawless the results (Chen, Hsu & Chang, 2011). To facilitate responses from professionals, the researcher replaced the fuzzy value in Table 4 with a 1–7 scale value, as shown:

Table 3.3: Fuzzy Scale

Item	Fuzzy number
Strongly disagree	(0.0, 0.0, 0.1)
Disagree	(0.0, 0.1, 0.3)
Somewhat Disagree	(0.1, 0.3, 0.5)
Neutral	(0,3, 0.5, 0.7)
Somewhat agree	(0.5, 0.7, 0.9)
Agree	(0.7, 0.9, 1.0
Strongly agree	(0.9, 1.0, 1.0)

3.5 The List of game development principles on language learning

Based on a literature review, researchers highlighted the guiding principles for creating language-learning video games. The researchers will then use the Fuzzy Delphi method to determine the experts' validity and consensus regarding the principles' applicability to the development of online games. The principles for developing online second language learning activities games were adopted (Chapelle, 1998; Elorriaga et al., 2016).

Table 3.4: The principles for game development on language learning

	Early item rank	Important principles to be included for the development of online second language learning activities.
Principles to be included for the development of online second language learning activities	GDL 1	The linguistic components of a second language have to be noticeable.
	GDL 2	Learners gain assistance in discerning semantic and syntactic values of the linguistic aspect.
	GDL 3	Learners can practice the target language.
	GDL 4	Learners are aware of their mistakes.
	GDL 5	Learners have to improve their linguistic performance.
	GDL 6	Learners have to take part in the communicative activity of the target language.
	GDL 7	Learners must participate in the target language task to boost their chances for meaningful interaction.
	GDL 8	The games have to come with learning objectives and be presented in stages.
	GDL 9	The display of images in the form of sensory stimuli to boost inspiration - Aesthetic.

GDL 10	Both compromise each other. Player and game - Connection player-game
GDL 11	The game should consist of a few challenges whereby the challenges improve as the players progress - Motivation.
GDL 12	The game integrates psychological aspects like giving feedback and rewards to motivate learning via playing - Promote learning.
GDL 13	While playing, the player has to confront barriers, resolve difficulties and compete with other players to reach the finish line - Troubleshooting.

4.0 Results

This section will provide expert consensus on the essential principles for game development in language learning. Nine experts in the relevant fields were presented with fuzzy Delphi questions, and data was collected based on their responses. The following are the findings of the study.

Table 4.1: Fuzzy Delphi Analysis Result 1 Defuzzification Report

Results	Item1	Item2	Item3	Item4	Item5	Item6	Item7	Item8	Item9	Item10	Item11	Item12	Item13
Expert1	0.03208	0.14113	0.01283	0.03849	0.04491	0.01283	0.01925	0.01283	0.03849	0.14113	0.01283	0.04491	0.01925
Expert2	0.08981	0.14755	0.01283	0.03849	0.01283	0.01283	0.01925	0.01283	0.01925	0.02566	0.01283	0.04491	0.03849
Expert3	0.03208	0.0834	0.04491	0.01925	0.01283	0.04491	0.03849	0.01283	0.01925	0.08981	0.01283	0.01283	0.01925
Expert4	0.31434	0.37849	0.01283	0.03849	0.04491	0.01283	0.01925	0.01283	0.01925	0.08981	0.01283	0.01283	0.01925
Expert5	0.0834	0.03208	0.01283	0.01925	0.01283	0.01283	0.03849	0.01283	0.01925	0.37207	0.01283	0.01283	0.01925
Expert6	0.08981	0.14113	0.01283	0.03849	0.04491	0.01283	0.01925	0.04491	0.03849	0.14755	0.07057	0.04491	0.03849
Expert7	0.03208	0.0834	0.01283	0.13472	0.01283	0.01283	0.01925	0.01283	0.01925	0.02566	0.21811	0.1283	0.01925
Expert8	0.08981	0.14113	0.01283	0.03849	0.04491	0.01283	0.01925	0.04491	0.03849	0.14755	0.07057	0.04491	0.03849
Expert9	0.03208	0.03208	0.04491	0.01925	0.1283	0.04491	0.03849	0.01283	0.01925	0.08981	0.01283	0.01283	0.01925

Table 4.2: Fuzzy Delphi Analysis Result 2

Statistics	Item1	Item2	Item3	Item4	Item5	Item6	Item7	Item8	Item9	Item10	Item11	Item12	Item13
Value of the item	0.08839	0.13115	0.01996	0.04277	0.03992	0.01996	0.02566	0.01996	0.02566	0.12545	0.04847	0.03992	0.02566
Value of the construct													0.05023
Item < 0.2	8	8	9	9	9	9	9	9	9	8	8	9	9
% of item < 0.2	88%	88%	100%	100%	100%	100%	100%	100%	100%	88%	88%	100%	100%
Average of % consensus													96
Defuzzification	0.84444	0.75556	0.97778	0.93333	0.92222	0.97778	0.96667	0.92222	0.93333	0.74444	0.87778	0.92222	0.93333
Ranking	6	7	1	3	4	1	2	4	3	8	5	4	3
Status	Accept	Accept	Accept	Accept	Accept	Accept	Accept	Accept	Accept	Accept	Accept	Accept	Accept

According to the results of the analysis, the bold threshold value exceeds the threshold value of 0.2 (> 0.2) after data processing (see Table 4.1). In other words, there are experts whose viewpoints do not coincide or even agree on some issues. In contrast, the average threshold value (d) for the most significant elements of game development on language learning impact is below 0.2, or 0.05023 (See table 4.2). If the average (d) value is less than 0.2, the item demonstrates a high consensus among experts (Cheng & Lin, 2002; Chang, Hsu & Chang, 2011). The total percentage of expert agreement is 96%, which is greater than (> 75%) 96%, indicating that the requirements for expert agreement on this item have been met.

Table 4.3: The list of game development principles based on expert consensus

DEVELOPMENT TEMPLATE			
Item No	Item/Construct	Previous Rank	New Rank
1	The linguistic components of second language have to be noticeable.	1	6
2	Learners gain assistance in discerning semantic and syntactic values of the linguistic aspect	2	7
3	Learners are able to practise the target language	3	1
4	Learners are aware of their mistakes.	4	3
5	Learners have to improve their linguistic performance.	5	4
6	Learners have to take part in the communicative activity of the target language.	6	1
7	Learners have to take part in the target language task to boost chances for meaningful interaction	7	2
8	The games have to come with learning objectives and be presented in stages	8	4
9	The display of images in a form of sensory stimuli to boost inspiration - Aesthetic	9	3
10	Both compromise each other, player and game - Connection player-game	10	8
11	The game should consist of a few levels of challenges whereby the challenges improve as the players make progress - Motivation	11	5
12	The game integrates psychology aspect like giving feedback and rewards to motivate learning via playing - Promote learning	12	4
13	While playing, the player has to confront barriers, to resolve difficulties and to compete with other players in order to reach the finish line - Tro	13	3

5.0 Discussion

The expert consensus shows that the top seven-game principles should be given priority in game development, including:

- Learners can practice the target language
- Learners have to take part in the communicative activity of the target language
- Learners have to take part in the target language task to boost chances for meaningful interaction

Good language games will give learners flexibility in learning in such a way that they can become independent learners. Independent learners utilize their linguistic resources to resolve their language problems without relying on their teachers. The finding concurs with a previous study by (Thomas & Munoz, 2016) that believes students should understand how the learning materials will benefit their learning. It also allows learners to explore their learning activities based on their goals and be active recipients of their learning process.

The experts also believe that learners should benefit from playing the game:

- Learners are aware of their mistakes
- Learners have to improve their linguistic performance.

Effective game exposes learners to plenty of drills on verb form focus, for example (goes, is going, went and was going) that provide learners with ample opportunity to learn more different structures, various forms and functions. Constant drills and repetition of

some aspects of gameplay should lead to effective learning (Thomas & Munoz, 2016). The games should empower learning and serve as a powerful approach to enhancing learners' language skills.

- The game integrates psychological aspects like giving feedback and rewards to motivate learning via playing - Promote learning.

The study by (Elorriaga et al., 2016) claims that the feedback function and rewards in the game permit learners to keep updated on their progress to reach the learning objectives. This will also enhance students' interest in the clues in every sentence and help them correct the errors in the game's questions.

- The display of images as sensory stimuli to boost inspiration - Aesthetic.

Despite the enthusiasm of game designers in creating a variety of new digital games, it is essential to recognize that certain games provide educational benefits but lack enjoyment. Teachers must view the game as "fun while learning" while achieving the learning objectives. (Largo et al., 2016). Digital games should trigger a certain thrill as learners are not pressured and are somewhat unconscious of the process of learning.

6.0 Conclusion and Recommendations

This study set out to validate the principles of game development in language learning. A rigorous procedure was utilized to revalidate the dimensions of the principles of game development and create a legitimate scale using the Fuzzy Delphi Method. Findings from the defuzzification procedure, threshold "d" value, and percentage of experts' consensus reveal that all items reach consensus and are reliable when subjected to expert judgements. Every procedure utilized in this study is consistent with the fuzzy Delphi technique. As a result, the statistics demonstrate that the validated products comply with the requirements. This study offers new input for the validation procedure explicitly. Most researchers employ factor analysis throughout the item validation process, although various approaches can be used. The variety of approaches might offer a fresh perspective on the game development field for language learning, particularly concerning the validation procedure. Based on the difficulty of developing suitable games for language learning, the researcher aims to find practical principles to guide educators in developing good games based on expert opinion using the Fuzzy Delphi approach. The findings could be the foundation for educators to design and create effective language games. The experts emphasize some key ideas from Chapelle (1998) and Elorriaga et al. (2016) to ensure success in language learning, including the need to create games that allow learners to use the target language, allow learners to recognize their errors and correct them, and create games that are exciting for learning. The key ideas can be used to ensure successful game development that will benefit learners in the learning environment. Hence, teachers have to deliberately think of what they want learners to learn, and the learning outcomes will be among many steps to consider in their teaching. It is not just about using sophisticated mobile features but understanding how they can beneficially reach learners most practically. Above all, the most excellent strategy to create the best educational

games is to learn through experimentation and constantly improve based on the users' input. The continuous process of developing digital teaching materials should be an enjoyable ride and will rekindle our enthusiasm for conducting the additional study. The researcher exclusively employs Malaysian expertise in this study, which is one of its limitations. Since the study focuses on the principles of game development, future studies may also incorporate experts' opinions on the challenges of game development and how to tackle them.

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Article Contribution to Related Field of Study
This paper is related to the field of Education/Learning Environment.

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