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A SYSTEMATIC REVIEW OF ELEMENTS IN GAME-BASED ARABIC LANGUAGE LEARNING FRAMEWORK FOR DYSLEXIC CHILDREN

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ABSTRACT

Game-Based Language Learning (GBLL) has been proven an effective approach tool to improve learning and has become a widely used teaching aid to maintain engagement and motivation in learners. The purpose of this systematic literature review is to identify the framework elements of Game-Based Arabic Language Learning (GBALL) for Dyslexic Children. Although previous research has addressed various guidelines and frameworks for educational tools in Arabic language learning, however, only few studies focus on dyslexic children. The methodology used in this paper is Systematic Literature Review (SLR) by Kitchenham (2004) and Kitchenham and Charters (2007). A selection of relevant research was performed to achieve the research objectives. The selected online open sources databases involved as are primary resources: Google Scholar, ResearchGate, UM Student Repository, Open Access Theses and Dissertation (OATD). Scientific publications and journals, conference proceedings, and technical papers are found in well-known online databases that include a complete citation and reference analysis. Based on a systematic review process, the researchers reported and discussed findings with possible future research directions. A total of 18 studies were selected, which revealed two themes: the multimedia elements of game-based language learning for dyslexic children and the

Arabic language learning elements for dyslexic children. The results of this study can be applied as a guideline for educational tools for dyslexic children in Arabic language learning.

Keywords: framework design, elements, guidelines, game-based Arabic language learning for dyslexic children, game-based learning, dyslexia language learning

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1.0 INTRODUCTION

According to recent studies that took part in the 21st-century educational system, gaming has become an authoritative educational tool to maintain engagement and motivation in terms of learning. Due to the remark, the need for game-based language learning had been raised as it had significantly changed learners' current thinking processes and motivations (Casañ-Pitarch, 2018). As stated in a study by So and Seo (2018) on 'A Systematic Literature Review of Game-Based Learning and Gamification Research in Asia', game-based learning influences gameplay design characteristics and principles to primarily motivate and engage users in education.

Proper teaching theories and techniques in language learning systems contribute to producing students with ample skills. Language is a part of culture that represents the pinnacle of human intellect, character, and thinking. The Arabic language serves not only as a part of a culture, but also as the cornerstone of Islamic civilization as Qur'an was revealed in Arabic (Yusoff & Adnan, 2008). The scope of studying Arabic, according to Putri (2017), comprises linguistic components, linguistic abilities, and cultural considerations. Further noted that the linguistic aspect itself comprises grammar (qawâ'idu al-lughah), vocabulary (mufradât), pronunciation, and spelling (ashwât 'arabiyyah).

Learning disabilities (LD) are neurologically-based processing problems that present as a challenge to learning or acquiring knowledge while also necessitating the development of fundamental skills like reading, writing, math, and reasoning, as well as listening and speaking, according to Anoual and Lakhouaja (2018). Frequently identified from the early stages of education, dyslexia is a term used to describe a variety of different problems, dyslexia covers the fields of psychology, medicine, linguistics, culture, and education (Al Rowais, Wald, &

Wills, 2014). Learning difficulties are seen as neurological conditions that have an impact on a student's performance and regular academic progress (Anoual & Lakhouaja, 2018).

2.0 LANGUAGE LEARNING FOR DYSLEXIC CHILDREN

Language learning is already known to be difficult for dyslexic children which makes it even more excruciating for second language learning. Very little research done on the topic of Arabic language learning for dyslexic children and its learning aid (Anoual & Lakhouaja, 2018; Aljojo, 2018; Haladjian et al., 2013), particularly in Malaysia. Arabic linguistic characteristics are described by Al Rowais et al. (2014), as Arabic is written by using an alphabetic system with 28 letters that represent 34 phonemes, which is distinguished by the various orthographic forms, depending on the position of the word. This attribute makes the learning process of Arabic letters more challenging for children with LD (Anoual & Lakhouaja, 2018), specifically children with dyslexia.

According to prior research, many approaches have been proposed for educational tools in learning, however only a few were addressed for dyslexic children in Arabic learning environments (Salih et al., 2015; Aldabaybah & Jusoh, 2018). This paper contributes to current research by presenting evidence from past research on the framework design and components in game-based Arabic language learning for dyslexic children. Crucially, this study reviews and carefully evaluates prior research utilising the Kitchenham-recommended systematic literature review (Kitchenham, 2004; Kitchenham & Charters, 2007). This study highlights the framework elements targeted at game-based language learning (GBLL) for dyslexic children, and Arabic language learning for dyslexia. The aim of this study is to identify the features and elements of game-based Arabic language learning (GBALL) for dyslexic children.

The paper is organised as follows: Section 1 explains the purpose of conducting this study. Section 2 presents the methodology used while Section 3 and 4 presents the process of achieving the data and findings. The review, synthesis and discussion of findings are presented in Section 5. Finally, Section 6 concludes the paper and points for further research.

3.0 METHODOLOGY

A literature review and internet sources are utilised to carry out this study in accordance with Kitchenham (2004) and Kitchenham and Charters, (2007). To find as many primary publications as viable that are relevant to the objective of the study, using an unbiased search technique, which is systematic literature, is necessary (Masrop et al., 2019). Systematic reviews demonstrate that the phenomenon is strong and transferable if research yields consistent results

(Kitchenham, 2007). If the findings of the investigations are inconsistent, the sources of variation may be looked into. The systematic review has three main phases, which are planning, conducting and reporting the review Kitchenham and Charters, (2007), Kitchenham et al., 2009; Kitchenham, 2010). The systematic literature review method's steps and specifics are documented in Figure 1.

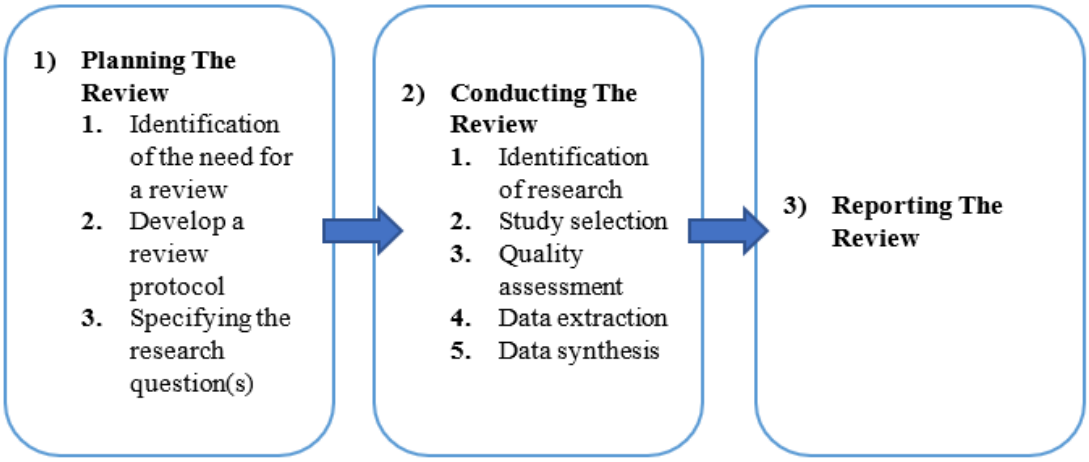

Figure 1: Systematic literature review phases adapted from Kitchenham (2004) and Kitchenham and Charters (2007)

3.1 Planning The Review

In order to undertake a systematic review, it is necessary to verify the need for one. For this phase, the identification of the need for a review, and the research questions are specified.

a) The Need for Systematic Review

This research requires the need for literature to identify the features and elements in game-based Arabic language learning (GBALL) for dyslexic children.

b) Research Question

The main objective of the systematic literature review is to identify the elements of GBALL for dyslexic children using the systematic literature review (SLR) method. Hence, the research questions the researcher addressed for this literature review are:

i) RQ1: What are the multimedia elements for game-based language learning (GBLL) among dyslexic children?
ii) RQ2: What are the significant Arabic language features for GBALL for dyslexic children?

3.2 Conducting the Review

This stage resides in the identification of research, study selection, quality assessment, data extraction, and data synthesis. Each of these phases will be covered in this section. While certain steps must be completed in a specific order, others can be finished concurrently.

3.3 Identification of Research

a) Search Strategy

The researcher will manually select and categorise the collected articles for the required data. The data are classified in Table 1.

Table 1: Article search strategy

Category	Description
Research ID	ID number is placed in each selected study to simplify the process of the screening and filtering of information
Title	The title of the selected study
Author	The author's name
Year	The year the articles were published

b) Search Keywords and String

The papers were probed by searching for the publications that match with the related words from the search engines. Search strings are also constructed using Boolean ANDs and ORs [10]. For this study, the terms used are; (framework OR elements OR model OR structure OR guide) AND ("game-based language learning" OR "game-based learning") AND "Arabic language" AND (dyslexic OR dyslexia) AND children AND (learning OR teaching OR education).

c) Database

A selection of relevant research papers was made to answer the research questions. The following are the selected online open sources that have been decided as our primary resources: Google Scholar, ResearchGate, UM Student Repository, Open Access Theses and Dissertation (OATD). Scientific publications and journals, conference proceedings, and technical papers are found in well-known online databases that include a complete citation and reference analysis.

3.4 Study Selection

a) Study Selection Process

The process of finding and reviewing the studies were conducted through the databases after determining the keywords and search string. The selected papers were investigated from the search engines from 2013 to 2022 by searching for publications that meet the logical words indicated previously. The search terms were applied to the papers' titles, abstracts, and keywords.

A manual abstract assessment was then conducted to eliminate the irrelevant studies. The studies were then further eliminated after being analysed based on inclusion and exclusion criteria. After removing the duplicates from the selected studies, the research was reorganised. Finally, after skimming through the full papers, the remaining research will then undergo the elimination process. The search strategy is summarized in Table 2.

Table 2: The search procedure and number of papers included in the review

Step	Description
Step 1	Search for the databases: All the papers that contain keywords in their titles and/or abstracts and/or keywords were included. Several reputable digital databases were used as data sources
Step 2	Inclusion and exclusion criteria application: The papers are then analysed based on the inclusion and exclusion criteria (refer to Table 4)
Step 3	Full paper skimming: The abstract and full paper are skimmed and reviewed manually according to the relevance of this study.
Step 4	Elimination process: After manually evaluating the remaining studies, it was discovered that a few of them were irrelevant, therefore they were removed. The elimination process is based on these characteristics: 1) the abbreviated version of studies that were already in the review as another study; 2) studies that do not offer any open-source full paper; Studies that are irrelevant to the research question or study.

The outline of the findings is given in Table 3 shows the qualitative results obtained after each phase. Digital databases were used to compile the research.

Table 3: Papers retrieved for each step

Step	Result
Step 1	5,710
Step 2	302
Step 3	42
Step 4	18

b) Inclusion and Exclusion Criteria

As shown in Table 4, the articles were sampled in accordance with the determined inclusion and exclusion criteria. Published papers that do not meet the requirements were excluded.

Table 4: The inclusion and exclusion criteria of the study

No.	Inclusion Criteria
IC1	Studies that include any of the keywords or logical words as stated beforehand
IC2	Papers that are published between 2013 to 2022
IC3	Studies that include anything related to Arabic language learning tools for dyslexic children
IC4	Studies that include guidelines or framework development on game-based language learning for dyslexic children
No.	**Inclusion Criteria**
EC1	Papers that are not written in English or Malay language
EC2	Articles that do not mention Arabic language learning OR dyslexic children
EC3	Papers that are not related to educational games for dyslexic children in language learning
EC4	Papers that do not mention any framework, elements or guidelines of game-based language learning for dyslexic children
EC5	Studies that are closed-source with limited information
EC6	Published before 2013

3.5 Quality Assessment

Each SLR was evaluated using the criteria that are adapted on four quality assessment (QA) questions as recommended by Kitchenham and Charters (2007). The questions are as follows:

- QA1: Is it likely that the literature search yielded all relevant studies?
- QA2: Are the evaluation of the quality and validity of the studies dependable?
- QA3. Does the study elaborate on elements or guidelines in game-based Arabic language learning for dyslexic children?
- QA4: Do the findings achieve the research objective?

The questions were scored and defined as shown in Table 5. Scores were calculated as follows: Y = 1, P = 0.5, and N/Unknown = 0. The scores will demonstrate the quality of the articles and answer the research questions.

Table 5: Details of the quality assessment questions

Scoring / **Question**	**Yes (Y) = 1**	**Partly (P) = 0.5**	**No (N)/Unknown = 0**
QA1	The writers have either searched four or more digital libraries and used additional search algorithms, or they have recognised and cited all journals on the subject.	The authors searched three or four digital libraries without using any additional search algorithms, or they searched a limited range of articles and conference proceedings.	The authors obtained up to two digital libraries or a very limited collection of journals.
QA2	Quality criteria were stated explicitly by the authors and retrieved from each primary study.	The study addresses quality issues as part of the research question.	There has been no attempt to assess the quality of individual primary studies explicitly.
QA3	The study elaborated on the elements and guidelines in game-based Arabic language learning for dyslexic children explicitly.	Only a summary of the elements or guidelines in game-based Arabic language learning for dyslexic children was stated or incomplete.	There is no elaboration on the elements or guidelines in game-based Arabic language learning for dyslexic children in the study.
QA4	The findings answer the research objective stated clearly in the study	The findings are inherent to the research objective	The findings aren't specified and can't be inferred easily

3.6 Data Extraction

The papers retrieved are then calculated based on the quality assessment questions. The average quality scores for studies each year is shown in Table 6.

Table 6: Details and quality assessment scores of the papers retrieved

ID	Title	Author	Year	Q 1	Q 2	Q 3	Q 4	Total Score
S1	Educational Software for Dyslexic Children: A Systematic Literature Review	Ishak et al.	2021	1	1	0.5	0.5	3
S2	Dyslexic Arabic Students in the Arab Countries: A Systematic Review of Assistive Technology Progress and Recommendations	Alsswey et al.	2021	1	1	0.5	1	3.5
S3	Exploring the Use of the ICT in Supporting Dyslexic Students' Preferred Learning Styles: A Preliminary Evaluation	Benmarrakchi et al.	2017	1	1	1	1	4
S4	RALF: an adaptive reinforcement learning framework for teaching dyslexic students	Minoofam et al.	2022	1	1	1	1	4
S5	Game-Based Interventions as Support for Learning Difficulties and Knowledge Enhancement in Patients with Dyslexia: A Systematic Literature Review	Saeed et al.	2022	1	1	0.5	0.5	3
S6	Strengthening Jawi Writing for Dyslexia Students through Online Games - Analysis of E-Jawi Games Online in Malaysia	Salih et al.	2015	1	1	1	1	4
S7	Measuring The Impact of Developing a Game-Based Mobile Application to Increase Reading Skills Level for Dyslexic Students At Primary Schools In Saudi Arabia	Allafi et al.	2022	1	1	0	1	3
S8	An Approach to Digital Game-Based Learning: Video-Games Principles and Applications in Foreign Language Learning	Casañ-Pitarch	2018	1	1	1	1	4
S9	Game User Interface Criteria for Dyslexic Children	Ishak et al.	2021	1	0.5	1	1	3.5

S10	Developing effective educative games for Arabic children primarily dyslexic	Anoual & Lakhouaja	2018	1	1	1	1	4
S11	"Let's Play a Game!" Serious Games for Arabic Children with Dictation Difficulties	Shohieb	2020	1	1	1	1	4
S12	Understanding the Needs of Arab Learners with Dyslexia for Adaptive Systems	Al-Dawsari & Hendley	2022	1	1	1	1	4
S13	An Arabic Framework for Dyslexia Training Tools	Al Rowais et al.	2013	1	1	1	1	4
S14	YUSR: Speech Recognition Software for Dyslexics	Taileb et al.	2013	1	1	0.5	1	3.5
S15	Usability Features for Arabic Assistive Technology for Dyslexia	Aldabaybah & Jusoh	2018	1	1	1	1	4
S16	Computer-Assisted Learning Language for Learning Disabilities in The Arabic Language: Diagnosis, Training and Assistance	El Kah	2019	1	1	1	1	4
S17	Communication Technology for Users with Specific Learning Disabilities	Benmarrakchi et al.	2017	1	1	1	1	4
S18	Importance Of Assistive Mobile Applications for Dyslexic Students in Saudi Arabia	Allafi & Newbury	2021	1	1	1	1	4

Table 6 shows the papers retrieved and the result of the quality assessment for each paper. From 2013 to 2022, only a few studies focused on game-based Arabic language learning for dyslexic children. One paper was selected per year from 2015, 2019, and 2020. Meanwhile, for 2013 and 2017, two papers each year were published and selected for this study. Also tabbed are three papers from the year 2018. Papers from 2021 and 2022 were retrieved the most with four papers selected each year.

The quality assessment yielded 18 papers with a total score of above 3 for each paper. Articles that scored 2 or more on the quality scale are deemed to be good quality (Kitchenham, 2010), hence the papers obtained are reliable for this study. A total of twelve papers resulted

in a full score of 4, three papers with a score of 3.5, and three papers with 3 scores. All the selected papers passed the quality assessment with higher scores than average.

4.0 RESULTS AND DISCUSSION

Uncovering the guidelines and framework of game-based Arabic language learning (GBALL) for dyslexic children has been a key focus of the extant literature. The research studies investigating the can be categorized into two themes, which are; 1) multimedia elements of game-based language learning (GBLL) for dyslexic children; and 2) Arabic language learning features for dyslexic children. The themes were outlined accordingly to match the research questions. Also discussed is the summary of findings which concluded as the main guidelines of GBALL for dyslexic children.

a) Multimedia elements of GBLL for dyslexic children

In order to answer 'RQ1: What are the multimedia elements for game-based language learning (GBLL) among dyslexic children?', the researcher suggests to breakdown the theme into a total of 24 components. The subthemes are as follows: 1) goal; 2) challenge; 3) feedback; 4) rules; 5) player autonomy; 6) repetition; 7) genre; 8) fantasy; 9) teamwork and competition; 10) navigation; 11) tangibility 12) colours; 13) style; 14) layout; 15) formatting; 16) interface; 17) input style; 18) audio; 19) video; 20) visual; 21) timing and duration; 22) content; 23) cognitive; and 24) skill increment and functioning level. The distribution of multimedia elements of GBLL for dyslexic children is shown in Figure 2.

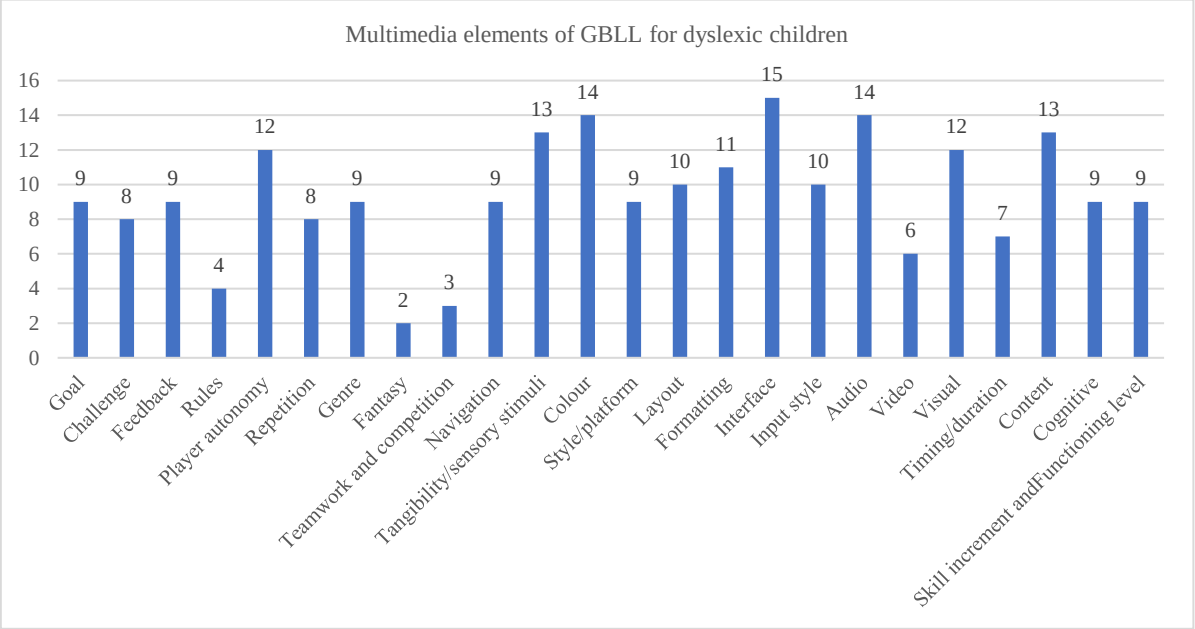

Figure 1: Distribution of multimedia elements for GBLL for dyslexic children

b) Arabic language learning elements for dyslexic children

To answer RQ 2, which is: 'What are the significant Arabic language learning features of for dyslexic children?', the researcher suggests to breakdown the theme into a total of four subthemes. The subthemes are as follows: 1) background; 2) Arabic linguistic features; 3) learning strategy and; 4) learning hierarchy. The distribution of Arabic language features for GBALL for dyslexic children is shown in Figure 3.

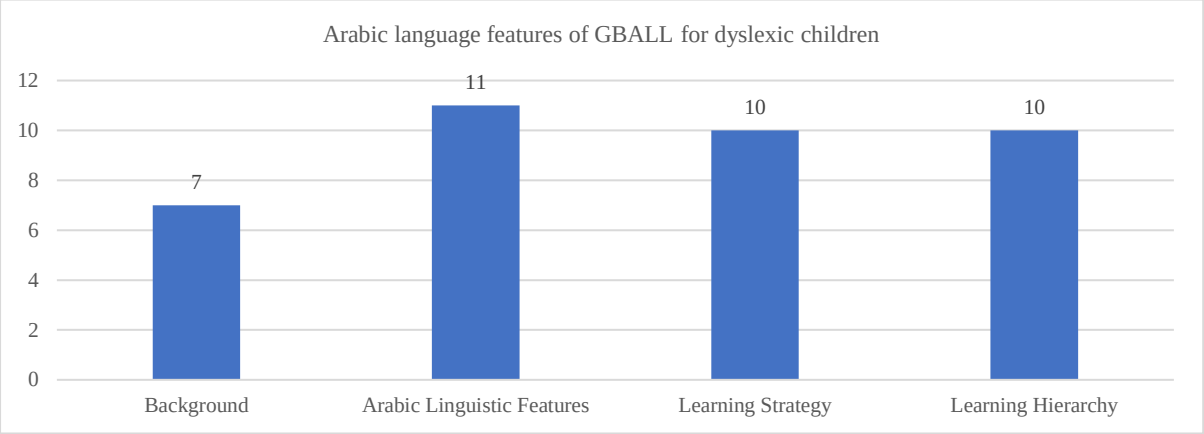

Figure 2: Distribution of Arabic language element of GBALL for dyslexic children

c) Framework elements of GBALL for Dyslexic Children

In this study, the researchers attempted to systematically analyse the current literature on the framework elements of GBALL for dyslexic children. Designing such applications will be quite difficult, however, proper framework design must be implemented to ensure that dyslexic children can enjoy using the game-based educational tool with ease. Altogether, 18 publications related to elements of GBALL for dyslexic children were chosen from the databases, revealing two themes and a total of 28 subthemes which are multimedia elements of GBLL for dyslexic children (with 24 subthemes) and Arabic language learning elements for dyslexic children (with four subthemes). Table 7 summarises the analysis results for elements of GBALL for dyslexic children, meanwhile, the themes and subthemes are summarised in Table 8.

Table 1: Summary matrix of elements of GBALL for dyslexic children

			PAPER ID																	
			S 1	***S 2***	***S 3***	***S 4***	***S 5***	***S 6***	***S 7***	***S 8***	***S 9***	***S 10***	***S 11***	***S 12***	***S 13***	***S 14***	***S 15***	***S 16***	***S 17***	***S 18***
ELEMENTS	Multimedia elements of GBLL for dyslexic children	Goal			/	/				/		/	/		/	/	/			/
		Challenge			/	/	/	/					/		/	/	/			
		Feedback				/			/	/			/	/	/	/	/			/
		Rule				/				/					/					/
		Player autonomy		/	/	/		/		/	/	/	/		/	/			/	/
		Repetition				/					/	/	/	/	/		/		/	
		Genre			/	/	/			/		/	/	/	/					/
		Fantasy								/					/					
		Teamwork and Competition					/			/					/					
		Navigation		/					/	/			/	/	/	/	/			/
		Tangibility		/	/			/		/		/	/	/	/	/	/	/	/	/
		Colour	/		/	/		/			/	/	/	/	/	/	/	/	/	/
		Style/platform	/		/		/	/		/		/	/			/				/
		Layout			/	/		/			/	/			/		/	/	/	/
		Formatting	/		/	/			/		/	/			/		/	/	/	/
		Interface		/	/	/		/	/		/	/	/	/	/	/	/	/	/	/
		Input style				/	/			/		/	/		/	/	/		/	/
		Audio	/	/		/	/		/		/	/	/	/	/	/	/		/	/
		Video		/			/							/	/	/			/	
		Visual	/					/	/		/	/		/	/	/	/	/	/	/
		Timing/duration				/			/	/		/		/	/					/
		Content			/	/		/		/		/	/	/	/	/	/	/	/	/
		Cognitive			/	/				/	/	/		/	/		/			/
		Skill Increment and Functioning Level				/			/	/			/	/		/	/		/	/
	Arabic	Background		/		/				/		/		/	/					/

		Arabic Linguistic Features			/	/	/	/				/	/		/	/	/	/		/
		Learning Strategy		/	/	/				/		/	/	/	/		/		/	
		Learning Hierarchy				/	/			/		/	/		/	/	/		/	/

Table 2: Guidelines and recommendations for GBALL for dyslexic children

Main Theme	Subtheme	Recommendation
Multimedia Elements of GBALL for Dyslexic Children	Goal	- Games should consist of clear and meaningful objectives. - Game goals need to focus on teaching and learning. - Goals should be achievable.
	Challenge	- Interactive educational games should include various levels of difficulty. - Challenge in games should be engaging and motivating for dyslexic children. - Games should include customised difficulty settings.
	Feedback	- Provide informative and immediate feedback. - Educational games should provide visualized continuous feedback on users' progress. - Include progress bar and representative feedback to keep track of users' progress and achievement. - Immediate audible feedback reward must be included such as clapping sounds and encouragement words. - The educational games must include correcting feedback.
	Rule	- Use clear rules and instructions. - Instructions are to be delivered both audibly and on screen.
	Player autonomy	- Provide sufficient options and control for flexibility in text editing and adjustment of the visual presentation such as: permitting the choices of different fonts, sizes and colours; graphic arrangement; and functionality.
	Repetition	- Repetition feature is needed to gain understanding and memorisation or words and exercises. - Provide access for repetition in audio, video, training, and exercises.
	Genre	- Game-based language learning genre recommended are: video games, action games, strategy games, adventure games, and puzzle games.
	Fantasy	- Using narration with immersive story with participatory aspects to increase pragmatic learning through problem-based tasks.

		- Narrative games should include character(s), a storyline, and a plot.
	Teamwork and Competition	- Game-based language learning design should boost social engagement, sense of competition, morale, self-confidence, interactions, and help to develop teamwork.
	Navigation	- Use relevant images instead of words and providing clearly clickable button sizes. - The transition between words, letters, options, colours, should be clear and simple, including focusing on error prevention.
	Tangibility	- Educational games need to include sensory activities - Games need to represent reality. - Sensory should not just include hearing and seeing, but also through body stimuli; such as carry out activities with hands, legs, waist, or face movement. - Use familiar items or sight-words to link with the learning process. - Avoid multisensory overload or bias.
	Colour	- Use a coloured background rather than white. - Background colour recommended are: cream, beige, yellow, pastel and light colours. - Black and dark font colours recommended. - Use bright colours for objects. - Avoid overusing colours. - Limit to only a few primary colours.
	Style/platform	- Video games with artificial intelligence (AI) suggests better goal achievement on the game-based assessment. - Virtual-reality (VR) technology increases playability enhancement. - Games should be accessible on mobile devices (such as IOS and Android OS) and computer-based intervention. - The use of 3D system with world map and tools increases the dyslexic children's interest.
	Layout	- Educational games should be displayed in full screen. - Utilizing large text and white space makes the text more readable.
	Formatting	- Text should be presented with larger inter-letter and inter-word spacing. - Texts should be larger than 12 font size, recommended to use 18 font size as bigger font size to increase readability. - Avoid underline and italics. - Use bold or highlights to emphasise words or sentences. - Use at least 1.5 line spacing or bigger. - Fonts recommended are: san-serif font type such as Arial font. - Typeface should be able to distinguish between dots and vowels. - Texts should be left-justified.

		- Use heading size of 80, a sub-heading size of 30. - Lines should not be too long. - Paragraphs should be composed of short, concise, and direct sentences. - Avoid narrow columns. - Use bullet points and numbering instead of prose. - Avoid beginning a sentence at the end of a line. - Avoid passive voice and double negatives.
	Interface	- Only a few options should be shown in the main menu, and the essential items should be put in a new sub-menu. - Use visual content such as icons to increase efficiency. - Interface should contain a few basic colours. - Utilise simple, straightforward, and bold interfaces with light background colours. - Do not use more than two graphics or layers overlaid in the interface.
	Input style	- Input devices recommended are touch screen and microphone (speech-to-audio).
	Audio	- Written material should include narration or audio. - The use of sound effects, background music and audio in general should not be too intricating and loud. - Provide audio to every image and text.
	Video	- Present animation on how to write the letter and pen holding. - Include animation to gain users' focus.
	Visual	- Simple and less complicated visual is highly recommended. - Avoid excessive use of the multimedia elements as it may distract children from the educational purposes of the interactive media. - The screen should not be crowded and there is enough white space.
	Timing/duration	- Include specific given time accordingly with the customised difficulty levels of the game.
	Content	- Content should be appropriate and in accordance with the dyslexic children's curriculum. - Contents should focus on the readability for dyslexics. - Simplify the reading content. - Contain more exercises with gaming functions as a test for users' learning and to avoid boredom.
	Cognitive	- It is important to consider how dyslexic children interpret information with the learning process.
	Skill increment and Functioning Level	- Flexibility in gaming is introduced based on the dyslexic children's IQ level. - Each mini game should cover one skill.

		- Game-based learning should be appropriate to the age and the dyslexic children's ability and functioning level. - Allow dyslexic children to master certain skill before leading to more complex teachings. - Educational tools should approach the understandings of dyslexia types, likewise understanding the reading process of dyslexic children.
Arabic Language Learning Elements for Dyslexic Children	Background	- Incorporate interaction context and cultural characteristics in system design. - It is also important to identify significant dyslexic students features for effective teaching strategy and important interaction problems.
	Arabic Linguistic Features	- It is critical to support the sound of the Arabic letters rather than the letter's name. - Proposed using different colours or sizes to differentiate similar letters, additional patterns (i.e. prefixes or suffixes), the dots and their positions, and long vowels. - Expose all the distinct shapes of Arabic letters as it is distinguished by its several orthographic forms, which vary depending on its location in the word. - Arabic fonts recommended: Dyslexic Arabic Font; OpenDyslexic; Square Kufic; Dyslexie. - Font features: heavy and bold letter base/bottom to resemble different letter height and form; light shadowed; letter spacing enhanced.
	Learning Strategy	- Recommended learning strategy: multisensory, visual, auditory, phonetic, repetition, learn by play, modelling and word analysis. - Learning theory suggested is Piaget's constructivist learning theory.
	Learning Hierarchy	- Arabic learning games for dyslexics should be focusing on reading and writing skills. - Include more vocabulary and writing sentences exercises. - The early level of learning Arabic language is to learn the Arabic characters and their pronunciation, followed by word building and finally building sentences.

5.0 CONCLUSION

Although prior research findings reveal great performance and improvement in game-based language learning (GBLL) in Arabic language for dyslexic children, there are still flaws, concerns and challenges that must be addressed and overcome. Game-based learning (GBL) is a type of learning tool that combines motivation, entertainment, and education. It is one of the educational aids that can be applied in a variety of ways and purposes, particularly with proper

guidelines, framework, system, and knowledge in the selected field, in which this study focuses on: game-based learning, Arabic language, and dyslexia.

The analysis of 18 studies retrieved revealed two main themes which are multimedia elements of GBLL for dyslexic children and Arabic language learning elements for dyslexic children. As a result, in order to develop effective GBALL for dyslexic children, all themes linked to the design features and elements must be thoroughly addressed and considered. Consequently, this finding can be used as a guideline for developers in GBALL for dyslexia to ensure the effectiveness and impact of the application. It is hoped that this research would assist future researchers in resolving issues and problems in GBALL for dyslexic children, as well as benefit language learning for dyslexic children in general.

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