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MyARTS: Towards enhancing users' knowledge and understanding of articles

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Abstract

MyARTS, an interactive grammar mobile game is exclusively designed according to the Theory of Variation (ToV). The game provides a variety of exercises to expose learners to different aspects of learning. The study is to examine the elements that support the design of the questions in the digital game. A qualitative content analysis was used in illuminating the elements from the theory that support the game and quantitative pre-and post-tests to see the impact of the game on learners. The features in the ToV guiding the game's tasks help learners to discern and remember the usage of articles. Keywords: The Theory of Variation; Grammar; Interactive; Mobile-Assisted Language Learning

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1.0 Introduction

Learners must be technologically savvy to compete in today's global community. One of the objectives of the Malaysia Education Blueprint (2015-2025) is to reinforce the use of information and communication technology (ICT) in the teaching and learning process to meet global standards. Aside from being technologically savvy, the current demand of the global workforce necessitates students be fluent in English, as it is the primary business language. One component that is necessary for understanding the grammar of the English language is the use of articles.

Students' skepticism regarding grammar lessons (Larsen-Freeman, 2015) and the difficulty in comprehending grammar, particularly in the learning of articles, are some of the causes for their lack of mastery of English grammar (Ahmad, 2018). As a result, there is an urgent call to improve grammar teaching and learning through games via technology to improve learners' English language proficiency. To elevate the learning potential, a game should be educational and stimulating. These can be achieved if such a game is developed based on an appropriate teaching methodology and an effective game theory (Elorriaga, Antunez, & Nicolino, 2016). Hence, the call to develop a carefully designed game that could stimulate learners' learning potential serves as the motivation for this particular study. The researchers created a language-based game (MyARTS) based on a learning theory that guides the game's development, which is the Theory of Variation (ToV) (Marton & Booth, 1997). The key feature of learning, according to Marton and Booth (1997), is for students to recognize the critical aspect through diversity rather than sameness. This is the essence of ToV, which served as a guiding concept in the creation of grammar exercises in the game. MyARTS is a coined acronym which means My Articles that includes articles a, an, the, and the usage of zero-article with the symbol of minuscule - ø, as well as some special cases under this particular English part of speech. The study is

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to examine the elements of the Theory of Variation that support the design of the questions in the MyARTS digital game and to focus on the efficacy of the game in helping learners to improve their knowledge and understanding of articles.

2.0 Literature Review

2.1 The Efficiency of Digital Games in Teaching Grammar Articles

The presence of digital game-based learning has been accepted in the realm of educational technology. Due to overwhelming responses, language games have been designed and developed to fulfil the demands of the younger generation via mobile phones in their daily life. Game-based language is an effective method of language acquisition because it boosts motivation and involvement (Nadia and Mar, 2020). Gamification can be a solution to the problem of low student involvement in the learning process (Saprudin et al., 2019). Thus, by having digital games language learners may voluntarily engage in English language activities rather than being forced to do so, which has shown a positive effect in studies of grammar acquisition (Muñoz et al., 2021). Gamification can be a powerful way to teach grammar and create an effective learning environment. 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 have to be challenging and fun enough to capture learners' attention.

2.2 The Theory of Variation

Marton and Booth in their 1997 seminal work suggested that all learners might have two ways of approaching the learning process which are a surface approach and a deep approach. Marton and Booth (1997) laid the foundations of the Theory of Variation. Later, this theory was incorporated into lesson study, where effective teaching and learning can be fostered through carefully designed learning situations (Pang & Lo, 2011). In promoting paramount learning situations and outcomes, ToV benefits the learning processes holistically in terms of the meaning of the learning task, the opportunity to identify errors, and to familiarise concepts of a subject matter in the learning syllabus (Asplund & Kilbrink, 2020).

Based on a study by Roy (2014), which specifically magnified English Grammar learning, Marton and Runesson (2003) assisted researchers and educators in outlining four patterns of variation to help learners to discern critical features of a subject matter which are contrast, separation, generalization and fusion.

Table 1. Four elements of variation and the indications for each aspect

Element	Indication
Contrast	Difference (variation) between two values or more
Separation	Separate aspect by varying values from an invariant aspect
Generalization	Allow varied appearances of the same value
Fusion	Use several critical aspects simultaneously

(Source: Marton & Runesson, 2003)

The pattern has been widely used by researchers in the language learning domain (Lindström, 2017; Ott, 2017) and they have successfully benefitted from this model within the educational-context experiments. ToV helps the students to discern grammar features holistically - by introducing the different 'articles' together, not separately.

3.0 Methodology

The research approach entailed the use of largely qualitative and quantitative measures. The qualitative data analysis employed content analysis to clarify how the elements in the Theory of Variation supported the design of the questions in the MyARTS digital game. Each type of question in the game was described according to the specification taken from the theory which is based on the elements of contrast, separation, generalization and fusion. There are 140 sets of questions in the digital board game based on two different formats which include:

- Four-answer options (multiple choice)
- What is the usage of the article? (Matching question)

The experiment took four weeks to be completed and sixty diploma students from the first semester were chosen as the respondents of the study. To study learners' problems with articles, the researcher had analyzed the placement test given to learners before developing questions in the MyARTS game. Based on the analysis, the researcher found that learners had difficulty identifying the usage of articles 'a, an, and the'. The researcher also administered a pre-test to the respondents before giving any treatment to them. After treatment was administered, the respondents were required to answer the post-test questions. Since the syllabus for that particular semester covered articles: a, an, and the, the test questions were only related to the articles. The test paper consisted of 25 error identification questions in

the form of sentences covering the topics of the articles. Players had to identify one error from each of the 25 sentences concerning articles by underlining and correcting the errors and writing the correct answers on top of the words that they have underlined.

The content development of the questions and the game had gone through systematic, rigorous and appropriate assessment evaluation in the preliminary work of the research. Firstly, the questions were edited by an experienced English language acquisition and grammar professor. Secondly, during the developmental stage of the questions in the TBT, the researcher also sought advice and worked closely with the expert of the Theory of Variation, Professor Mun Ling Lo from Hong Kong via email. Thirdly, two experts in Computer Science and Mobile Learning were also assigned to examine the design of the digital board game. Their comments and suggestions were considered to further improve the design of the game. The feedback from the expert on the Theory of Variation and the feedback from the expert on Computer Science and Grammar were important to ensure that the game content was in line with the principles of the theory, the game design, the learning approaches and the language acquisition.

4.0 My Articles (MyARTS) Game

The mobile application is created for Android users only and it is not meant for IOS users. The game can be accessed offline once it has been successfully installed. There are several key features which consist of MyARTS' Infographic Notes, the Practice, the Game with different levels of difficulty and the final scores for the players to keep track of their progress and record. Before playing the game, players have to click on the 'note' button to get to know the basic rules of the articles. The practice button consists of quizzes that will assist the players with the simple and basic exercises of articles. Once the players understand and are confident with their progress on each article, they can start playing the game by retreating from the 'practice' menu and clicking the MyARTS' game button. The researcher prepared 140 different types of questions, the answers and feedback in the game section.

The researcher also took time to systematically and critically analyze several game elements and second language learning theories to be included in the digital board game to make the game challenging and beneficial for learners. The five important elements from Elorriaga et al. (2016) were considered in MyARTS to ensure positive output from the learners:

- (1) Aesthetic - The display of images in a form of sensory stimuli to boost inspiration. There are audio and visual elements in TBT.
- (2) Connection player-game - Both player and game are linked to each other.
- (3) Motivation - The game consists of a few levels of challenges whereby the challenges improve as the players make progress.
- (4) Promote learning - The game integrates psychological aspects like giving feedback and rewards to motivate learning via playing.
- (5) Troubleshooting - While playing, the player has to confront barriers, resolve difficulties and compete with other players to reach the finish line.

In addition, three principles for the development of technology-based second language learning by Chapelle (1998) were injected into MyARTS.

- (1) The linguistic components of a second language have to be visible.
- (2) Learners can understand semantic and syntactic values of the linguistic aspect.
- (3) Learners are aware of their mistakes.

To be categorized as an educational game, the design of the digital board game is supported by four important elements, which are "active", "engaging", "meaningful" and "socially interactive" (Politi, 2017).



Figure 1. MyARTS' Interface

5.0 Findings

5.1 The elements used to support the design of the questions in the MyARTS game.

Each type of question in the game was described using the Theory of Variation (ToV) specifications which are based on the elements of contrast, separation, generalization and fusion.

Sample of the First Format of the Question

- Four-answer options (multiple choice)



Figure 2. Four-answer options- Contrast and Fusion

For the first type of question, learners have to choose one correct answer from the four options given. The patterns of variation involved (Marton et al., 2004, p.16-17).

- Contrast - to see the difference (variation) between two or more values
- Fusion - to use several critical aspects simultaneously

The patterns of the questions: The sentences are similar but with four different articles. Here, learners have to use the contrast element to compare and contrast the sentences to see the differences among articles "a, an, the and zero article Ø" and be able to determine the appropriate use of each article by referring to the context. The contrast will alert learners to the differences in the critical features of each article (Lo, 2012). Some of the critical features related to the use of articles include: "What makes learning to use articles difficult for learners? What makes each article different from the other in terms of usage? When and how to use each article?" Therefore, the questions were designed by considering the possible critical features that can serve as clues for learners in choosing the correct answers.

The Theory of Variation propagates that to experience what article 'a' is, learners must experience other articles (such as 'an' and 'the') as well. Only after having the experience of the other value can the learners discern the specific use of article 'a' (Lo, 2012). By showing all articles together, their meanings could be clearer to learners and would increase their possibility to learn them (Lindström, 2017). Fusion is applied when all the articles are used simultaneously. At this stage, students have to consider when and how to use each article correctly and compare and contrast more than one critical feature simultaneously.

By using contrast and fusion, learners are made aware that language consists of different grammar usage that construes meaning. Contrast does not only enable learners to differentiate and distinguish the use of each article but also to highlight that without seeing the difference, it is difficult to discern similarities. According to the Theory of Variation, depending completely on similarities alone is incomplete. Lo (2012) and Marton and Pang (2013) believe that to be able to understand an element requires an understanding of the differences (variation) among elements. Discernment would not be possible without seeing differences and without having to experience two or more different elements concurrently.

Sample of the Second Format of the Question

What is the usage of the article?

In the second format, learners are to choose the correct usage of the article 'the'.

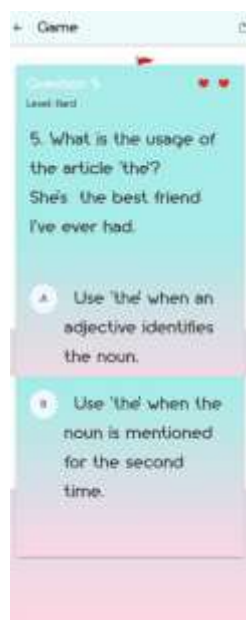


Figure 3. What is the usage of the article? – separation and generalization

The following section will unfold the rationale on what are the elements used to support the design of what is the usage of the article used?

- The patterns of variation involved (Marton et al., 2004, p.16 - 17)
Separation - separate aspect by varying values from an invariant aspect
Generalization - allowing varied appearances of the same value
- The patterns of the questions:
Different sentences of the same category (article 'the'). Learners have to choose one sentence of the same category that has a similar usage to the one provided.
- What is expected to be discerned by learners?
To provide variations in the different usage of article 'the', learners can separate the correct answer (the examples) from the incorrect ones (non-examples) and at the same time, generalize the usage of each one.
To understand that article 'the' serves different usage.

Learners who see the options of different sentences from the same category (article 'the') may perceive them as an unseparated whole, for example, they might know that the sentences use the article 'the' without realizing that each sentence carries different usage. Hence, to assist learners to separate the sentences from the same category, they must be exposed to different usage that each sentence carries. Once learners understand the different usage of article 'the' from the same category, they may be able to discern the dimension of variation that takes place with different usage as values. We cannot assume that learners will discern an object without knowing how different it is from other objects, or in what capacity of variation it stands. The idea is to provide sentences that are in the same category so that students can make certain generalizations and contrast them with other options that vary in usage. In doing so, learners may be able to separate the usage that does not apply.

With generalization, learners were exposed to at least one other value in the same dimension of variation (different usage of article 'the'). For example, in teaching the article 'the', teachers expose learners to another value of 'the' in the same dimension of variation that is - 'the' carries different usage (use 'the' when an adjective identifies the noun, use 'the' when the noun is mentioned for the second time or use 'the' to show something specific).

Table 2. Another value of 'the' in the same dimension of variation

Usage	Example
Use 'the' when an adjective identifies the noun	The <i>amazing</i> dancer dances gracefully
Use 'the' when the noun is mentioned for the second time	I took an English lesson. The lesson was quite interesting.
Use 'the' to show something specific	The teacher will teach us Mathematics

*Italicised word is an adjective

The different usage of the article 'the' is clearer to them. Here, separation occurs when learners can separate the usage that does not

apply. This is to allow learners to see varied appearances of the same value and to see the difference as meaning comes from the differences and not from the sameness (Ott, 2017). Widening a dimension of variation (different usage) of article 'the' helps learners to understand better and when they encounter other articles in the future ('an, the and Ø'), they will be able to formulate them along this dimension of variation and understand the connection among these values as each article carries different usage.

5.2 The participants' performance after using the MyARTS game

The finding in Table 5.1 shows learners' pre-and post-test scores. Paired sample T-test was used to find the probability value to see whether there is an improvement in scores in the pre-and post-tests. There is an improvement in scores and a significant difference between the pre-and post-test the 'p-value was below 0.05. The results of the paired pre-and post-test suggest that the students' understanding/knowledge of articles has improved after doing the exercises using the digital game MyARTS.

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	PRETEST - POSTTEST1	-5.89362	5.00536	.73011	-7.36325	-4.42399	-8.072	46	.000

Table 5.1. Learners' Pre- and Post-Test Scores

6.0 Discussion

Teachers should not only have a powerful understanding of a subject matter but also solid pedagogical expertise to help students discern it. It is apparent that if teachers intend to assist learners to understand a subject matter, they must first help learners to develop powerful ways of seeing to improve learning. Powerful ways of seeing can be developed by helping learners to focus on certain important features of the subject matter to enhance learning. The application of the elements from the Theory of Variation could lift learners' awareness of the critical features of articles which eventually increases their opportunity to learn and understand them better. Learners must be given the chance to focus on the important features of the subject matter for them to apply them thereafter. Therefore, teaching materials should be meticulously designed according to specific theoretical principles that encompass cognitive activities and learning styles to increase the likelihood of learners' understanding and application of the English grammar knowledge. By adding to the pool of knowledge on the value of MALL, the study has supported the Education Blueprint policy on the use of technology in teaching and learning.

The positive results in the post-test suggest that MyARTS could enhance learners' grammar knowledge. The improvement in the post-test scores of the respondents could also suggest that the use of the game in teaching articles not only helps learners to remember article rules and usage but also reduces grammatical mistakes. The finding concurs with a previous study by (Saprudin et al., 2019) that finds positive benefits of using games via MALL in teaching. The positive findings could initially allow us to deduce that the more learners are exposed to an intriguing learning activity, the more positive emotions will be developed to remove their fear of grammar. In this context, the positive emotions are brought about through the non-threatening environment of gaming that puts the students at ease with their lessons and helps them to acquire better input and perform better in the post-test.

7.0 Conclusion

The research will also shed light on the importance of incorporating elements of pleasure and enjoyment into formal learning, as recommended by gamification via the MALL application. The goal is to encourage students to learn rather than the teacher teaching. This can be realized if we have well-rounded language instructors eager to try out different teaching methods using technology to promote interactive and engaging learning. In brief, the game (MyARTS) via MALL is meant to help students better comprehend and memorize how to use 'articles'. The positive outcomes from the use of MyARTS via MALL can be used as an example of a learning tool to bring learners closer to grammar and remove their fear of grammar. MyARTS which is guided by sound pedagogical principles can supplement traditional face-to-face teaching methods. The burden on teachers to provide technical grammar knowledge can be alleviated in some ways by technology. The study demonstrates an alternative technique to teach 'articles' to learners by using the Theory of Variation to drive the design of questions in the game using four patterns of variation: contrast, separation, generalization, and fusion. However, the case study involved first-semester diploma students of UiTM Raub. The objective is to gauge whether the digital game (MyARTS) could assist the students in the learning of articles. Hence, the generalization of the findings should be evaluated within the confines of the setting of the study. The results should be viewed in the context in which they were obtained.

Future studies may also incorporate other grammar elements such as the teaching of prepositions, parts of speech, pronouns and modals, and perfect tenses using digital games.

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Paper Contribution to Related Field of Study

This paper is related to the field of Education/Learning Environment.

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