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Interactive and Meaningful Language Learning using ToV

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Abstract
Interactive games enhance learners' engagement and motivation. Hence, to fulfill the needs of learners, an interactive digital game named Throw Back Time (TBT), governed by the Theory of Variation (ToV), was designed. The application of the theory will help learners to develop awareness of the critical aspect of grammar. To clarify how the elements in the Theory of Variation support the design of the questions in TBT, a content analysis was used. Thus, the study suggests how powerful ways of seeing can be developed by helping learners to focus on certain essential features of the subject matter to enhance learning.

Keywords: Grammar; The Theory of Variation; Interactive; Digital learners

1.0 Introduction
The study expands from the researcher's previous research on the use of a digital board game, Throw Back Time (TBT), using mobile devices and governed by The Theory of Variation (ToV). The first study presented the results from the pre and post-test scores of grammar tests after TBT treatment via ToV was given to the sampling. The second emphasized the five formats of the questions in TBT via ToV. The current study, however, elaborates on the last format of the question in TBT. The study's objective is to examine how the elements from ToV support the design of the question.

Many studies have found that digital games via Mobile Assisted Language Learning (MALL) could empower learning. The games can also serve as a powerful approach to enhance learners' language skills (Alowayr & Mccrindle, 2016; Kukulska-Hulme, Norris, & Donohue, 2015; van Dijk, Witteloostuijn, Vasic, Avrutin, & Blom, 2016; Wu et al., 2012). MALL offers a more enriching independent learning experience to learners as devices like smartphones and tablets allow language learning to occur conveniently at any time and any place. This autonomous learning potential could captivate learners and optimize learning as they could self-edit their work and chart their progress (Baleghizadeh & Oladrostam, 2010; Jin, 2015; Li, 2013; Luís, 2016; Ni & Yu, 2015). With all these potentials, MALL has prompted mobile educational games consisting of audio, animation, interactive images, and projections that could enhance interactivity and collaboration between educators and learners, making learning more fun, exciting and compelling. Studies state that learners are often anxious about mastering the metalanguage aspects, i.e., grammar rules and complicated vocabulary (Azar, 2007; Chitravelu, 2005; Collentine & Collentine, 2015; Ediger, 2016; Gribbin, 1996; Jalali & Dousti, 2012; Stavre & Pashko, 2016). The anxiety is problematic as the more anxiety learners have, the more unenthusiastic they could become learning grammar. Hence, there is a need to ease this fear and instead trigger learners' interest in learning grammar.

One mobile educational game that is intriguing is the digital game (Ganapathy et al., 2016; Ongoro & Mwangoka, 2014; Virvou & Papadimitriou, 2014). Digital games trigger an absolute thrill as learners are not pressured and are somewhat unconscious of the process of learning that takes place. The joy happens when the hidden factor that brings success in gamification is enjoyment (Largo et al., 2016). The excitement is due to certain elements that target our cognitive behavior and position our body systems for specific surroundings. Positive feelings are essential in any learning environment. To maximize the learning potential, a game should be educational and stimulating. This can be achieved if such a game is developed based on an appropriate teaching methodology and a practical game theory (Elorriaga, Antunez, & Nicolino, 2016; Jantke & Hume, 2015; Marklund & Taylor, 2016). Hence, the call to develop a carefully designed game that could stimulate learners' learning potential serves as the motivation for this particular study. A fun game (Throw Back Time – TBT) is developed by the researcher uploaded into mobile devices according to the theory that governs the game's development, which is the Theory of Variation (Marton & Booth, 1997). According to Marton and Booth (1997), the fundamental aspect of learning is for students to notice the critical element through variation and not sameness. The principle is the essence of designing the grammar exercises in the game. It is also used as a teaching aid in this study. TBT is a digital board game where players have to correct errors of grammar tenses and aspect. Elements of challenge, competition, motivation, and reward are included in the game to create a fun and engaging learning environment.

2.0 Literature Review

Different teaching materials that educators keep in the classroom and their approaches will affect what learners learn (Bowden & Marton, 1998; Marton, 2015). Educators should ensure that learners are conscious of the different methods they use (Fazeli, 2012; Vivian, 2008), and they have to realize the connection between personality and academic accomplishment (Eysenck, 1967; Fazeli, 2012). The theory does not highlight the teaching methodology but reinforces the necessary aspects when students learn new things. The core of the idea lies in discernment, vital in learning (Marton, 2015). Several studies by Marton and Morris (2002), Marton and Tsui (2004), Annie (2011), and Lindström (2017) indicate that educators who use the Theory of Variation are likely to be successful in teaching compared to those who do not use the theory.

There are four patterns of variation: contrast, separation, generalization, and fusion (Marton & Runesson, 2003). Each pattern indicates different things, for example:
- Contrast – determining variation between two values
- Separation – setting apart aspect with varying values from invariant aspects
- Generalization – allowing varied appearances of the same value
- Fusion – having several critical elements simultaneously (Marton, Runesson, & Tsui, 2004, p. 16-17).

Thorsten (2015) believes that the variation theory elements help teachers prepare an excellent pedagogical design that assists learners in learning. However, Lo (2012) stresses that using the features of variation cannot guarantee learning discernment. Teachers first have to identify learners' problems in learning and assist them in establishing powerful ways of seeing the relevant elements they need to learn while helping them improve their difficulties in learning.

Several studies in language learning and grammar that have successfully benefited from the Theory of Variation include those on teaching reading (Tong, 2012), writing (Thorsten, 2015), present tense (Annie, 2011), present perfect (Annie, 2011; Roy, 2014), adverbs (Roy, 2014), present progressive (Lindström, 2017) and present perfect (Ott, 2017). Many other studies that use the Theory of Variation are from natural science class (Lo, 2012; Ott, 2017), but fewer studies have focused on tenses and aspect (Ott, 2017; Lindström, 2017). To address the gap, the researcher had utilized the elements in the Theory of Variation to design grammar questions in the Throw Back Time (TBT) digital game.

A learning approach that applies to digital learners is through digital games. (Prensky, 2001) believes that acquiring knowledge via games could be a trend for the future. The advent of technology has brought innovation to language teaching and learning. One such technology is Digital Game-Based Language Learning (DGBL), which reinforces gameplay in exposing learners' learning contents. The evolution of DGBL started in the 20th century during the global technology explosion. The expansion allows digital generations easy access to cell phones, computers, music and digital games in their lives. Prensky (2001) points out that educators must adapt their teaching approach based on digital learners' needs. Elorriaga et al. (2016) recommend five crucial elements into game-based learning for a successful teaching approach:
1. Aesthetic - The display of images in the form of sensory stimuli to boost inspiration.
2. Connection player-game - Both players and games negotiate with each other.
3. Motivation - The game should consist of a few challenges whereby the challenges improve as the players progress.
4. Promote learning - The game integrates psychology aspect, 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.

3.0 Methodology

Using content analysis, qualitative data clarified how elements in the Theory of Variation supported the design of the digital board game questions. Each type of question in the game was described according to the specification taken from the theory. The specifications include the elements of contrast, separation, generalization, and fusion. Each helped to support the tenses and aspect grammar questions in the TBT game.

The sample population for this research was the Teaching English as a Second Language (TESL) Foundation Programme students of Universiti Teknologi MARA (UiTM) Dengkil Campus. Forty-seven students who participated in the study were randomly grouped into 23 pairs, with one participant working alone. For ten weeks, each team of students got to keep a seven-inch tablet, loaned for the experiment's duration. The instrument was the digital board game Throw Back Time (TBT) uploaded into the tablet. TBT consists of 664 grammar questions, which the researcher adapted from UiTM textbooks. The content development of the items and the game had gone through systematic, rigorous, and appropriate assessment evaluation in the research's preliminary work.

Firstly, an experienced English language acquisition and grammar professor edited the questions. Secondly, during the developmental stage of the TBT questions, the researcher also sought advice and worked closely with the expert of the Theory of Variation, Professor Mun Ling Lo from Hong Kong University, via email. Each type of question was checked, commented, and amended by Professor Mun Ling Lo to ensure that the questions complied with the theory's specifications. The specifications include the elements of contrast, separation, generalization, and fusion. Thirdly, two experts in Computer Science and Mobile Learning examined the design of the digital board game. Their comments and suggestions helped further in improving the creation of the game. The feedback from the expert on the Theory of Variation and the input from the expert on Computer Science and Grammar were essential in the study. The feedback and input ensured that the game content was in line with the theory's principles, the game design, the learning approaches, and language acquisition. As the case study only involved first semester TESL foundation students of UiTM Dengkil, the generalization of the findings should be evaluated within the confines of the study's setting.

4.0 Findings
There are 664 sets of questions in the digital board game based on six formats, and for this paper, the researchers only highlight the final design, which is to fix the sentences using the correct grammar rule. The elaboration of the strategy is as follows:

Figure 1: Fix the sentences using the right grammar rule

Learners have to choose one correct grammar rule from the two options shown in Figure 1. Once the learners click on the answer, they can immediately check their answer by clicking on the question mark (?) button (on the right-hand side) that provides feedback for each question (Figure 2).

As shown in Figure 1:
We wait for Jane when suddenly Louis comes around the corner - The sentence is incorrect as both clauses are in simple present. *We waited for Jane when suddenly Louis was coming around the corner*. The sentence is also incorrect as the first and the second clauses do not show that an action in the past was interrupted by another act.

Figure 2: The feedback of the answer in a green box

The green box in Figure 2 states the following:

The correct grammar rule will be: use 'were waiting' for the first clause to show a past action was in progress and 'came' for the second clause to show that it interrupted the first action as in – 'We were waiting for Jane when suddenly Louis came around the corner'.

The following section highlights the rationale for the elements used that support the design of the question. The participants had to fix the sentences using the correct grammar rule. The design presents (i) the patterns of variation involved, (ii) the patterns of the questions, (iii) invariants, (iv) variants, (v) what can learners discern? And (vi) the elements used that support the design of the questions as described below:

1. The patterns of variation involved:
- Separation - separate aspect by varying values from an invariant aspect
- Generalization - allowing varied appearances of the same value

2. The sentence design: Two grammatically incorrect sentences where learners must correct the sentences using the correct grammatical structure.

3. Invariants: The object, actions, and events are similar.

4. Variants: Tense aspects of the action, verb, and meaning.

5. What learners need to discern:
- The underlying principles or grammar rules
- The essential and unimportant elements in making decisions about the correct use of tenses

6. What are the elements used to support the design of the questions?

Learners have to separate the correct and incorrect grammar rules and also to generalize the use of grammar rules. Generalization enables learners to see the relationship between the use of each tense and aspect and its meaning. Learners also have to examine beyond each sentence and use more than one clue to help them distinguish the correct tense. Other than that, learners have to understand why different tenses or aspect should be used in each sentence and discern its meaning. Learners can also check the time marker or the context in choosing what tense is appropriate.

The sixth format involves an error analysis type of question and is the last design in the game. It is the most challenging question because learners have to discern the whole structure of grammar tenses and aspect, including their rules and usage, and to be able to use their knowledge to correct the sentences.

Overall, the elements of contrast, separation, generalization, and fusion (from the researchers' previous studies) help learners see each tense and aspect better. Contrast, for example, allows learners to differentiate two values or more, for instance, between the simple present with present progressive or simple past with past progressive. When learners are alert of a value (simple present) by contrasting it with another value (present progressive), it allows separation to take place. On the other hand, generalization occurs when learners can see at least one other matter in the same dimension of variation. For instance, with generalization, learners are aware that simple present carries different usage (to show perception, senses, mental state, or describe illness or schedule). Hence, they can associate it with other usage. Lastly, fusion takes place when learners see the use of two or multiple tenses or aspect simultaneously. Fusion allows learners to observe how the tenses and aspect are connected to or different from one another.

The findings from this study reveal how TBT via MALL helps enhance learners' knowledge of grammar tenses and aspect and how their account of the importance of the digital board game. Further research is necessary to understand better how TBT via MALL or gaming can further be improved to help learners optimize the learning benefits in learning grammar tenses and aspects.

5.0 Discussion

The Theory of Variation states that to make learners understand what they learn and to boost their analytical and problem-solving skills, teachers need to present them with the correct and incorrect elements of the object of learning (Lo, 2012). Learners should not be given the correct understanding of tenses and aspect all the time. In the context of this study, learners saw the incorrect version of tenses and aspect, and then they were asked to improve the error. Elorriaga et al. (2016) mention that one of the four essential criteria that affect how learners formulate language input is by 'active construction' where learners actively take charge of their learning by solving the questions themselves without being spoon-fed by the teachers.

The rationale for the questions to be introduced in six different formats (two answer options, three answer options, four answer options, what is the similar sentence with the given one, what is the grammar usage of the sentences (from the researchers' previous studies) and fix the sentences using the correct grammar rules (from the current research) is that according to the Theory of Variation, "students may have qualitatively different ways of experiencing the same situation, so this generates different experiences of the same object of learning for each student" (Lo, 2012, p. 29) which is also supported by Ur (1996). What the researcher wished to present in the tenses and aspect might be understood differently by different learners. Therefore, the questions are in various types to cater to diverse learners and to help develop consciousness and apprehension of grammar structures in terms of form, meaning, and correct usage of these structures. Many studies concur with this claim that the teaching and learning of grammar should involve how it works through different grammatical concepts (Azar, 2007; Baugher, 2012; Brown, 2014; Jean & Simard, 2011; Larsen-Freeman, 2015). In other words, several patterns of variation and invariance are vital to acquire the object of learning. One will be good at learning something by seeing the elements through a wide range of variation (Lo, 2012; Marton & Booth, 1997). *One approach fits all* is not a suitable means to cater to learners with other learning needs. Indeed, learners have other characteristics and learning attributes that make each different (Heift, 2007; Slavuj et al., 2015; Vandewaetere, Desmet, & Clarebout, 2011). Thus, teachers have to consider learners' different learning needs.

6.0 Conclusion & Recommendations

The study's novelty is incorporating the Theory of Variation in designing the questions in the Throw Back Time (TBT) game. Learners could experience the variation of the critical features where the characters, actions, and events in the sentences were similar, but the linguistic and discourse aspect were varied. The theoretical elements of contrast, fusion, separation, and generalization have helped learners develop consciousness and understanding of the form, meaning, and the correct usage of grammar structures. The strategy's application presents empirical evidence of an innovative way to teach grammar in a fun and exciting way. The traditional approaches of grammar teaching are being replaced by a more recent innovative approach in education. The conventional 'teacher-centered' methodology gives way to more cooperative, interactive, and flexible avenues between teachers and learners. Flexibility in learning via MALL allows learners to have continuous practice anywhere and at any time, which helps learners to improve their grammar knowledge and understanding. Therefore, one viable approach to teaching grammar integratively is using digital games that focus on form through meaningful activity and context.

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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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