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Gamification on Phrase Building Training Application*

Sungyoung Lee and Sora Lim

Hankuk University of Foreign Studies
lee_sungyoung@hotmail.com, angelalim@hufs.ac.kr

Abstract

Computer Aided Instruction (CAI) has been considered as a powerful device for teaching and learning second languages. However, contrary to expectations, many have assessed CAI to be less than satisfactory in terms of their efficacy and effectiveness. It is because of boring and monotonous characters of educational applications. To complete all tasks in educational applications requires great efforts and patience due to lacking fun and amusement. Therefore, how to add amusement elements on applications is a big deal for the developers of e-learning applications for language learning. In this paper, in order to seek a solution for this, we will show a way to add these elements by gamification of an application for practicing building phrase which is mostly difficult to attract learners' interests in spite of its importance in language learning.

Keywords: *e-learning, language learning, gamification, phrase building, fun and amusement*

1. Introduction

Today, along with the rapid advancement of computer and information technology, e-learning, u-learning or smart learning are in fashion in education field.[1] This is indubitably true in language teaching/learning area. Many useful applications have been developed and employed to help language learners in improving their performances and proficiency levels of target language.

Some applications are especially suited for grammatical corrections. In fact, correcting spelling and grammar mistakes in word processing program is probably the most well-known example of this application. There are some others suitable for enhancement of conversation skills using ready-made conversational patterns [1-2]. By the way, it is rare to find applications well-suited for writing ability. In language education field, writing ability is no less important than conversational fluency. At works, higher writing ability is frequently asked for documentations.

In this respect, it is worth developing a writing assistance application to enhance learners writing ability. Until now, writing assistance has been realized in traditional ways. Language learners send their writings to assistants and these assistants provide them with feedback or suggestions that will support their further learning. Providing corrections made by personal assistants, namely qualified teachers, is certainly the best way to enhance learner's writing ability. But it is not a conceivable option that can be easily incorporated into autonomous knowledge acquisition based on e-learning applications where personal assistance is mostly excluded.

So, if we want to develop such a writing assistance application, it is necessary to create a special environment where the number of possible syntactic and semantic combinations is limited and predictable. There is also another thing that we need to think is how induce

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* This paper is a revised and expanded version of a paper entitled "Consideration on Gamification of E-Learning Applications: Case study with Phrase Building Training Application" presented at MulGraB 2014, occurred at Hainan, China, on December 20-23, 2014.

[1] In this paper, we do not differentiate between e-learning, u-learning and smart learning.

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end users to be more interested in accomplishing the tasks that need to be done. Unlike entertainment applications, educational applications are always faced with difficulties in linking performances/achievements with compensation. In fact, there are difficulties in determining what compensation should be made. In educational applications, life and death, valuable game items and sometimes even sexual images are used to encourage and compensate each user. However, the above mentioned compensation or rewards elements are not suitable for educational applications that men and women of all ages uses.

In this context, apart from structuring writing assistance applications, we would also suggest appropriate rewarding solutions that could attract and engage end users of educational applications to learn and take action. For this, we review some educational method that are based around the principles of gamification. In this way, we look at realistic ways to systematically link and integrate gamified e-learning models with traditional pedagogy.

2. Basic Concept

Traditional ways of teaching are sometimes turned out as the best educational method in language learning. The circumstances are not very different when it comes to the discourse on phrase building training. In fact, many have assessed computer aided instruction (CAI) to be less than satisfactory in terms of their efficacy and effectiveness. Furthermore, when it comes to maximizing learning for foreign language learners, instructors' lecture strategy and learners' competence in self-led learning and motivation have been argued as more effective in enhancing learning performance, notwithstanding the importance of learning contents, material and building of a learning management system (LMS) [3-6].

Therefore, in an effort to solve and reapply the issues of existing e-learning materials that fail to draw the users' interest and thereby hinder immersion into the learning process, we suggest a gamification framework that combines education with entertainment, according to the different competence levels of learners, and then derive ways to design and operate an efficient learning environment.

Our gamification framework is partially consistent with the Input-Process-Outcome Model of Garris, Ahlers and Diskell [7], who identified an inherent instructional model that incorporates certain characteristics of games, and then illustrated it by using a simple diagram that describes gamified learning processes (see Figure 1).

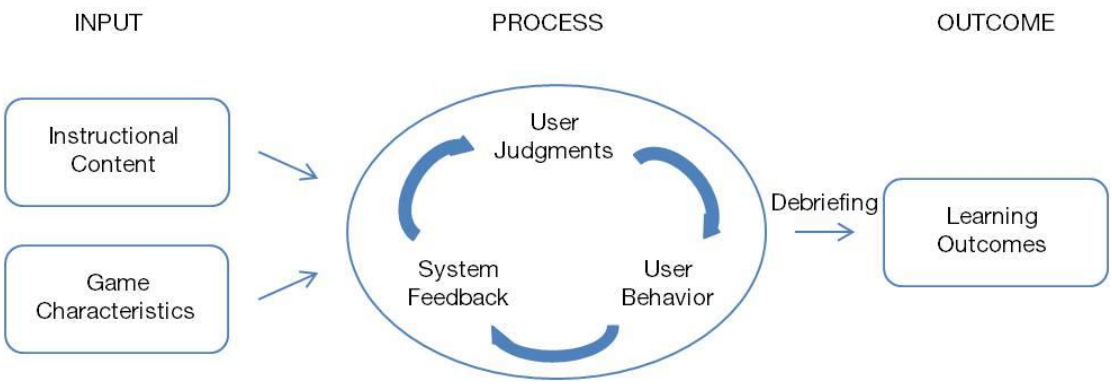

Figure 1. Input-Process-Outcome Game Model

The debriefing process mentioned in Figure 1 is a fundamental link between game experiences and learning. It enables the learner to reflect on what occurred in the game experience, analyze why it occurred, and learn from his or her mistakes and experiences

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to make improvements in the future. In short, through this debriefing process, the learner can transform his or her game experiences into learning.

However, although based on gamified learning processes, our gamification framework involves different phases of instruction. According to the instruction model of Gagné [8], we extended the previously mentioned Input-Process-Outcome Model to incorporate into our gamification e-learning application, which is summarized in Figure 2.

To teach phrases to children at early age, we used to use word cards letting them arrange those cards in special order to build the proper meaning. This is one of the most conventional teaching method but nothing to sneeze at. Therefore, our conceptual framework was conceived with this traditional teaching method and developed to convert it to e-learning application form. In order to make more efficient these instructional processes, we suggest developing an educational game.

According to the above-mentioned theoretical backdrops, we start displaying words on application programming interface (API) asking end users to arrange them in proper order or in a correct sequence so as to form a meaningful phrase. The following example serves to make our conceptual framework clear and comprehensible (see Figure 3).

Given limited number of words, language learners can build various grammatical or non-grammatical phrases. As smart-learning applications ultimately aim at self-reliant without human assistance, error correction functions should be included. Most word processors contain a spelling and grammar checker. And in some cases, they suggest alternative phrase structures comparing with built-in standard patterns. Even though these functions are helpful in a sense, they have certain limitations and are not suitable for language learners or enhancing their writing ability.

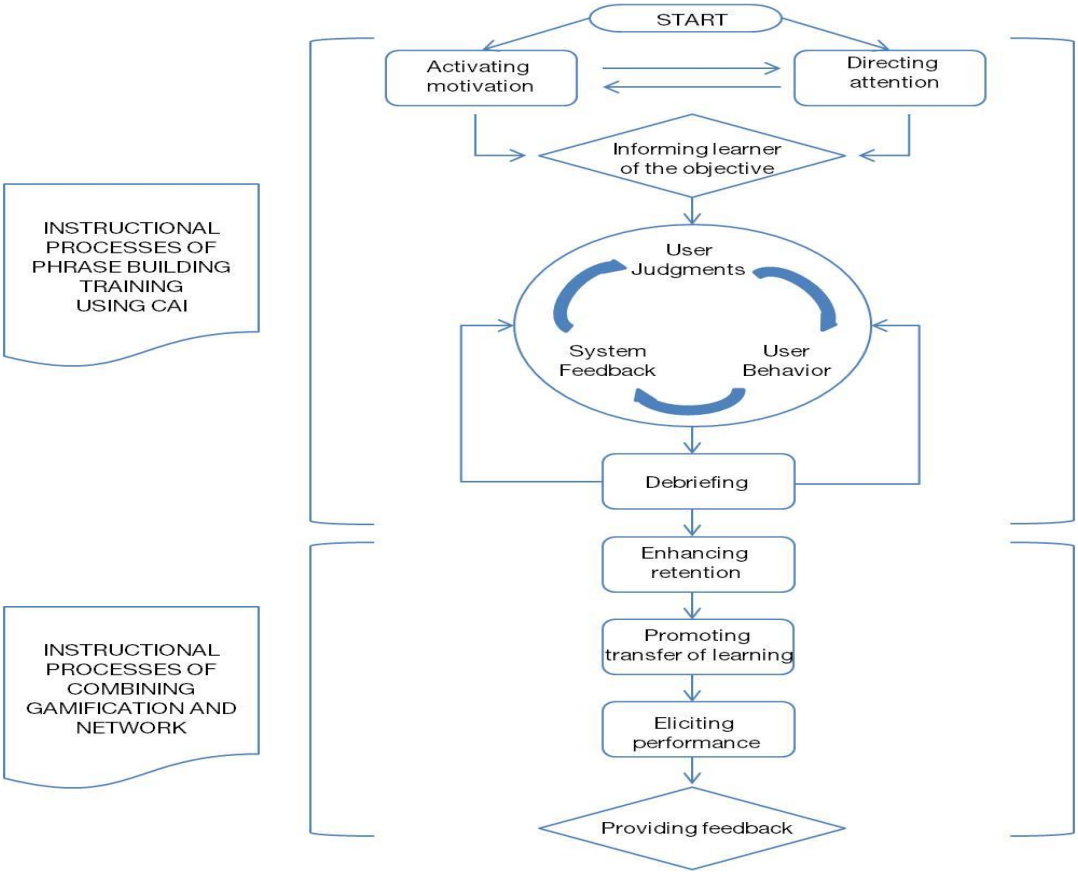

Figure 2. Instructional Processes of Gamification E-Learning Application

Ex: Make a sentence with following given words using one at a time.

Words {Tom, Mary, give, a, book, to}

Figure 3. Example of Phrase Building Training

In order that an e-learning application may become self-reliant without human assistance, a number of cases should be limited in predictable scope. This can be done by calculating all probabilities to all possible grammar productions of those given limited words (see Figure 4).

CASE 1 : Tom gives Mary a book.

CASE 2 : Mary gives Tom a book.

CASE 3 : Tom gives a book to Mary.

CASE 4 : Mary gives a book to Tom.

Figure 4. Example of Grammatical Cases

Asking to complete a phrase with given words is not different from what is done with traditional word cards. But in forms of CAI it does stand-alone and starts to use an interactive self-study format that allows learners to get feedback on their writing, by way of one-to-one tutoring. In the figure above, with given 6 words, the number of possible meaningful phrases is 4. And possible related grammatical errors are also predictable such as subject-verb agreement, omissions of article or preposition. All predictable grammatical errors that end users may produce can be corrected immediately and explained in detail comparing ready-made data (see Figure 5).

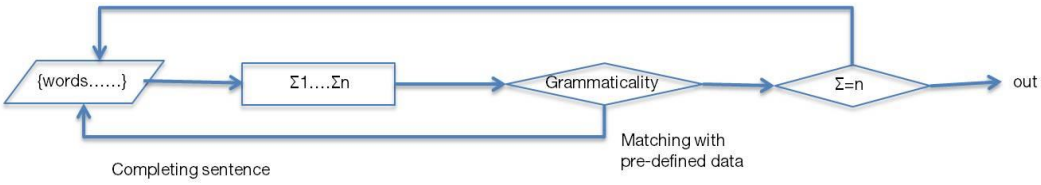

Figure 5. Flowchart Illustrating the Stages in the Process of Phrase Building Training in CAI

When the number of given words is small, the above approach is not bad. But if it is increased to an unlimited number, it will be not possible to record all grammatical sentences and all imaginable semantic-syntactic errors in archive. We believe it is neither possible nor desirable, for economic reasons. Natural language is very complex and too complicate to be digitalized. Linguistic theories are very difficult to be converted into information technologies. But the question of how we can handle linguistic data without simple accumulation of all possible cases is the biggest barrier towards language digitalization. This is the problem which should be overcome at last in order to create a perfect artificial intelligence (AI).

Besides all problems still unsolved, theories of the generative grammar seem to be most useful to design such a linguistic component without big archive, because

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they pursue rules that generate only syntactically grammatical sentences. For example, under the generative perspective, the Case Theory rules out following sentence without any necessity of accumulating all possible grammatical cases (see Figure 6).

* Men to love women are crazy.

Figure 6. Example of Applying the Case Theory

According to the Case Theory, a noun is assigned a case only when a head possessing [-n, +v] feature governs it [9].[2] Theory internally, men in the construction of [men to love Mary] occupying the subject position does not receive any case because the infinite is not the nominative case assigner. In this theory, accusative case is assigned under government while nominative case is assigned via Spec-Head Agreement (SHA) (see Figure 7).[3]

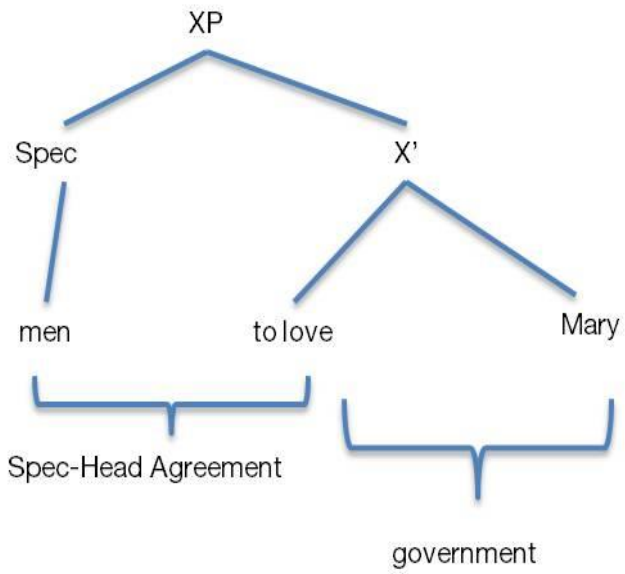

Figure 7. Linguistic Phrase Structure Rules

Here, it is not necessary to pile up all grammatical sentences to rule out ungrammatical ones. All what need is feature classification according to word class and its syntactic structure. In the long term, constructing theory based language component is more recommendable as it has an unlimited power of grammatical correction. But this solution is too far away to come. This is beyond our discussion and left for coming studies.

[2] Government was very important concept in generative framework for case assignment until Minimalist Program appeared in 1994. Governing is very special configuration between words in a sentence.
[3] In the recent generative frame under Minimalist Program, syntactic cases are not assigned any more through government. Case features are checked via SHA.

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3. Gamification

3.1. Applying Gamification Elements

By definition, the process of applying game-like-elements and game mechanics to a non-game context is called gamification [10]. Accordingly, a game itself cannot be gamified, because if it is already a game, it is not a form of gamification. Huang and Soman [11] note that there are two major elements that determine whether gamified application to the learner is successfully applied, which are summed up in the following way:

• Self-elements can be points, achievement badges, levels, or simply time restrictions. These elements get learners to focus on competing with themselves and recognizing self-achievement.

• Social-elements on the other hand, are interactive competition or cooperation, like for example leaderboards. These elements put the learners in a community with other learners and their progress and achievements are made public.

These two major gamification elements satisfy basic human desires, creating the addictive learner experiences that motivate learners to take certain actions. For that reason, using them individually or together, it's possible to build a highly motivational learner experience. Regarding the interaction of basic human desires and game mechanics, it's possible to propose a matrix as follows (see Figure 8).

Game Mechanics	Human Desires					
	Reward	Status	Achievement	Self-Expression	Competition	Altruism
Points	●	●	●		●	●
Levels		●	●		●	
Challenges	●	●	●	●	●	●
Virtual Goods	●	●	●	●	●	
Leaderboards		●	●		●	●
Gifting & Charity		●	●		●	●

Figure 8. Interaction of Basic Human Desires and Game Mechanics [12][4]

Taking into account all these factors, we decided to plan and develop our gamification e-learning framework using some of the most common features of game mechanics.

3.2. Scoring

The most considerable weakness in e-learning applications, in spite of their advantages, is that they are boring. This looks like somewhat inevitable due to the property of education. Gamification, in some way or other, can be a solution to

[4] The green dots signify the primary desire a particular game mechanic fulfills, and the blue dots show the other areas that it affects.

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overcome this weakness. For example, making the longest phrase can be one of possible games that we can imagine (see Figure 9)[5]:

Ex: Make the longest phrase as possible as you can with given words, using one at a time.

Words {I, work, overslept, for, late, that, was, morning, and}

CASE 1 : I overslept. //2 words

CASE 2 : I was late for work. //5 words

CASE N : I overslept that morning and was late for work. //9 words

Figure 9. Example of Gamification of Phrase Building Training

The above example gives 9 words. And language learners are free to build phrases in various lengths. But the longest one is Case N that contains all nine words. Longer phrase gets higher score. In the course of combining given words, players use their language competence more actively producing phrases of various length and meaning. This can be an element with which gamification is possible because scoring is possible according to the length of sentences.

The main purpose of this kind of application is to maximize learners' language capability triggering their desire to win. To satisfy this, it is good to limit available time for making a phrase whatever its length is. Time constraint is very efficient to exercise quick linguistic reaction. This is more suitable for middle and advanced level users. However, phrase length and building speed based evaluation system seem to be efficient for all levels of players.

3.3. User Friendly Interface

First thing we have to take into consideration is easiness of playing game. If players are asked to use keyboard in order to enter or arrange given words to complete phrases, players will feel inconvenient and give up without playing twice. In order to avoid this problem, it is conceivable to offer players a crossword puzzle like presentation below (see Figure 10).

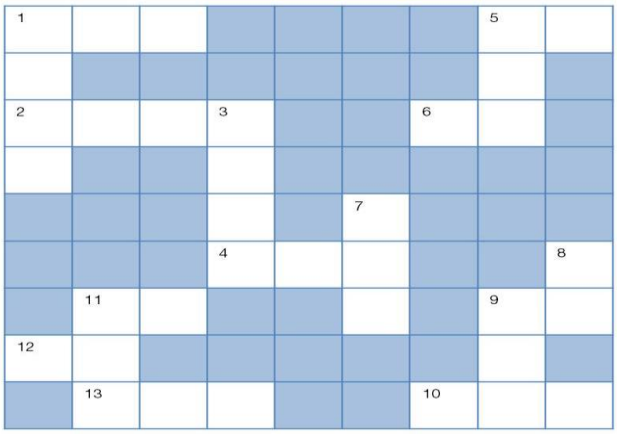

Figure 10. Crossword Puzzle as a Basic Form of Gamification

[5] Besides this, we can imagine many other types of game. One another alternative instead of phrase length, counting number of built phrases is also suitable for gamification.

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Furthermore, if every given words are marked by features that constraint which class of words can precede or follow it, this will prevent producing ungrammatical order of given words (see Fig.11).

Figure 11. Preventive Features Against Ungrammatical Order Producing

For example, supposing α is noun, ψ should have [-N] in romance languages that do not allow compounding noun without preposition. It not only allows to give words but also facilitates building phrase by clicking mouse or touching panel instead of typing through keyboard. When phrase is done, clicked cells become inactive preventing its double use. Players can build phrases one after another as long as remain possible combinations. If there is no possible combination, computer stops game automatically displaying score. Score is calculated based on the length of each phrases and the number of well-formed phrases. The number of columns and rows is user adjustable according to personal levels and also to devices.

3.4. Storytelling

The aim of this application is increasing language ability through phrase building exercise. Its basic idea is making phrases with given words. However, this may get players feel pressured.

To compose phrases, stories are bare essentials. Without stories and ideas, it is not easy to make phrases even in his or her mother's tongue. That is why we think about offering contexts to help players get ideas more easily to arrange given words in meaningful phrase forms. First step is offering graphic images containing stories that can be expressed in given words. The second step is using already known stories like fairy tales. It requires more prudence to select stories in which end users play game. If an unknown story is selected, the end users will suffer from uneasiness and difficulties to play.

If context is confined and if players are familiar with it, they can build related phrases more easily saving time and effort. Besides, adding stories on simple games makes them more attractive and facilitates storytelling which is dependent on the leveling or awakening of hope to progress to the next stages.

3.5. Networking

As it is already mentioned above, language-learning applications are boring in general and ask learners great efforts to complete all tasks. Getting higher score can be a kind of compensation or a reward for learners but it requires more to activate and stimulate their desire for winning. It is believed that gamification network is suitable for this purpose.

Unlike entertainment applications, namely games, educational applications have the limits by nature as we have mentioned before. Even though we succeed in gamification, it will be still difficult to keep the learners playing the gamified e-learning applications due to lack of compensation.

Scoring is one of the most employed bait to attract game players. Most game applications are designed to make players try to get higher score during the play. The sense of achievement recording higher score or surviving longer time is the main reason that makes players bound up in games. Of course, fun is a major premise. If a game is neither fun nor challenging, scoring system is meaningless no matter how perfect it may be.

Applications for language learning have no entertaining elements by nature. And they are not so challenging too. It is believed that a breakthrough is in networking,

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because competing with others is itself challenging and brings the sense of achievement. In this respect, networking all users of the application for building phrases forms a competition as other games.

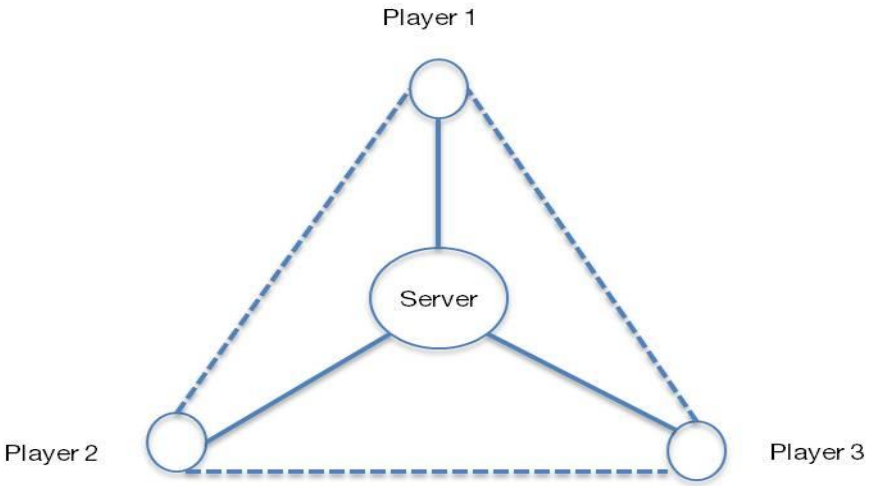

Figure 12. Gamification Network

Every users of the application can play only with a computer independently isolated from the others as it is in most language learning applications. But in this application that we have discussed, they can be interlinked via servers or via P2P type direct connection. Connecting to the server or to other users, he or she enters into a world of competition where exist winners and losers. Here getting higher score has meaning as rewards or compensation for effort.

Those who learn a language are not alone. And they are elsewhere not only classrooms but also in work areas or in private language courses and so on. If they can play the application that we are conceiving in network, they will be able to fulfill themselves through competition with others.

4. Conclusion

We believe that composition is, according to one's own experiences, one of the best ways to learn foreign languages. It is good to increase phrase building ability and helps ultimately enhance speaking ability. And now we think that e-learning solution can help increase phrase composition ability of foreign language learners. In recent years, e-learning or smart learning has been rapidly developed. However, applications for practicing building phrases have not received much attention because its inherent difficulty to stand alone. Each learner has his or her own writing styles and moreover, still a computer cannot automatically correct human individual errors. Besides, frequency of use of e-learning applications for language learning is considerable low. In our view, the quality of being boring and monotonous is largely responsible for this. Then, in designing an application for increasing building phrase ability, developers should consider following two things at least: limited condition to be a stand-alone and fun. To be an application stand-alone without or independent from constant human assistance, all variations should be predictable. This can be realized with limitation on words. And gamification can be useful to add amusement feature on e-learning application.

From the above process, the significance of applying a gamification e-learning framework to language education can be summarized as follows:

• It is possible to trigger more interest and motivation into the learning process.

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• It enables self directed learning that allows learners to decide when, where, and what to learn.

• Mobile and ubiquitous learning becomes possible.

• Because of its instantaneous response/immediate feedback to the answers elicited, presence in the learning process is further enhanced.

• It offers individually customized learning through one-to-one interaction.

Although the gamification e-learning framework proposed here has limitations, it is important to note that this research shows that gamification has tremendous potential in the realm of education, and verify that gamified e-learning systems offer a potentially effective method for language instruction.

Acknowledgements

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Authors

Sungyoung Lee, is a professor of Hankuk University of Foreign Studies (HUFS), Seoul, Rep. of Korea.

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Sora Lim, is an assistant professor of Hankuk University of Foreign Studies (HUFS), Seoul, Rep. of Korea. From 2009 to 2012, she was a senior researcher for the Institute of Latin American Studies at HUFS. She has conducted research on multimedia learning materials for university students. She is currently interested in designing AR-based language learning model and digital cultural mapping. She graduated from HUFS with a B.A. degree in Portuguese. She received her M.A. and Ph.D. degrees in Comparative Literature from Federal University of Rio Grande do Sul, Brazil.

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