ENHANCING YOUNG LEARNERS' ENVIRONMENT VOCABULARY VIA GAME-BASED DIGITAL LEARNING USING ZEP QUIZ

Ainaya Shafa Malikha, Rudi Hartono, Sri Wahyuni.
Master's Program in English Language Education
Semarang State University
Semarang, Indonesia
ainayasm@students.unnes.ac.id

Abstract

As we can see now that the technology use has become habit for everyone in this digital era, and most of them are millennials, gen z, and gen alpha. Digitalization is being prioritized in a lot of aspects, include the education field. On the other hand, some of young learners still has low awareness for the importance of environmental issues, such as sustainable lifestyle. The aim of this study is to investigate about the effectiveness a web game-based ZEP Quiz as a platform for digital learning in order to improve the environmental vocabulary for young learners or elementary school level of students in this digital era, so they can know better about environmental issues, build awareness from an early age, and it can assist them for English learning in the future as their second or third language. This research uses mix-method approach, the data collected through pre-test and post-test in both experimental group and control group for quantitative, and the data analyze using descriptive statistic and inferential statistic. Whereas the qualitative, the data collected by interview for selected students based on specific criteria to know about their experiences in the learning process. The qualitative data analyzed with thematic analysis. The results of using a web game-based ZEP Quiz as a digital learning platform is expected to enhance the vocabulary in students, especially environmental vocabulary, and also improve the motivation of students in English learning through this activity. The findings reveal how using a web game-based ZEP Quiz can be an innovation method for English Language Teaching (ELT) to young learners' students.

Keywords – digital learning, young learners, game-based learning, ZEP Quiz, vocabulary enhancement

Introduction

The technology use has become habit recently, and it influences for every aspect in human daily life, include the education field. The education system, especially in Indonesia is now getting a significant transition phase, with the massive enhancement of technology through digitalization for learning process. In simpler terms, teachers and learners are expected to use digital platforms as facilitation in the learning process, particularly in English Language Learning (ELL). In order to support teaching and learning process, digitalization can be implemented in various ways by using digital platforms. Learning activities such as game-based learning, video-based learning, interactive multimedia learning, mobile learning for instances, which can motivated students to make meaningful learning process. According to Mayer (2009), he stated that learners get information effectively through words and pictures simultaneously than only text form, moreover human have two ways to acquire information, which are visually and auditory or verbally process. Therefore, we can use digital platform that provide such pictures, words, and even sounds. UNESCO (2023) states that learning process by using technology can improve learning qualities, since

technology can assist teachers and learners to strengthen quality of learning process, offer learners more opportunities for exercises, and personalized instruction for each student's needs. Furthermore, as we can see and recognize environmental issues, such as extreme weather, plastic waste, pollution, and natural disasters are occurring more frequently in daily life. According to United Nations Environment Programme (2024), argue that we are facing the triple planetary crisis in this world currently, which are climate change, biodiversity loss, and pollution. As human being living on Earth, we need to overcome and resolve those environmental issues to create a better future. Environment conditions have a significant impact for all of living creatures, not only human.

Learning process through digital platform generally projected to construct engaging, interactive, and student-centered learning environments. Learners can acquire the materials easily, collaborate with peers, and develop information by themselves in learning process. As state by the constructivist theory of Piaget (1952) learners can obtain their knowledge actively through learning experiences, exploration, and interaction. This indicates that digital platforms are considered as a tool to support student-centered learning and interactive learning setting. Some of young learners get difficult experiences while learning vocabulary, especially English vocabulary. It is widely known that vocabulary mastery involves some repeated exposure, meaningful also active participation of the learners in the learning process. According to Wilkins (1972) we cannot communicate effectively if we do not have a strong and appropriate vocabulary knowledge, as well as for the learners. Since vocabulary is an essential aspect in the language learning. However, some teachers are still delivering of the vocabulary through conventional methods or teacher-centered in learning process, so that some learners, especially in the level of primary students may less motivation and participation. Learners are likely to learn through interactive activities to make a meaningful learning by implementing digital platform, such game-based learning may support learners' engagement in English vocabulary learning. As explained by Prensky (2001) modern learners are getting more motivated and engaged in learning process that applied digital game-based learning method. Furthermore, there are still low of concern about environmental issues among young learners. Although the current generation can adjust to the technology development quickly, but some of them have lack of awareness in environmental issue, so we must remind by encourage young generation to have responsibility in order to protect and preserve environment. Environmental vocabulary is not effectively integrated in the English learning material for elementary school students explicitly, for school that implementing of *Merdeka Belajar* Curriculum in particular. The materials for elementary school students mostly focus daily vocabulary, which lead the students may have low exposure to the environment vocabulary in English. In addition, gamification affects learning process for students' motivation and also participation (Hamari et al., 2024), so using game-based as digital platform for learning, ZEP Quiz for instance, may facilitate to familiarize young learners with environmental vocabulary.

In accordance with the objectives that dealing with the implementation of web game-based ZEP Quiz as platform for enhancing environmental vocabulary for young learners, this research formulates several research questions. Quantitatively, this research examines how the environmental vocabulary knowledge of young learners indicates before and after

the implementation of a web game-based ZEP Quiz, as well as the significant improvement in young learners' environmental vocabulary after implementing the platform. Whereas, for qualitatively, this research explores the perceptions and engagement of young learners regarding to the implementation of web game-based ZEP Quiz in the learning process, include how web game-based ZEP Quiz as the digital learning platform effects on environmental vocabulary acquisition for young learners.

This research is investigated about the effectiveness of implementing a web game-based ZEP Quiz as a platform for digital learning in order to enhance the English vocabulary, especially environmental vocabulary for young learners. It expected that this research is considered to give some insight for interactive teaching and learning activities, improve students acquisition about environmental vocabulary, and support the utilization of technology-based learning for English Language Teaching (ELT).

Methodology

This research applies a mixed methods for research design to analyze of the effectiveness of web game-based digital learning ZEP Quiz, as well as the exploration to the experiences and viewpoint of young learners regarding to the learning activity. Creswell and Plano Clark (2018) describe that research with mixed methods design authorizes the researcher to conducts both quantitative method and qualitative method to enhance more detailed explanation according to the research problem. explanatory sequential is the type of design that this research employs, which is the first stage of process is quantitative, and leading to qualitative for the next stage. Creswell (2014) state that explanatory sequential design is compatible for research with qualitative data to provide detailed results. Mixed Method design in this research is expected to deliver both of statistical findings on English vocabulary enhancement integrated with empirical insight into the engagement and perceptions of learners according the use of web game-based ZEP Quiz.

Quantitative

Sugiyono (2019) describe that quantitative research examines a particular population or sample, which the analyze of the data by using statistical techniques and the data involve through research instruments. Sadish et al. (2002) describe a quasi-experimental is conduct by researcher to know about the effects by comparing groups. This research applies a quasi-experimental research design, which conduct a pre-test and post-test with non-equivalent, and this indicates that the design includes two groups. An experimental group and a control group. The experimental group acquire treatment via a web game-based digital learning using ZEP Quiz, whereas the control group acquire treatment using conventional instruction without a web game-based ZEP Quiz. This research design accommodates the researcher to evaluate in comparison of the enhancement of English environmental vocabulary in young learners between experimental and control groups through the implementation of pre-test and post-test scores, and provide the evidence of the effectiveness of the educational strategy.

Young learners in the level of elementary school are the subject of this research. There young learners are in the fifth grade, who learn English vocabulary, especially environmental vocabulary. It determined from two regular classes at one elementary school, which one class is for experimental group and one another class is for the control group. As described by Fraenkel et al. (2012) that

the sample of quasi-experimental is rely on intact groups or classroom, since random assignment is not appropriate and nor possible in the field of education. The instrument of this research is vocabulary test, which is carried out as both a pre-test and post-test. The vocabulary test is in the form of multiple-choice about twenty-five questions, which include twenty questions without pictures, and five question with pictures. The questions to be tested are emphasize and prioritize on environmental vocabularies, such as recycle, waste, pollution, energy, etc. This vocabulary test is implemented to examine environmental vocabulary mastery on young learners before and after treatment between the experimental group and control group. Brown (2004) to know about the effectiveness in measuring vocabulary achievement on learners can apply language test as a tool.

Richards (2001) explain that continuous experience frequently and meaningful learning exercise are important in the vocabulary learning. First, the researcher conducts the pre-test for both experimental and control group to know their knowledge of vocabulary about environmental. Second, experimental group are delivered instruction using web game-based digital learning platform through ZEP Quiz, while control group delivered instruction with conventional method, which are textbook-based. Last, both experimental and control group are given the post-test after conduct the treatment. Regarding to the collection of the data, the researcher analyzes the data in two steps. First, descriptive statistics, which the researcher describes the vocabulary scores of learners in both of experimental and control, with analyzing the means scores, standard deviation, and the percentage of the data collected. Second, inferential statistics, which a paired sample t-test to analyze the enhancement for each group according to their score of pre-test and post-test, and independent sample t-test is conduct to compare the results of the post-test between experimental group and control group.

Qualitative

Ary et al. (2012) explain that qualitative method is pay more attention into social phenomena based on the perspective of human that involve in the field of study. This research also utilizes qualitative method, which is case study approach to investigate about perceptions, and engagement in young learners based on the learning process related to the implementation of web game-based ZEP Quiz, in order to enhance the English environmental vocabulary. Yin (2018) describe that case study is a proper approach for researcher who want to examine or investigate the current phenomenon that related to the real-life condition, in particular if the researcher want to acquire deeper understanding from the experiences of participants.

The subjects for this method are the fifth-grade elementary students. These young learners are participating in learning process about English environmental vocabulary via web game-based ZEP Quiz. Each subject selected as indicate by some specific criteria, which are the young learners or students who actively in the learning process using web game-based ZEP Quiz, participants who indicates different level of vocabulary outcome before and after test, and the participants who show their engagement and interest during the learning activities. Regarding to Palinkas et al. (2015) the participants is purposively selected since they acquire the knowledge or experiences related to the research in purposive sampling. Creswell (2014) further explained that qualitative research method is well-known or commonly use the purposive sampling. The researcher conduct observation on the participation, interaction, and interest of the

participants, and then gathers the data by carries out the open-ended questions for participants about their engagement in the learning process, and then do interviews with several selected students to gain more explanation of participants' participation and engagement in the learning process using web game-based ZEP Quiz as digital learning platform for the data collection. The collected data analyze with thematic analysis for qualitative, which are familiarizing the data, coding the data, identifying the themes, and interpreting the results. As indicate by Braun and Clarke (2006), thematic analysis is commonly used to identify, analyze, and report emerging themes in the scope of the qualitative data. Nowell et al. (2017) emphasize that it is used on qualitative method generally since it conducted in structured and transparent process to maintain the trustworthiness in qualitative results.

Finding and Discussion

The finding and discussion of this research are shows in this section. The results structured in line with the research questions dan data analysis procedures.

Table 1. The result of experimental group students' scores of pre-tests and post-test.

Experimental Group		
	Pre-Test	**Post-Test**
Median	10.50	23.00
Mean	10.65	22.85
St. Deviation	1.348	0.671
Max	13	24
Min	9	21

As illustrated on Table 1, the experimental group students represented an improvement in their environmental vocabulary scores after the implementation of web game-based digital learning of ZEP Quiz. The mean score enhances from 10.65 in the pre-test to 22.85 in the post-test. Its remarkable improvement in the vocabulary knowledge of the students. The median score also enhanced from 10.50 in the pre-test to 23 in the post-test after the treatment. Another point is that the maximum score improved from 13 in the pre-test to 24 in the post-test, likewise in the minimum score improved from 9 into 21. The standard deviation decreased from 1.348 in the pre-test to 0.671 in the post-test.

Table 2. The result of control group students' scores of pre-tests and post-test.

Control Group		
	Pre-Test	**Post-Test**
Median	11	14.50
Mean	10.95	14.65
St. Deviation	1.317	1.496
Max	13	17
Min	9	12

Furthermore, as illustrated on Table 2, the control group students showed slight improvement in their environmental vocabulary scores with traditional learning implementation. The mean score improves from 10.95 in the pre-test to 14.65 only in the post-test. The median score also improves from 11 to 14.50 in line with the results after the learning process. Besides, the maximum score increased from 13 to 17, as well as the minimum score increased from 9 to 12. The standard deviation slightly increased from 1.317 in the pre-test to 1.496 in the post-test.

The implementation of the web game-based ZEP Quis in the learning process played a role positively and contributed to the students' enhancement in their environmental vocabulary knowledge. The experimental group showed significant improvement in their post-test scores in contrast with their pre-test scores. This improvement reveal that the utilizations of ZEP Quiz was effective in assisting and helping young learners to

understand and remember the environmental vocabulary. The implementation web game-based ZEP Quiz in the learning process as digital platform constructed more engaging and interactive learning experience for young learners in the elementary school level students. The web game-based learning offers the students learning experiences which through quizzes, visual elements, and game-like activities, and this leads to their participate became more actively and also encouraged in the learning process. This finding is relevant to the concept of game-based learning, which indicated the importance of interactive activities can enhance the motivation of learners in the learning achievement.

In opposition, despite the fact that the control group also showed enhancements, but the significant amount of students' enhancement was lower than the experimental group. This present evidence of the conventional or traditional learning activities may help students to acquire certain level of vocabulary knowledge, still they may not provide equivalent engagement experiences and stimulation a web game-based learning as digital platform. The slight enhancement results in the control group strengthen the evidence for effectiveness a web game-based ZEP Quiz in enhancing young learners' environmental vocabulary mastery acquisition. Furthermore, the decreased standard deviation in the experimental groups indicates that students' scores outcome became more consistent after the treatment. It means that most students experienced positive outcomes from the implementation of the ZEP Quiz. Therefore, web game-based ZEP Quiz can be regarded an effective digital platform to support and assist vocabulary learning in early-aged lor young learners.

Table 3. The result of Paired Samples T-Test of experimental group.

Measure 1	Measure 2	t	p
Pre-Test	Post-Test	-11.36	<.001

As illustrated in Table 3, the paired sample t-test results shows that t-value is -11.36 and the p-value less than .001. This result indicates a considerable statically significant difference between the pre-test scores and post-test scores in the experimental group. The p-value is considerably below the standard threshold of 0.05.

Table 4. The result of Independent Samples T-Test.

	t	p
Pre-Test	0.712	.481
Post-Test	-22.36	<.001[a]

As presented in Table 4, the pre-test comparison shows the t-value is 0.712 and the p-value is .481, it means there is no significant difference between the experimental group and control group before the treatment activities. Due to the fact that the p-value is higher than 0.05 in both experimental and control group, so it indicates they have equal level knowledge in the beginning of the learning. On the other hand, the post-test comparison shows the t-value is -22.36, and the p-value is less than .001, which reveals a clear and strong significant difference between the experimental group and control group after the treatment activities.

There was statistically significant enhancement in the experimental gorup achievement from pre-test and post-test according to the paired sample t-test result, which is the p-value less than .001. Thus, for the independent sample t-test exposed that there is no significant difference between experimental and control group initially at the pre-test, since the p-value is .481. The both groups reflected similar initial vocabulary

knowledge before the intervention or treatment. However, there was found the significant difference in the post-test scores, which the p-value shows the number less than .001, with experimental group achieving better outcomes than the control group.

Further findings were gathered from interview sessions with 10 students of experimental group, which participate actively in vocabulary learning with web game-based ZEP Quiz activities. The data collections were analyzed through four stages, which are familiarizing the data, coding the data, identifying themes, and interpreting the results.

The interview outcomes reveal that most of participants or young learner showed favorable attitudes and positive response toward ZEP Quiz in the learning process of environmental vocabulary. Most participants conveyed enjoyment and considered the game-based activity more engaging than traditional learning. As stated by one of the participants, S2 mentioned, "*Seneng banget miss*, *soalnya kayak main game beneran. Aku jadi ga ngantuk*" ["I was really happy because it felt like playing a real game. I didn't feel sleepy"] It implies that the game-based was effective in reducing boredom and maintaining student attention in learning process. Several participants expressed feelings of immersion during the learning activity. S1 stated, "*Aku sampe lupa kalau itu sebenernya belajar*," ["I even forgot that it was actually a learning activity"] which indicates that the game-based learning effectively integrated play and learning process. Furthermore, S7 expressed a desire to repeat the learning activity through game-based ZEP Quiz, "*mau lagi miss!*" ["I want to do it again, miss!"] It reflects that their motivation also enhancing in learning process through game-based. Moreover, the leaderboard feature of ZEP Quiz seemed to encourage motivation for several participants. S3 mentioned, "*Suka banget! Apalagi ada skornya, jadi pengen ngalahin temen-temen,*" ["I really loved it! Especially, there were scores leaderboard, so I wanted to beat my friends"] whereas S9 mentioned "*Aku ranking 3! Seneng banget.*" ["I was ranked third! I was so happy"] These response show that leaderboard feature of ZEP Quiz encouraged students to enhance performance at a higher level. Meanwhile, the contribution of social aspect can enhance student motivation. S5 mentioned, "*Bisa bareng-bareng sama temen. Kalau belajar sendiri pake buku bikin ngantuk.*" ["We could do it together with friends. Studying alone with a book makes me sleepy"] This indicates that learning with peers in group or collaboratively designed by ZEP Quiz enhance student motivation. In accordance with Vygotsky (1978) that, the effectiveness of learning is achieved when it takes place in a social context. Regardless of the positive responses of the students, some of them mentioned small difficulties during learning process through web game-based ZEP Quiz. S8 mentioned, "*Agak grogi karena ada waktunya, cepet-cepetan. Aku takut salah mulu.*" ["I was a bit nervous because og the time limit. I was afraid of getting everything wrong"] That is expressed anxiety related to the time limitation. Whereas, S7 mentioned, "*Pertama agak bingung cara mainnya.*" ["At first I was a little confused about how to play it"] That indicates early confusion in operating the platform. In addition, S4 mentioned, "*Soalnya susah, ga tau artinya, terus coba tebak-tebak*." ["The questions were hard, I didn't know the meanings, so I just tried to guess"] It indicated a propensity toward guessing the answer when found unfamiliar vocabulary. These difficulties seemed to be temporary and did not reduce the engagement of students in the learning process. These findings indicate that provide clearer and less ambiguous instruction and scaffolding

before activities may reduce confusion and anxiety in the beginning of learning process, which can improve the game-based learning effectiveness.

There are several effects of game-based ZEP Quiz as the digital learning platform on young learners' vocabulary enhancement, especially in the environmental vocabulary. The interview results indicated that web game-based ZEP Quiz assisted young learner to acquire new environmental vocabulary. Most students could recall and identified new environmental vocabulary, involving unfamiliar vocabulary for them. S3 mentioned, "*Baru tau artinya endangered, kiarin artinya bahaya.*" ["I just found out that endangered means animals close to extinction. I thought it just meant dangerous"] This indicate that not only recognition of words but also conceptual understanding. It aligns with Nation (2001) statement that understanding the context of words is more effective than memorizing definition. Some features of ZEP Quiz were found to assist and support the learners' vocabulary retention. Repetition appeared as the most commonly reported factor. S10 mentioned, "*Kata-katanya susah tapi jadi hafal soalnya diulang-ulang,*" ["The words were difficult but I ended up memorizing them because they kept appearing repeatedly"] whereas S8 also mentioned similarly, "*Soalnya sering muncul.*" ["The question appeared frequently"] These findings are also aligned with Nation (2001) which state that frequent exposure to a word can strengthen retention outcomes.

Conclusions

This research conducted to investigate the enhancement of young learners' environmental vocabulary through game-based learning using ZEP Quiz as the digital learning platform. The results from both quantitative data and qualitative data systematically show that the implementation of ZEP Quiz facilitates students' and has a beneficial effect for the in the context of vocabulary development, especially in relation to improved achievement, engagement of learning, and knowledge retention. According to the descriptive statistical and inferential statistic findings, it can be concluded that game-based ZEP Quiz showed significant positive impact on young learners' environmental vocabulary knowledge achievement. The experimental group revealed significant enhancement based on the results of pre-test and post-test scores. It indicates students in experimental group generally experienced significant progress in environmental vocabulary learning following the use of web game-based ZEP Quiz. In contrast, students in the control group showed only slight enhancement in their environmental vocabulary based on pre-test and post-test scores. The enhancements were somewhat restricted compared to the experimental group. It indicates that conventional approach may not equally support the learners in order to acquire consistent vocabulary mastery. Furthermore, in qualitative findings based on the interviews, most of students described that learning use ZEP Quiz as digital learning platform is more interactive, engaging, enjoyable, and less boredom compared to the traditional or conventional learning process. Several features of ZEP Quiz also mentioned by learners that encourage them to participate actively in the learning process and motivated their higher performance. The integration of quantitative and qualitative data confirms that web game-based ZEP Quiz as digital learning platform is effective in order to enhancing young learners' environmental vocabulary. Not only the academic achievement that improved, but also fosters consistent performance, higher motivation, and better retention of vocabulary knowledge. Based on the

results above, it suggests that web game-based learning develop a more interactive, meaningful, and student-centered learning environment compared to the conventional or traditional approach in learning process.
Moreover, ZEP Quiz assisted the learners to acquire and gain new environmental vocabulary. Overall conclusion, ZEP Quiz in the digital learning platform regarded a beneficial instructional tool in English vocabulary learning for young learners. Its gamification of educational content results in more engaging and effective learning experiences. Therefore, the implementation of web game-based platforms, especially ZEP Quiz is suggested as an innovate approach for language learning, especially for vocabulary enhancement in young learners' context.

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