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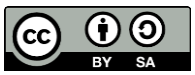

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Developing a Minecraft Adventure Map to Support Eleventh Grade Senior High School Students' Vocabulary Learning

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Abstract

With the rapid development of technology, Indonesia's Curriculum demands full support of technology in its implementation. As a result, its incorporation into English language teaching and learning becomes inevitable. One of the ways to incorporate technology in education is by using video games. Thus, this study aimed to develop a Minecraft adventure map as a learning media to support eleventh grade senior high school students' vocabulary learning. To achieve the aim, this research was done by focusing to know how the product was developed, how it looked like, how appropriate the product was, and what the students' opinions were towards the product. Therefore, the development research with the model of ADDIE by Branch (2009) was used. The research procedures consisted of analyze, design, and develop stages. The participants of this research were the English teachers of eleventh grade in SMA N 1 Pontianak, and the students of XI MIPA II as selected through purposive sampling. The techniques of data collection involved interviews for analyze stage, a questionnaire for internal evaluation, and another questionnaire to know the students' opinions of the product. The product was made using Minecraft Java Edition version 1.18.2. It was in the form of a Minecraft adventure map that covered relevant topics of English for eleventh grade students. It was also available for PC and mobile devices. To sum up, it was found that the product was strongly appropriate for the target users through internal evaluation. Moreover, the product received positive responses from most of the targets.

Keywords: Metaverse; Minecraft; Problem-Based Learning; Vocabulary learning

Introduction

Vocabulary is a crucial part of language learning. Harley (2006) states that there are three building blocks of language. They are sounds, words/vocabularies, and sentences. Moreover, English spelling is notoriously unphonetic. How it looks is different from how it sounds and vice versa (Rao, 2018). Even though students are familiar with certain sounds of a word, they may not know how to spell it without proper practice in its written form. Without proper learning of those three aspects, one may not be able to build their language skills smoothly. Thus, many practices for students are necessary to avoid mistakes in spelling. However, learning new vocabulary is not an easy job.

The huge amount of vocabulary and the limited time in school become a problem for both the teachers and the students. These conditions were later worsened by the emergence of the COVID-19 pandemic. One out of many solutions is to be taken. That is to implement independent learning. Independent learning is a method where students have the chance to control themselves during learning built by their motivation (Naibaho, 2019). However, independent learning is nowhere easy for teachers. It requires rich and quality materials (Moore, 2020). In addition, it is important to note that independent learning relies strongly on students' motivation. Therefore, teachers are obligated to fulfill all those aspects before utilizing independent learning.

One of the ways to implement independent learning is through technology. Using technology in education is not unusual, especially video games. Games in general are ensured to be educationally valuable (Gozcu & Caganaga, 2016). There are several advantages of video games for EFL learners. According to Gee (2005), research has shown that with proper guidance from teachers, video games not only promote higher-level thinking skills but also provide opportunities to learn the language and knowledge of professionals from other semiotic domains. Connolly, Boyle, MacArthur, Hainey, and Boyle (2012) find that video games raise students' motivation and participation. The results also show that video games enhance skills, such as cooperation, collaboration, and teamwork. In another study by Thompson and von Gillern (2020), it is stated that digital games can facilitates various contexts of learning, such as helping EFL Learners to develop their vocabulary knowledge. Moreover, video games are also proven to enhance students' engagement with peers. As a result, it is concluded that video games help to motivate, and also support students' pace of learning at the same time. Therefore, it is crucial for educators to maximize the potential of video games in education.

Minecraft is a type of metaverse video game application. This metaverse world is called Minecraft map, a Minecraft-designed world that can be accessed and shared using the Minecraft application. The word metaverse first appeared in 1992 and was introduced by Neal Stephenson. Metaverse itself refers to a virtual universe where people can interact with other people and their environment without the limitations of the real world (Narin, 2021). In the past, the idea of the metaverse was mere fiction. However, as the world experience the explosion of knowledge and

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Information Communication and Technology (ICT), technology is advancing rapidly (Malik, 2018). Metaverse applications start to emerge. One of them is Minecraft. With the engaging and new idea of the metaverse, Minecraft's name becomes very popular and it has been gathering many prestigious awards. What makes it very popular is the game system. Minecraft allows its players to explore, interact through numerous servers, and modify the game (Minecraft Wiki, 2021). It is a video game that is relatively intuitive to play, and capable of supporting incredibly complex interactions and experiences (Lane & Yi, 2017).

With its massive popularity, the idea of utilizing Minecraft for educational purposes appears. In a study done by Kuhn (2017), it is claimed that Minecraft holds a promising potential to be an effective tool for language acquisition and practice. In another study by Uusi-Mäkelä, (2015), it is stated that the students show an incredible enthusiasm towards Minecraft. Moreover, Edwards et al. (2021) claim that Minecraft represents a unique chance for a digital legacy of the project and remote learning, even during the current pandemic. It can be concluded that Minecraft has a remarkable potency as a new fun way of learning English, and it needs to be maximized to the fullest advantage. Based on the situations regarding vocabulary learning, and video games in education, it was concluded that Minecraft had a great potency to be used as a media for independent learning.

Although many researchers have conducted studies related to Minecraft for education, none of them has tried to develop the game for specific learning objectives even though this game allows all kinds of topics to be learned. The studies are either related to Minecraft Education Edition, in which the edition is limited by authority, or trying to prove that Minecraft is indeed effective. Therefore, the researcher was inspired in conducting a study to develop an educational Minecraft map without using Minecraft Education Edition. This study aimed to develop a video game in the form of a Minecraft adventure map with a Minecraft application that supported eleventh grade senior high school students' vocabulary learning. Since the product was made to support vocabulary learning, it can be used as an additional exercise independently by the students. Therefore, development research was the perfect method to achieve the aim of this study.

This study focused on four research questions namely; (1) how is the product developed?; (2) how does the product look like?; (3) how appropriate is the product for the targets?; (4) what are the targets'/the students' opinions towards the product? Therefore, the objectives of this study were to develop the product, to describe the product, to identify how appropriate the product was, and to identify the responses of the students. In conclusion, this study recorded and discussed the process of developing a Minecraft adventure map to support eleventh grade senior high school students' vocabulary learning.

This study provides valuable information regarding relevant topics of Minecraft, as a metaverse for education, especially how other teachers may create their own metaverse which accommodates specific learning objectives only by using Minecraft.

The findings and the results of this study can be used by English teachers to encourage them more in using technology to its full advantage. This study may also open new ideas for material developers in designing highly advanced technology-based teaching and learning materials, so that more research that is relevant to this study may be taken into consideration.

Method

The study design

This study aimed to develop a Minecraft Adventure map as a supporting media for eleventh grade senior high school students in their vocabulary learning. Therefore, development research was used. According to Richey, Klein, Taylor, and Francis (2007, p. 15), "Development research is the systematic study of design, development and evaluation processes with the aim of establishing an empirical basis for the creation of instructional and non-instructional products and tools and new or enhanced models that govern their development". The model of development research used in this study was ADDIE by Branch (2009). Development research consists of stages known as ADDIE. It is an acronym for Analyze, Design, Develop, Implement, and Evaluate (Branch, 2009). However, after considering the limitations of this research, only the stages of analyze, design, and develop were implemented. The processes are as follows:

Analyze

In this phase, the analysis of interviews with the teachers, the curriculum, the lesson plans, and books was done. These analyses were to know the conditions of the students, the strategies used by the teachers in teaching vocabulary, the teachers' view towards the product, and the content of vocabulary learning in eleventh grade.

Design

In this phase, the design of the product was built. This stage referred to Richard's and Rogers's six aspects of the design stage. According to Richards and Rodgers (2001), there are several things to be planned in the design phase of the language teaching process. They are (a) the aims of the method; (b) the selection and arrangement of language content within the method used in the model of the syllabus; (c) the types of learning tasks and teaching activities; (d) the role of learners; (e) the role of teachers; and (f) the role of teaching material.

Develop

All the six aspects that had been designed in the previous stage were manifested during this develop stage. Using Minecraft Java Edition version 1.18.2, the product was developed. The development included generating concepts, developing supporting media, developing guidance, conducting formative revision, conducting a pilot test, and doing internal evaluations. The internal evaluation involved evaluating the product in terms of its content, language, and presentation.

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The Subject of the Research

During the time of the research, it was appropriate to implement purposive sampling due to the inconsistency of schools' online and offline learning. To be consistent with the research aim, only the two English teachers in eleventh grade and the 33 eleventh grade students of XI MIPA 2 class in SMA N 1 Pontianak were purposively chosen to participate in this study. The teachers participated in the interviews in analyze stage and internal evaluations in develop stage as evaluators. Meanwhile, the students participated after the final product was obtained to give their opinion on the product.

Data collection techniques and Instrument Development

This research included three stages of development, namely analyze, design, and develop. During the course of those stages, informal note-taking of document review, one-on-one interviews, and questionnaires were used.

Informal note-taking of document review

Informal note-taking of document review was used in the analyze stage to gather the contents of vocabulary learning in eleventh grade. The documents referred to the 2013 Curriculum, two English lesson books, and lesson plans. According to Creswell (2012), documents are good resources of information to collect data, and one of the ways to record the data is by informal note-taking. Thus, informal note-taking of document review was used in the analyze stage to gather all the important vocabulary.

One-on-one interviews

According to Creswell (2012), an interview is best used when researchers could not directly observe the participants or the target of the research. Since the state of the learning activity at schools was not yet stable due to COVID-19 at that time, the technique of interview was best to be used. Some interviews were done in the analyze stage to know the conditions of the students, the strategies used by the teachers in teaching vocabulary, and the teachers' views towards the product.

Questionnaires

According to Codó, (2009), a questionnaire is useful for collecting biographical information and quantifiable data on language abilities, practices, and attitudes. Moreover, it is efficient to gather pieces of information, and it is less time-consuming (Codó, 2009). Therefore, two questionnaires were used (1) to evaluate the appropriateness of the map effectively, and (2) to know the students' opinions towards the product.

Data analysis techniques

Qualitative data analysis

Since there were several techniques of data collection, there were several techniques of data analysis as well. Data gathered in interviews and document reviews were qualitative data. They were analyzed using six steps of qualitative data analysis. According to Creswell (2012), there were six steps commonly used to

analyze qualitative data. The steps were data collecting, data preparing, reading through the data, coding the data, coding for themes in the research report, and coding the description in the research report.

Quantitative data analysis

The data from the internal evaluations were analyzed using a formula by Suharto (2006, as cited in Alyani, 2016). Here, the appropriateness of the product' content, language, and presentation was evaluated. The formula and the data conversion table were as follow:

$$Mn = \frac{\sum fX}{N}$$

Mn : Mean (scale)
$\sum$ fX : Total number of score
N : Number of cases

Table 1. Data Conversion Table Suharto (2005) in Alyani (2016)

No.	Scale Range	Category
1.	1 ≤ x ≤ 1.74	Not appropriate
2.	1.75 ≤ x ≤ 2.49	Poorly Appropriate
3.	2.5 ≤ x ≤ 3.24	Appropriate
4.	3.25 ≤ x ≤ 4	Strongly appropriate

For the data gathered through the students' opinion questionnaires, they were analyzed by converting each answer to the questions into a percentage. The percentage was obtained by dividing the frequency of an option by the total of the respondents which was multiplied by 100%. The formula is shown as follows:

$$P(100\%) = \frac{f \times (100)}{N}$$

P : Percentage
F : Frequency
N : Total participants
100 : Fix number

Results

Analyze Phase

Condition of the students

When it was associated with knowledge of English vocabulary in grade 11 in SMA N 1 Pontianak, some students' vocabulary knowledge was sufficient, and some were less adequate. It was reported that the limited amount of time during English class could possibly be the main reason why some students' vocabulary knowledge was less adequate. It was also recorded students were having difficulty in using certain words in sentences and using words that look similar.

Teachers' strategies in teaching vocabulary

The teachers used various strategies to help students with their vocabulary

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learning despite the limited time. The first strategy was the guessing strategy. The second strategy was giving the synonyms. The third strategy was the context clue strategy with short reading material with one or two paragraphs. It was claimed that several more strategies were used but they were not used as often as those strategies.

Teachers' views towards the product

The product received positive responses as the teachers agreed that vocabulary learning is crucial. They claimed that vocabulary was the foundation of using English. Vocabulary acted as an asset in speaking English. It was impossible for students to be fluent in English without a proper amount of vocabulary ready in their minds.

The teachers also highly supported independent learning. Aside from it being in line with the 2013 Curriculum, they agreed that the outside world provided important lessons just as important as lessons in the classroom or maybe even more important. Thus, not supporting independent learning meant limiting the students to discover greater experiences.

The contents of vocabulary learning in eleventh grade

After going through several books and lesson plans, it was found that several topics were mandated to the eleventh grade students. Students had to learn vocabulary related to analytical exposition, personal letters, procedure text, and lyrics songs for teens. Considering, the topic, the details of the topics, and the language features of each topic. Several vocabularies were selected.

Design phase

Considering findings gathered in analyze stage, the design stage was done by designing six crucial aspects of the design phase by Richards and Rodgers (2001). It started with the aim of the product. The content of the product came second, followed by the types of activities, the role of learners and teachers, and the learning material. First, the product aimed to help students of eleventh grade in senior high school in their vocabulary learning, specifically written open class words that were relevant to the curriculum of 2013. Second, the contents of the product were carefully selected through analyze stage. Third, the types of learning tasks and teaching activities were designed based on the PBL. According to Hmelo-Silver (2004, p. 235), "PBL is an instructional method in which students learn through facilitated problem solving". The cycle of PBL begins with a problem scenario, followed by identifying facts, generating hypotheses, identifying knowledge deficiencies, applying new knowledge, then an abstraction. Fourth, the learners held a prominent role in the teaching and learning process as the researcher, problem solver, and collaborator. Fifth, considering the role of the students, the teachers held the role of the provider, motivator, and supervisor. Lastly, the product held the role of supplementary media or as the media that the teachers provide for the students. After all 6 aspects were then manifested in develop stage.

Develop phase

The product only referred to the findings from the previous phases in its process of making. It was built using Minecraft Java Edition version 1.18.2, the latest version available for public use during this research. All features in the game that were considered useful or practical were utilized for the sake of the product's completeness. However, the most useful features were the creative mode and Minecraft's coding system. Using those features, the virtual form of the product and the content in the product were developed.

The product consisted of several areas. They were the Hall serving as the introduction point for the players, the main station serving as the navigation area, and areas of analytical exposition, personal letter, procedure text, songs, and extra area where players can go back and forth through the navigation area.

Since the product was made using Minecraft Java Edition. Its language programming was not compatible to be used in mobile devices such as Android and iOS. The product was converted into a type that was compatible to be used in Android and iOS as well.

Internal evaluations

The internal evaluation was done with the two eleventh grade English teachers. It was done to find out the appropriateness of the content, language, and presentation of the product. First, the teachers were presented with the product thoroughly from the beginning to the end. The presentation included the pilot test. After some questions and answers, the teachers filled in the internal evaluation questionnaire. Here are the results of the internal evaluation:

Table 2. First Internal Evaluator

Appropriateness	Score	Score conversions
The content	3,6	Strongly appropriate
The language	3,67	Strongly appropriate
The presentation	3,6	Strongly appropriate

Table 3. Second Internal Evaluator

Appropriateness	Score	Score conversions
The content	3,8	Strongly appropriate
The language	3,67	Strongly appropriate
The presentation	3,4	Strongly appropriate

Revision

Through the internal evaluation process, some revisions were pointed out to be needed. First, it was found that a few mistakes in spelling and tense were there. Second, one area was not in the same design as the other areas. Third, some instructions were not detailed enough. Fourth, it was suggested to add some more decorations. The revision was then conducted based on the problems mentioned and the suggestions.

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Students' opinions on the product

33 students participated in giving their opinions of the products. It was found that the product received positive responses from most of the students. 66,7% of students strongly agreed that they enjoyed learning vocabulary using the product. 66,7% of students strongly agreed that learning did not seem hard when using this kind of media. 63,6% of students strongly agreed that the product was interesting. Moreover, 60,6% of students strongly agreed that they were interested in trying the product. Details are shown in the table below:

Table 4. Students' opinions on the product

No.	Statements	Strongly Agree
1.	The presented game was very interesting.	63,6%
2.	This game is not difficult to be played.	39,4%
3.	The instructions in the game could be understood well.	51,5%
4.	I enjoyed learning with this video game.	66,7%
5.	Learning did not seem hard when using this kind of media.	66,7%
6.	I could learn English vocabulary using this video game.	66,7%
7.	I could remember the material taught well.	48,5%
8.	I liked studying using this video game because it provided challenges.	54,5%
9.	This video game trained my problem-solving ability.	54,5%
10.	This video game allowed me to collaborate with my friends in solving problems.	54,5%
11.	If I have the opportunity, I want to learn with this video game independently.	60,6%
12.	I feel motivated to learn vocabulary with this video game.	54,5%
13.	I hope such media will be used occasionally in the classroom.	60,6%

Final product

After the development, the final product was finally obtained. It could accommodate students to learn many vocabularies with the focus being 109 vocabularies. The 109 vocabularies are open class words and contractions that are relevant to the 2013 curriculum of English lessons in eleventh grade.

The product consists of five main topics namely, analytical exposition, personal letter, procedure text, songs, and extras area. These five topics share a number of areas that the students could play in with different objectives and unique problems. Making the product more diverse and non-monotone. It consisted of a front area named the Hall where players are introduced to the map, what it is, its aims, and the rules in playing the map, and the main station that serves as a

navigation system enabling players to go back and forth from one play area to another play areas which include areas of analytical exposition, personal letter, procedure text, and songs.

The product comes with a user guide to help the users, which in this case is the students. There, the players will be able to understand how to install the product on their devices. They will also know how the rules of what to do and what not in the user guide. The product can be used in devices, such as PC, and mobile devices with operating systems of Android, and iOS. It supports Minecraft 1.19.0 and above. The product would be best used as an additional exercise after all the basic competencies already thought at school. The product can be accessed through this link: https://drive.google.com/drive/folders/1k6u9hr-dDQX-jl1-UZXBWy_wgAEl_r_S?usp=sharing

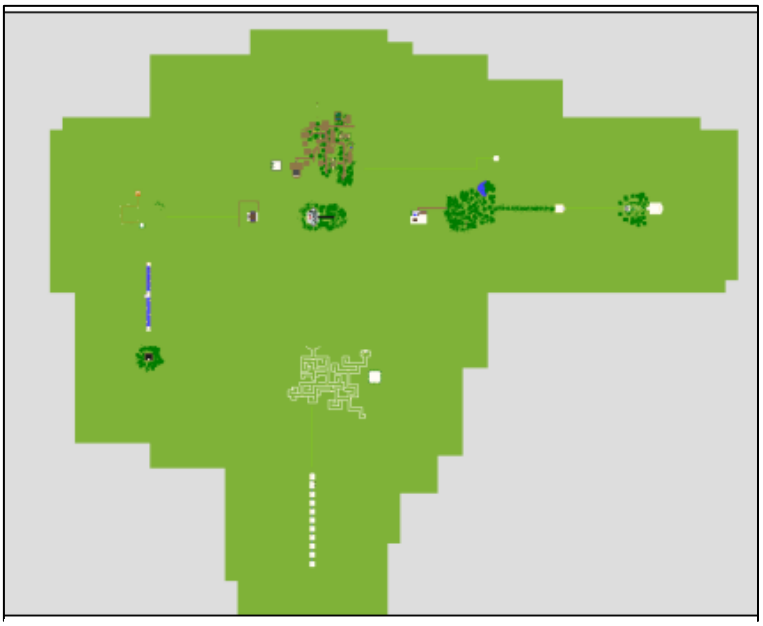

Figure 1. Top View of the Product (the Minecraft Map)

Figure 2. The Hall (an Introductory Area in the product)

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Discussions

It was found that students most likely faced difficulty when using new vocabulary in sentences, a practical difficulty. Schmitt (2008) states that one of the reasons for this kind of difficulty was the lack of exercise. Repeated exposure such as exercise involves factors that are acknowledged as the facilitator of new words' effective retention (Schmitt, 2008). Those factors are noticing, retrieval, and generative use. Thus, students will be able to overcome the said difficulty with decent and proper exercise.

The product of this research was made to fulfill the exercise that the students would need. While there are many other types of exercises, the findings indicate that utilizing technology in learning is only natural. Moreover, it supports the 2013 Curriculum. On the other hand, knowledge can be transferred in numerous ways with technology (Mellati & Khademi, 2019). Thus, giving students much more opportunity and freedom to learn. Therefore, this product supports the nature of independent learning, as stated by Naibaho (2019) that students have the opportunity to control themselves in independent learning.

The internal evaluation showed that the product was strongly appropriate in terms of content, language, and presentation. Some suggestions were also offered. Thus, the revision was done based on those suggestions. The revision helped made the product more appealing and easier to play. The aspect that received the highest scores was the content aspect which was 3,6 and 3,8 with a mean of 3,7. Meanwhile, the aspect that received the lowest scores was the presentation aspect which was 3,6 and 3,4 with a mean of 3,5.

After gathering students' opinions of the product, it was found that the product received positive responses from most of the students. There were three responses with the highest percentage of strongly agree option reaching 66,7%. First, the students strongly agreed that they enjoyed learning vocabulary using the product. Second, the students strongly agreed that learning did not seem hard when using this kind of media. Lastly, the students strongly agreed that they could learn English vocabulary using the product. Other responses relevant to be pointed out were that students hoped more such media would be used more often in the classroom as they thought that it was very interesting and motivating, and they would like to play with the product independently.

The findings mentioned in the previous paragraph suggest that the product received positive responses from the students as it was interesting and motivating. This is in line with a study done by Zou et al. (2021). It was found that the majority of 21 digital game-based vocabulary learning being studied highlighted the positive influence of games on motivation. This phenomenon is probably the result of students being able to learn vocabulary with little anxiety in the game environment, and enjoying it (Young & Wang, 2014 as cited in Zou et al., 2021). This is in line with Connolly et al. (2012) who state video games increase students' motivation and participation.

The lowest percentage of responses in the strongly agree option was 39,4%. Only 39,4% of students strongly agreed that the game or the product was easy to play. While there might be many reasons why this was the case, the most relevant reason was probably that the students were not familiar with Minecraft. For individuals who have never seen, heard, or known anything about the game, Minecraft may seem difficult.

Conclusions

To be consistent with the research questions and research findings, four conclusions were made. First, it is concluded that the product underwent three stages of development research. They were analyze stage, design stage, and development stage from the ADDIE model by Branch (2009). Several findings were obtained in the analyzed stage which then served as references in the design stage. Referring to Richards and Rodgers (2001), six aspects in the design phase were designed. The base principles and the learning material were developed into a draft product using Minecraft's creative mode. After that, it went into internal evaluation and revision before it was finalized. Secondly, the final product was in the form of a Minecraft adventure map which was available for PC and mobile users. The product could accommodate the learning of 109 vocabularies of open class words related to analytical exposition text, personal letters, procedure texts, and songs. Those vocabularies were to be learned through several areas where each area was developed by following the process of the PBL learning cycle. Thirdly, the internal evaluation showed that the product was strongly appropriate in terms of its content (3.6 and 3.8), language (3.67 and 3.67), and presentation (3.6 and 3.4). Fourthly, the product received positive responses from most of the students.

To be consistent with the aim of this research, the product can be used independently by the targets. The product was made to maximize the use of technology and its potential for education. Therefore, it is the freedom of the users to use the product. The product is suggested to the students who are familiar with the video game and the application since the findings revealed that not all students enjoy video games. Therefore, it could not force onto them.

Nevertheless, this study was done during the infamous COVID-19 pandemic. Therefore, the participants and the time given for doing the research were limited. Only the first three stages of ADDIE were done, namely analyze, design, and develop. Thus, this research was an incomplete set of development research. In addition, this research also faced technological limitation. The use of video games was a novelty in classrooms of the school. Both the school and the students were not familiar with the idea. Thus, the most effective way to utilize the product of this research was through independent learning.

Suggestions

Based on the limitations of the research, several suggestions were made. First, for teachers who are interested in the idea of using Minecraft for education purposes, it is best to be familiarized with the students first. Some students might never have

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any experience with video games, especially Minecraft. Second, any further research on this product is welcomed. However, the product only underwent internal evaluation. If it is to be used in the implement and evaluate stage, expert validation of the product is necessary.

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