

# Development of 4D Model “GEMBUL” Mathematics Learning Media in Welcoming Education in the Era of Society 5.0

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**Abstract.** This research aims to develop mathematics learning media products on integer material in the form of "GEMBUL" (Integral Mathematics Education Game) which is suitable to use and effective in learning in the era of society 5.0. The development method used in this study adopted the 4D development model, namely *Define*, *Design*, *Develop*, and *Disseminate*. It carried data collection techniques out through instruments in the form of validation sheets, learning outcomes tests and student response questionnaires. The fundamental contribution of this research which is also the output target is to produce "GEMBUL" products that have been validated by three validators consisting of 2 experts in mathematics and 1 expert in information technology and have been tested limited to Grade VII students of MTs Nurul Ulum Gadingrejo. Based on the results of the validation, "GEMBUL" has a validation rate of 84.67%, which means the media is valid and fit for use. Meanwhile, based on the results of learning tests and student response questionnaires, the average student learning outcomes were 84 or greater than the KKM, and the results of student responses were 82%. Based on this contribution, it can be concluded that the learning media "GEMBUL" is suitable for use and is considered effective in learning in the era of society 5.0.

## 1. Introduction

Curriculum development 2013 is an effort to improve the quality of education to produce graduates who are creative and able to face life. Therefore, teachers are required to implement effective and efficient learning in line with implementing the 2013 curriculum. But in fact, learning carried out by teachers in Indonesia is still teacher-centered, so it requires appropriate learning innovations under technological developments in the era. society 5.0 today.

Society 5.0 is a concept coined by the Japanese government. The concept of society 5.0 is not only limited to manufacturing factors but also solves social problems with the help of integrating physical and virtual spaces [1]. Society 5.0 will affect all aspects of life starting from health, urban planning, transportation, agriculture, industry and education (Law of the Republic of Indonesia on the National Education System). Society 5.0 can be defined as a concept of a human-centered and technology-based society [2].

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To realize or prepare for Society 5.0 in education, it is not enough for students to only understand or be given a theory. In addition, it requires teachers to be more innovative and dynamic in teaching by following developments with current technologies [3]. Among the tasks of the teacher is to become a facilitator in learning at school. As a facilitator, of course, you must also have the enthusiasm to continue learning and improve one's abilities so that later you can determine the direction and find solutions to problems in learning. This can be realized by creative thinking and creating new innovations by utilizing technological resources as a medium in the learning process.

Mathematics is a subject whose material is abstract, this makes students find it difficult to learn mathematics, so that innovation is needed in its delivery. One alternative to overcome this problem is to carry out learning innovations through learning media and according to the student's condition. Learning media that are considered suitable and innovative are educational game-based learning media. [4] Educational games are games that are packed with thinking, including increasing concentration and solving problems. [5] Educational games are also a learning medium that should make it easier to understand learning material and increase interest and motivation in learning. [6] Educational games have an attractive appearance that can increase children's interest in learning materials and this game is quite interactive to make children enthusiastic about playing games and more active because it can indirectly train fine motor skills got when children touch and hold. Use his finger as an action in the game. Educational games are very suitable to support learning and excel in several aspects when compared to conventional learning methods. One significant advantage is interesting animations that can increase enthusiasm and memory so that children can store subject for a longer time than conventional teaching methods. Using educational games can help and make it easier for students to understand a material. [7] The use of games in learning can make learning more relaxed and can stimulate students to learn to be more active in solving problems. Not only that, the use of educational games also aims to make students able to compete with current technological advances.

Indonesia is experiencing a world disaster, namely the outbreak of the COVID-19 pandemic which has a profound impact on the world of education. This pandemic could speed up education 5.0, namely a learning system carried out remotely by utilizing information technology. Distance learning is better known as online learning. [8] Online learning is learning that takes place in a network where teachers and students do not meet face to face directly. Online learning requires internet network help via Android or computers and certain applications such as WhatsApp, Zoom, Google meetings and so on. The enormous challenge in implementing the online learning model is that the academic community is not yet used to using a fully online learning system.

Based on a preliminary analysis at MTs Nurul Ulum Gading Rejo Pringsewu, learning in the COVID-19 pandemic era has been running at the school, the teacher has only been limited to sending files in the form of photos of material in the teacher's books, then students are required to understand the content of the material. Students are given assignments whose results are sent back via the WhatsApp group. This makes students feel difficult in understanding the material being taught and feel bored.

In this research, interactive learning media based on educational games will be designed with the name "GEMBUL"Integral (Mathematics Education Game). Learning media "GEMBUL" is a medium for mathematics subjects on integer material in which there is material combined with educational games. Educational game media "GEMBUL" contains two benefits at the same time for students. The first advantage is that students can easily understand the concept of integers without having to meet face to face, the second advantage is that students can learn while playing without feeling bored.

Based on the explanation above, the researcher is interested in developing "" media GEMBUL and wants to see its feasibility The media goes through an expert validation process so that later it can apply to mathematics learning, and testing the effectiveness media through learning outcomes tests and student response questionnaires.

## 2. Research Methods

The type of research is Research and Development which refers to the development stages according to Thiagarajan which known as the 4D development model [9]. This 4D development model consists of four stages, namely define, design, develop, and disseminate.

Activities at the stage define include student analysis and concept analysis to be taught. Activities at the stage design are compiling tests and choosing alternative learning media. Activities at the stage develop are expert assessments and field trials. Expert judgment includes content validation, which includes all media designs developed at the stage design. What is meant by experts is that validators are competent to assess learning media in the form of educational games on integer material and provide input or suggestions, in order to improve the media design that has been compiled. Meanwhile, field trials were carried out to get direct input from the field on the prepared media designs. The results of this trial are used to revise and improve media designs that have been prepared previously. Tests are carried out in online learning and offline learning. The purpose of this stage develop is to produce suitable learning media after going through several revision processes. On stage disseminate the product result in the form of learning media will be used by students of class VII MTs Nurul Ulum Gadingrejo and will be uploaded via YouTube that can an alternative medium of learning integers by all teachers and students.

This media trial was carried out at MTs Nurul Ulum Gadingrejo in Pringsewu district with the subjects being five grade VII students of the 2019-2020 academic year even semester. The data in this study are quantitative data and qualitative data. Quantitative data were obtained based on the results of expert validation on the "GEMBUL" media which was analyzed and developed to meet the validity of the media. Meanwhile, qualitative data is obtained based on suggestions and criticisms as well as responses from the validators used as development materials and considerations in revising the product.

The instrument in this study used a test of learning outcomes and student response questionnaires. Learning outcome tests are used to get data about student learning outcomes. Before the test was tried out, several experts conducted content validation. Student response questionnaires are used to measure student opinions on the components in the "GEMBUL" media in terms of educational games, their content and appearance. It calculates the percentage of student responses using the formula:

$$\frac{A}{B} \times 100\% \text{ where } A = \text{the score obtained, and } B = \text{the total score [9].}$$

## 3. Research Results

Based on the efforts to develop the "GEMBUL" media using the 4-D model, revisions have been made. Revisions were made based on:

### 3.1 The results of the media design "GEMBUL"

GEMBUL was designed to have 5 main menus, namely (1) containing KD and indicators; (2) Material; (3) games; (4) instructions; and (5) profiles. The initial display of GEMBUL looks like in Figure 1. below.



Figure 1. Initial display of POOL

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The five main menus of GEMBUL are: (1) Basic Competency & Indicators, containing basic competencies and indicators on the material of Integer Numbers. (2) Material, contains integer material. (3) Play Game, serves to start the MOVIE game. (4) Instructions, contains about how to use GEMBUL, the use of each button and instructions on how to play the GEMBUL game. (5) Profile, contains the GEMBUL learning media and the profile or identity of the maker of this learning media.

### 3.2 The results of the first test the first test

The results are through the assessment of 3 validators. The names of the validators can be seen in table 1 below.

**Tabel 1.** Names of Validators

<b>Nama</b>	<b>Occupation</b>
Binti Annisaul Khasanah, M.Pd	Mathematics Education Lecturers
Azizul Fikri Sholehan, S.Kom	Teacher in IT
Helmiyati, S.Pd	Mathematics Teachers

Based on the results of the validation, the percentage level of validity according to the expert's judgment for the "GEMBUL" media can be seen successively in table 2 below.

**Table 2.** Percentage of validity values (Based on Validation Results)

<b>Name of Validators</b>	<b>Display Aspect</b>	<b>Programming Aspects</b>	<b>Material Aspects</b>	<b>Validation Results</b>
Binti Annisaul Khasanah, M.Pd	<b>82</b>	-	<b>84</b>	<b>83</b>
Azizul Fikri Sholehan, S.Kom	<b>84</b>	<b>88</b>	-	<b>86</b>
Helmiyati, S.Pd	<b>85</b>	-	<b>85</b>	<b>85</b>
	<b>Rata-rata</b>			<b>84,67</b>

Based on the validation results in table 2. It can be seen that the "GEMBUL" media has a validation rate of 84.67%, which means that the media is valid and there are no suggestions or revisions from the validators.

### 3.3 Second stage test results

After the first test, the second stage testing is carried out by testing the product. The trial was carried out in class VII MTs Nurul Ulum Gading Rejo, totaling 5 students in two ways, namely online and offline.

The following is a description of the activities at the time of the trial: (1) Online testing, testing the "GEMBUL" media on integer material with sub-discussion comparing integers. Because the "GEMBUL" media can only be opened through the construc 2 application which requires a computer / laptop and not all students have a laptop, so the "GEMBUL" media is shown via video so that students candownload via WhatsApp. Students are very enthusiastic about learning material through media that has been turned into video, they feel the learning is different from the usual and more interesting, but this situation is not as expected by the author, because the purpose of the educational game game has not been achieved. This online trial was held for three meetings. (2) Testing by offline, After an online trial analysis was carried out, the authors felt that the learning objectives had not been achieved, so they conducted trials directly or outside the network (offline) to see the effectiveness of GEMBUL media. At the time of this direct trial the writer packaged the evaluation in the form of a game, namely by one by one the students playing the game. In the game, there are several questions that are presented. Before getting into the questions, there are orders that

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must be fulfilled first, then a multiple choice question appears. Every student feels happy when playing games because they can play while learning.

### 3.4 Student learning outcomes Student learning

Outcomes in integer learning after participating in the "GEMBUL" learning media trial can be seen in table 3. below this.

**Tabel 3.** Students Learning Outcomes

No.	Name	Score
1.	Elya Aziza	80
2.	Fika Adinda	100
3.	Rahma Nanda Sari	80
4.	Refal Abi	100
5.	Syaika Aulia Azzahro	100
<b>Mean</b>		<b>84</b>

Minimum Criteria of mastery Learning or in Indonesia is shortened as KKM on integer material at MTs Nurul Ulum Gadingrejo is 75. Based on table 3. above, the average learning outcomes obtained by students after participating in the trial process of "GEMBUL" media products were classified as high, namely 84, which was higher than the KKM. It can be concluded that the math bilbul educational game is considered effective for improving student learning outcomes.

### 3.5 Results of student responses

From the results of students' answers contained in the student response questionnaire, the following details are obtained.

**Tabel 4.** Students' positive responses toward "GEMBUL"

Nama	Programming Aspects	Content Aspects	Display Aspects	Mean
Elya Aziza	80%	89%	91%	87%
Fika Adinda	50%	84%	86%	78%
Rahma Nanda Sari	85%	76%	77%	80%
Refal Abi	65%	84%	83%	79%
Syaika Aulia Azzahro	86%	92%	80%	86%
<b>Total mean</b>				<b>82%</b>

Based on table 4. above, it can be concluded that the student response to GEMBUL learning media is positive, which is 82%, so that the media is "GEMBUL considered effective based on the results of the student response analysis.

## 4. Conclusion

fundamental contribution to this research which is also the output target is to produce a product in the form of an Integer Mathematics Education Game (GEMBUL) which has been validated by three validators consisting of 2 experts in mathematics and 1 expert in the field of information technology and has been tested limited to students of MTs Nurul Ulum Gadingrejo Class VII. Based on the results of the validation, GEMBUL has a validation rate of 84.67% which means that the media is valid and fit for use. Meanwhile, based on the student learning outcomes test, the average learning outcomes obtained by students after participating in the GEMBUL media product trial process were high, namely 84, which had a higher value than the KKM, which was 75. This shows that GEMBUL is

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considered effective in improving student learning outcomes. . Likewise, based on the results of the student response analysis, it can be concluded that the student response to GEMBUL learning media is positive, which is 82%, so that the GEMBUL media is considered effective based on the results of the student response analysis. Based on these contributions, it can be concluded that GEMBUL is suitable for use and is considered effective in learning in the era of society 5.0.

## References

- [1] Skobelev P and Borovik Y S 2017 On The Way From Industri 4.0 To Industri 5.0: From Digital Manufacturing To Digital Society *International Scientific Research Journal "Industri4.0"* 307-311
- [2] Government C O 2018 *Society 5.0*. (Japan)
- [3] Alimuddin Z 2019 *Era Masyarakat 5.0 Guru Harus Lebih Inovatif Dalam Mengajar* (<https://www.timesindonesia.co.id/read/214466/20190518/165259/Zulkifar-Alimuddin-Era-Masyarakat-50-Guru-Harus-Lebih-Inovatif-Dalam-Mengajar>)
- [4] Ridwan A R and Dewi T 2016 Pengembangan Game Edukasi Pengenalan Nama Hewan dan Habitatnya dalam 3 Bahasa sebagai Media Pembelajaran Berbasis Multimedia *Jurnal Algoritma Sekolah Tinggi Teknologi Garut* **13** 1
- [5] Indra G T I and Asriyanik 2017 Game edukasi sejarah gerakan kemuhammadiyah dengan metode picture and picture berbasis android *Jurnal Buana Informatika* **8** 3
- [6] Topan R S A N and Fatah Y A 2018 Game Edukasi Menghafal Doa-doa Harian Sebagai Media Belajar Untuk Anak Usia Dini Berbasis Android *Jurnal Emitor* **18** 02
- [7] Ariesto H S 2012 Teknologi informasi dan komunikasi dalam pendidikan *Journal Yogyakarta: Graha Ilmu* 131-134
- [8] Albert Efendi Pohan 2020 *Konsep Pembelajaran Daring berbasis pendekatan Ilmiah* (Jawa Tengah: CV Sarnu Untung)
- [9] Trianto 2009 *Mendesain Model Pembelajaran Inovatif Progresif* (Jakarta: kencana prenada media grup)