

# Augmented Reality Based Synectic Model Application Designing with the Objectives to Overcome the Constraints of Development of Story Fact in Learning to Write Short Story

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**ABSTRACT.** A Short story is a miniature of people's experience while the characters, plot, and setting aimed to record imaginative events from it (Stanton, 2017). When making up story ideas, students have problems in developing story facts such as plot, characters, and settings (Sayuti, 2006: 1). This barrier resulted in conflicts that unevenly distributed across all stages of the flow. The development of characters was natural and had a degree of lifelikeness. The direct characterization employed in storytelling (telling, analytic) made the short stories less varied. The physical and setting depicted did not work out optimally. The setting was also considered inconsistent with other elements. The advantage of employing the Synectic model is that it can provide opportunities for students to look for and make up concepts to describe objects through an analogy process. Augmented reality allows users to interact with an object's interface and see it in a well-designed and attractive 3D format so that this can overcome the obstacles of students in developing story ideas in learning to write short stories.

**Keywords:** *augmented reality, short story, Synectic.*

## 1. INTRODUCTION

There are three main focus on writing short stories (Stanton, 2007) : (1) story facts such as plot, characters, settings, and themes; and the meaning of the story, relating to the language and criteria of short story writing such as title, point of view, style, symbolism, and irony; and (2) the content of the writing, and (3) the state of the author and reader. The meaning and facts of the story are the bridge (scaffolding) between the author and the reader. Therefore, the constraints of writing short stories on the fact of the story are the overall constraints of writing short stories.

According to Gagne et.al (2005), the use of ICT (information communication technologies) can help teachers to teach. Its use depends on the ability of the students and the material being taught (Norabeerah, Halimah, & Azlina, 2011). Teachers are key players who play a role in influencing the use of technology and its application in education (UNESCO, 2011).

With regard to this issue, this research focus on the development of a Synectic model assisted by the application of Augmented Reality media in facilitating the implementation of the teaching-learning process. The synectic model is a strategy of bringing together various elements by using figures of speech to obtain a new point of view (Gordon, 1980: 168). Synectic is a problem-solving

methodology that stimulates thinking processes that the subject is unlikely to be aware of (Siddiqui, 2013: p. 132). The method used by providing a set of tools / processes that can be used successfully in various situations (Nolan, 2003: p. 24). To maximize innovative solutions and increase the probability of successful learning, analysis, generalization, and analogy are used (Prince, 1968: p. 1).

The Synectic model was chosen with the consideration that this model is flexible, recursive, collaborative, and developing so that it provides an opportunity for researcher to develop Synectic model application design products assisted by Augmented Reality that are in accordance with the needs of students continuously until we find the products that are considered appropriate, effective, and efficient.

Augmented Reality allows users to interact with the interface of an object and be able to see objects in well- designed and attractive 3D format. The object of label A and label B can be made a separate object so that it makes it easier for students to stimulate ideas to write. The application of the Synectic model based on Augmented Reality is a solution for students who have difficulty in following: (1) the stages of the Synectic learning model, especially in making direct analogical statements, personal analogies, and solid conflicts; and (2) superficiality of ideas and story processing

by combining two characteristics of character images and country background icons as well as setting morning, noon, evening and night.

Thus, this study intends to create a different application for learning to write short stories with the title, "Designing a Synectic Model Application Based on Augmented Reality to Overcome the Constraints of Development of Story Facts in Learning to Write Short Stories" with the formulation of the problem: (1) How to build an application based on Augmented Reality, (2) How to implement a Synectic model application based on Augmented Reality. Research is limited by: (1) This application will reflect character objects, country settings, and morning, afternoon, evening and night scenes as well as the soundtrack of the country's icons, (2) The learning process to write short stories with a Synectic model is carried out in three stages, namely: (1) the direct analogy stage, (2) the personal analogy stage, and (3) the solid conflict analogy stage, and (3) This application is made using Augmented Reality, namely a technology that allows computers to display virtual objects precisely in a real object directly (Milligram and Kishino 1994;

Milligram, Takemura et.al 1994). The marker designs are made with vuforia, Blender, and ArtToolKit.

## 2. MODELS


Research on Synectic learning models based on augmented reality uses the development research design of Recursive Reflective Design & Development (R2D2) based on a constructivist view. While the design of augmented reality devices uses a system development model adapted from the Agile SDLC model which consists of phases, namely: literature study, needs analysis, design, implementation, testing, and system deployment.




## 3. RESULT AND DISCUSSION


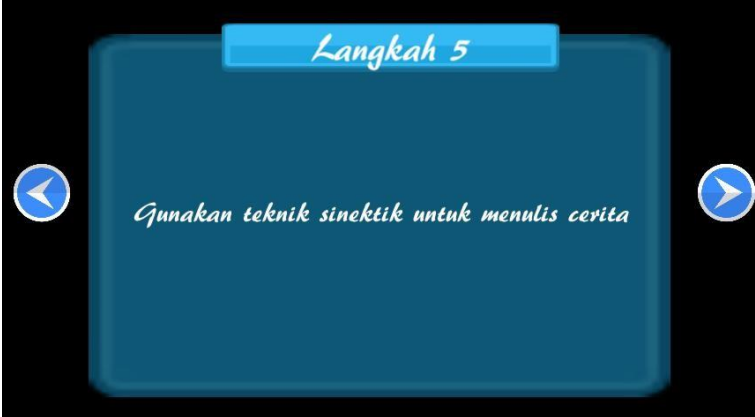

### Implementation of the System

It is the stage of design translation based on the results of the analysis into a particular programming language, and operating the result of the design that have been made. Table 1 shows the implementation of augmented reality-based Synectic model system.

TABLE 1. Implementation Of Augmented Reality-Based Synectic Model System

No	User Interface	Description
1	 <p>Step1</p> <p>Download "Petualangan Sepatu" on Google Playstore and install the application</p>	Application Guide Page contains information on how to use the application

2		
3		
4		<p>Step3</p> <p>Set a country icon as a setting of a story and the shoes icon as a character</p>

5	 <p>Langkah 4</p> <p><i>Pindailah sambil membayangkan/berimajinasi karakteristik sepatu sebagai tokoh utama</i></p>															
	<p>Step 4</p> <p>Scan while imagining the characteristic of a shoe as a main character</p>															
6	 <p>Langkah 5</p> <p><i>Gunakan teknik sinektik untuk menulis cerita</i></p>															
	<p>Step 5</p> <p>Use the synectic technique to write a story</p>															
15	 <p>Pedoman Penilaian</p> <table> <tr> <th rowspan="2">Aspek</th><th colspan="4">Kriteria dan Skor</th></tr> <tr> <th>25</th><th>20</th><th>15</th><th>10</th></tr> <tr> <td> <ul style="list-style-type: none"> <li>Kelengkapan aspek formal cerpen</li> <li>Kelengkapan unsur intrinsik cerpen</li> <li>Keterpaduan unsur/ struktur cerpen</li> <li>Kesesuaian penggunaan bahasa cerpen</li> </ul> </td><td> <ul style="list-style-type: none"> <li>Memuat               <ol style="list-style-type: none"> <li>judul</li> <li>nama pengarang</li> <li>dialog</li> <li>narasi</li> </ol> </li> <li>Memuat               <ol style="list-style-type: none"> <li>fakta cerita (plot, tokoh, latar)</li> <li>sarana cerita (sudut pandang, penceritaan, gaya bahasa, simbolisme, dan ironi)</li> <li>pengembangan</li> </ol> </li> </ul> </td><td> <ul style="list-style-type: none"> <li>Hanya memuat tiga sub aspek</li> <li>Memuat ketiga sub aspek, namun tidak lengkap (misalnya, fakta cerita hanya memuat plot dan tokoh, tanpa disertai latar yang jelas).</li> <li>Memuat ketiga sub</li> </ul> </td><td> <ul style="list-style-type: none"> <li>Hanya memuat dua sub aspek</li> <li>Hanya memuat dua sub aspek</li> <li>Hanya memuat dua sub aspek</li> <li>Hanya memuat dua sub aspek</li> </ul> </td><td> <ul style="list-style-type: none"> <li>Hanya memuat satu sub aspek</li> <li>Hanya memuat satu sub aspek</li> <li>Hanya memuat satu sub aspek</li> <li>Hanya memuat satu sub aspek</li> </ul> </td></tr> </table>	Aspek	Kriteria dan Skor				25	20	15	10	<ul style="list-style-type: none"> <li>Kelengkapan aspek formal cerpen</li> <li>Kelengkapan unsur intrinsik cerpen</li> <li>Keterpaduan unsur/ struktur cerpen</li> <li>Kesesuaian penggunaan bahasa cerpen</li> </ul>	<ul style="list-style-type: none"> <li>Memuat               <ol style="list-style-type: none"> <li>judul</li> <li>nama pengarang</li> <li>dialog</li> <li>narasi</li> </ol> </li> <li>Memuat               <ol style="list-style-type: none"> <li>fakta cerita (plot, tokoh, latar)</li> <li>sarana cerita (sudut pandang, penceritaan, gaya bahasa, simbolisme, dan ironi)</li> <li>pengembangan</li> </ol> </li> </ul>	<ul style="list-style-type: none"> <li>Hanya memuat tiga sub aspek</li> <li>Memuat ketiga sub aspek, namun tidak lengkap (misalnya, fakta cerita hanya memuat plot dan tokoh, tanpa disertai latar yang jelas).</li> <li>Memuat ketiga sub</li> </ul>	<ul style="list-style-type: none"> <li>Hanya memuat dua sub aspek</li> <li>Hanya memuat dua sub aspek</li> <li>Hanya memuat dua sub aspek</li> <li>Hanya memuat dua sub aspek</li> </ul>	<ul style="list-style-type: none"> <li>Hanya memuat satu sub aspek</li> <li>Hanya memuat satu sub aspek</li> <li>Hanya memuat satu sub aspek</li> <li>Hanya memuat satu sub aspek</li> </ul>	<p>The synectic page contains information about synectics</p>
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The menu page before the AR camera contains information about AR learning media

### 3.1 Testing the System

Application testing stage with 4 criteria includes Functional Suitability, Performance Efficiency, Usability, and Portability. With this test, we will get results to what extent the application is suitable for use. Based on one of the software testing methods is the ISO 25010 standard. Iso. (2011). ISO / IEC 25010: 2011. <https://www.iso.org> [April 28, 2017]

#### A. The Result of Functional Suitability

At this stage, the test is carried out using the Black-Box approach to get test results based on the functions contained in the application. The results of the Functional Suitability test were carried out on 3 experts to determine the validity of the Functional Suitability aspects of the application. The test results are presented in Table 2.

**TABLE 2.** Analysis Of The Results Of Expert Testing Of Application Materials For Synectic Learning Models Based On Augmented Reality

No	Indicator	Total Score	Average	Classification
1	Learning Procedure	48	4	Very Feasible
2	Subject Matter	18	3	Feasible
<b>Total</b>		<b>66</b>	<b>3,5</b>	<b>Feasible</b>

$$\text{Average} = \frac{48}{4} = 12$$

$$\text{Average} = \frac{18}{3} = 6$$

**TABLE 3.** Analysis Of The Results Of Expert Testers On The Synectic Learning Model Based On Augmented Reality

No	Indicator	Total score	Average	Classification
1	Learning Procedure	48	4	Very Feasible
2	Subject Matter	18	3	Feasible
<b>Jumlah</b>		<b>66</b>	<b>3,5</b>	<b>Feasible</b>

$$\text{Average} = \frac{48}{4} = 12$$

$$\text{Average} = \frac{18}{3} = 6$$

### 3.2 Performance Efficiency Test Results

This test is carried out using an application on a *cloudy* site. Testing was carried out using 5 sample devices with different specifications. The summary results of the tests above are as follows:

#### 1) Time Behavior

Time Behavior is an aspect of how long it takes to run an application. Based on the data in the table above, an average of 5-10 seconds the device can run the application based on the time taken by the device to run the application according to the data obtained from tables 5.27 to 5.28.

#### 2) Resource Utilization on the CPU

Resource Utilization on the CPU is device activity that uses CPU resources when running applications. Based on the data in table 5.28, it can be seen that the average device capable of using CPU resources to access applications is 148 MB with a minimum use of 120 MB and a maximum of 180 MB.

#### 3) Resource Utilization on Memory

Resource Utilization on Memory is device activity using Memory resources when running applications. Based on the data in table 5.27, it can be seen that the average device can use Memory resources to access applications is 20.6% with a minimum usage of 17% and a maximum of 25%.

### 3.3 Portability Test Results

In this portability test, the aspects tested are adaptability, install-ability, and replace-ability. Adaptability and installability aspects are tested by installing, running and uninstalling applications on various devices and OS versions. Meanwhile, the replaceability aspect is done by installing a new version of the application.

1) The results of adaptability and installability tests on various devices, OS versions

Table 4 shows the results of testing on 5 kinds of devices with different brands and Android OS versions.

**TABLE 4.** The Results Of Testing The Application Of The Synectic Learning Model Based On Augmented Reality On Various Devices And Os

No	Device	Android Version	Install	Uninstall
1	Asus Zenfone Go	4.4.4	Successful	Successful
2	Panasonic Elugal 2	5.1.0	Successful	Successful
3	iTel Selfie Pro	6.0.0	Successful	Successful
4	Nokia 5	7.1.1	Successful	Successful
5	YuYureka	5.1.1	Successful	Successful

It can be concluded from Table 4 that the Adventure Shoes application has been successfully installed and uninstalled on sample of 5 different

devices. Further, Table 5 shows a summary of the results of the application adaptability and installability tests on various OS versions.

**TABLE 5.** Summary Of The Test Results Of The Application Of The Synectic Learning Model Based On Augmented Reality On Various Devices And Os

No	Android Version	Install	Uninstall	Total
1	4.4.4	1	1	2
2	5.1.0	1	1	2
3	6.0.0	1	1	2
4	7.1.1	1	1	2
5	5.1.1	1	1	2
<b>Total</b>		<b>7</b>	<b>7</b>	<b>14</b>

From the test results, the following percentages can be obtained:

$$\begin{aligned} \text{Percentage} &= \frac{\text{---}}{\text{---}} \times 100\% \\ &= \frac{\text{---}}{\text{---}} \times 100\% \\ &= 100\% \end{aligned}$$

Based on the percentage results above, it can be concluded that the application meets the standards of adaptability and installability with a percentage of 100% or valid.

1) Adaptability and installability test results on various screen sizes

**TABLE 6.** Summary Of The Test Results Of The Application Of The Synectic Learning Model Based On Augmented Reality On Various Screen Sizes

No	Screen	Successful	Unsuccessful
1	Asus Zenfone Go	1	0
2	Panasonic Elugal 2	1	0
3	iTel Selfie Pro	1	0
4	Nokia 5	1	0
5	YuYureka	1	0
Total		5	0

In addition, testing is also carried out to see the application's ability to adjust to various screen sizes. The following are the test results on 5 sample testing applications of various screen sizes. Table 6 shows the summary of the results of the application tests on various screen sizes

From the test results, the following percentages can be obtained:

$$\text{Percentage} = \frac{\text{Successful}}{\text{Total}} \times 100\% = 100\%$$

Based on the percentage results above, it can be concluded that the application meets the standards of adaptability and installability with a percentage of 100% or is **valid**.

Repleaceability testing is done by updating old versions of applications with new versions. This test uses several different devices. The results of this test can be seen in Table 7.

1) Application repleaceability test results

**TABLE 7.** Summary Of The Results Of Testing The Repleaceability Of The Application Of The Synectic Learning Model Based On Augmented Reality

No	Device	Versi Android	Berhasil Update	Gagal Update
1	Asus Zefone Go	4.0	1	0
2	Panasonic Elugal 2	5.0	1	0
3	iTel Selfie Pro	6.0	1	0
4	Nokia 5	7.0	1	0
5	YuYureka	5.0	1	0
<b>Total</b>			5	0

From the test results, the following percentages can be obtained:

$$\text{Percentage} = \frac{\text{Berhasil Update}}{\text{Total}} \times 100\% = \frac{5}{5} \times 100\% = 100\%$$

Based on the percentage results above, it can be concluded that the application meets the standards of Repleaceability with a percentage of 100% or is **valid**

### 3.4 Usability Testing Results

Usability testing was carried out by testing the

application directly to the user. This test was an additional test to support the results of the Fictional Conformity test by conducting tests to see whether the application can meet the expected targets. This test was carried out on 28 IPI students. The way to apply this Usability test is to share markers in the form of students and download the Adventure Shoes

application which is uploaded to the Google Play Store. From the test results, the analysis obtained

from the test is depicted in Table 8.

**TABLE 8.** Analysis Of The Test Results. Use Of The Application Of The Synectic Learning Model Based On Augmented Reality "Petualangan Sepatu"

No	Indicator	Total	Average	Classification
1	Usefulness	867	3,870536	Feasible
2	Ease of use	1077	3,496753	Feasible
3	Ease of learn	388	3,464286	Feasible
4	Satisfaction	721	3,678571	Feasible
<b>Total</b>		<b>3053</b>	<b>3,627537</b>	<b>Feasible</b>

Based on the results in Table 8, it can be concluded that the application meets Usability standards with an average value of 3.6 and a compatible classification. Usability testing is the end of the process of testing the development of a synectic model application based on Augmented Reality.

#### 4. CONCLUSION AND FURTHER RESEARCH

After designing the implementation along with the application testing phase with 4 criteria including Functional Suitability, Performance Efficiency, Usability, and Portability, it can be concluded that the application of a Synectic model based on Augmented Reality is compatible to use. This model provides an opportunity for students to search and find concepts and then develop it with an analogy process towards a description which is used as the object of analogy. Augmented Reality allows users to interact with an object's interface and see objects well-designed and attractive 3D format. The regression test results obtained the correlation value = 0.116 and the KD value obtained by 1.4% against the constraints of developing story facts. This can overcome the constraints of developing story facts in learning to write short stories

#### ACKNOWLEDGMENT

The author would like to thank Dr. H. Nizar Alam Hamdani, M.M., M.T., M.Si, the chancellor of Universitas Pendidikan Indonesia for giving financial support for this ICORSH paper, colleagues and Gina Rahayu Meilani, S.Pd.

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