



© Hak Cipta milik Politeknik Negeri Jakarta

**Hak Cipta :**

1. Dilarang mengutip sebagian atau seluruh karya tulis ini tanpa mencantumkan dan menyebutkan sumber :
  - a. Pengutipan hanya untuk kepentingan pendidikan, penelitian, penulisan karya ilmiah, penulisan laporan, penulisan kritik atau tinjauan suatu masalah.
  - b. Pengutipan tidak merugikan kepentingan yang wajar Politeknik Negeri Jakarta
2. Dilarang mengumumkan dan memperbanyak sebagian atau seluruh karya tulis ini dalam bentuk apapun tanpa izin Politeknik Negeri Jakarta



**MEMBANTU ANAK AUTIS UNTUK  
MENINGKATKAN PERAWATAN DIRI MEREKA  
MENGUNAKAN DESAIN *FLASHCARDS*  
*AUGMENTED REALITY***

**SKRIPSI**

**FADHLI HARIS SANDI 1807432009**

**POLITEKNIK  
NEGERI  
JAKARTA**

**PROGRAM STUDI TEKNIK MULTIMEDIA DIGITAL  
JURUSAN TEKNIK INFORMATIKA DAN  
KOMPUTER  
POLITEKNIK NEGERI JAKARTA**

**2022**



© Hak Cipta milik Politeknik Negeri Jakarta

**Hak Cipta :**

1. Dilarang mengutip sebagian atau seluruh karya tulis ini tanpa mencantumkan dan menyebutkan sumber :
  - a. Pengutipan hanya untuk kepentingan pendidikan, penelitian, penulisan karya ilmiah, penulisan laporan, penulisan kritik atau tinjauan suatu masalah.
  - b. Pengutipan tidak merugikan kepentingan yang wajar Politeknik Negeri Jakarta
2. Dilarang mengumumkan dan memperbanyak sebagian atau seluruh karya tulis ini dalam bentuk apapun tanpa izin Politeknik Negeri Jakarta



**MEMBANTU ANAK AUTIS UNTUK  
MENINGKATKAN PERAWATAN DIRI MEREKA  
MENGUNAKAN DESAIN *FLASHCARDS*  
*AUGMENTED REALITY***

**SKRIPSI**

**Dibuat untuk Melengkapi Syarat-Syarat yang Diperlukan untuk  
Memperoleh Diploma Empat Politeknik**

**FADHLI HARIS SANDI**

**1807432009**

**PROGRAM STUDI TEKNIK MULTIMEDIA DIGITAL  
JURUSAN TEKNIK INFORMATIKA DAN  
KOMPUTER  
POLITEKNIK NEGERI JAKARTA**

**2022**



## PENGISYTIHARAN (Declaration)

Saya, Fadhli Haris Sandi, calon bagi ijazah Bacelor Multimedia Kreatif (Kepujian).  
*I, Fadhli Haris Sandi, candidate for the degree of Creative Multimedia (Hons),*

Management & Science University mengakui bahawa:  
*Management & Science University certify that:*

- i) Tesis saya telah dijalankan, digubal dan ditulis sendiri di bawah penyeliaan:  
*My thesis was personally developed, conducted and written by us under the supervision of*  
  
Miss Mazni Binti Muhd Ruzita
- ii) Data saya adalah data asal dan saya sendiri mengumpul dan menganalisisnya; dan  
*My data are original and personally collected and analysed and*
- iii) Saya akan sentiasa mematuhi syarat, polisi dan peraturan MSU mengenai penulisan tesis, termasuk undang-undang Hakcipta dan Paten Malaysia.  
*I shall at all times be governed by the conditions, policies and regulations of the MSU on thesis writing, including the copyright and Patent laws of Malaysia.*

Jika saya didapati melanggar perkara-perkara di atas, saya/kami dengan relanya menepikan hak penganugerahan Ijazah saya/kami dan tertakluk kepada syarat dan peraturan disiplin Management & Science University.

*In the event that my thesis be found to violate the conditions mentioned above, I voluntarily waive the right of conferment of my degree and be subjected to the disciplinary rules and regulations of Management & Science University.*

Fadhli Haris Sandi

7<sup>th</sup> June 2022

Nama Calon  
*Candidate's Name*

Tandatangan Calon  
*Candidate's Signature*

Tarikh  
*Date*





PERAKUAN KERJA KERTAS PROJEK  
(Certification of Project Paper)

Saya, yang bertandatangan, memperakukan bahawa  
*(I, the undersigned, certify that)*

Fadhli Haris Sandi

calon untuk Ijazah  
*(candidate for the degree of)* Bachelor in Creative Multimedia

telah mengemukakan kertas projek yang bertajuk  
*(has presented his project paper of the following title)*

Fostering Autistic Children to Enlarge Their Self-Care Using Augmented Reality  
(AR) Flashcards Design

seperti yang tercatat di muka surat tajuk dan kulit kertas projek  
*(as it appears on the title page and front cover of project paper)*

bahawa kertas projek tersebut boleh diterima dari segi bentuk serta kandungan, dan meliputi bidang ilmu dengan memuaskan.  
*(that the project paper acceptable in form and content, and that a satisfactory knowledge of the field is covered by the project paper).*

Nama Penyelia  
*(Name of Supervisor)* : Mazni Binti Muhd Ruzita

Tandatangan  
*(Signature)* :

Tarikh  
*(Date)* : 7<sup>th</sup> June 2022

Hak Cipta :

1. Dilarang mengutip sebagian atau seluruh karya tulis ini tanpa mencantumkan dan menyebutkan sumber :
  - a. Pengutipan hanya untuk kepentingan pendidikan, penelitian, penulisan karya ilmiah, penulisan laporan, penulisan kritik atau tinjauan suatu masalah.
  - b. Pengutipan tidak merugikan kepentingan yang wajar Politeknik Negeri Jakarta
2. Dilarang mengemukakan dan memperbanyak sebagian atau seluruh karya tulis ini dalam bentuk apapun tanpa izin Politeknik Negeri Jakarta



**Hak Cipta :**

1. Dilarang mengutip sebagian atau seluruh karya tulis ini tanpa mencantumkan dan menyebutkan sumber :
  - a. Pengutipan hanya untuk kepentingan pendidikan, penelitian, penulisan karya ilmiah, penulisan laporan, penulisan kritik atau tinjauan suatu masalah.
  - b. Pengutipan tidak merugikan kepentingan yang wajar Politeknik Negeri Jakarta
2. Dilarang mengemukakan dan memperbanyak sebagian atau seluruh karya tulis ini dalam bentuk apapun tanpa izin Politeknik Negeri Jakarta

## FOSTERING AUTISTIC CHILDREN TO ENLARGE THEIR SELF- CARE USING AUGMENTED REALITY (AR) FLASHCARDS DESIGN

Fadhli Haris Sandi

*Bachelor in Creative Multimedia  
Faculty of Information Science and Engineering  
Management and Science University University Drive,  
Off Persiaran Olahraga, 40100 Shah Alam, Selangor.*

*Harissandi01@gmail.com*

### ABSTRACT

This research was conducted to find a self-care learning method that is appropriate and can meet the needs of children with autism disorders. This learning method will use a technology called Augmented Reality combined with Flashcards design in its delivery. The scope of this project takes an age range of 3-7 years. This is in order to help parents nurture their children as soon as possible after finding out that their child has autism disorder. Data were taken using Qualitative Methods with Questionnaires and Interviews as instruments. Parents who have children with autism disorders and teachers who teach in schools with disabilities are samples for questionnaires and interviews so that the results obtained can suit their needs. To fulfill the objective of this project, the research methodology that will be used is the ADDIE Model. ADDIE Model is a model that involves the stages of model development with five steps/development phases including Analysis, Design, Development or Production, Implementation or Delivery and Evaluations). The software used to make this application is Adobe Photoshop CC 2019, Maya 2020, and Unity 2020.3.34f1 and with the help of Vuforia as its Augmented Reality platform. With the use of Augmented Reality as a learning medium for children, researchers assume that they will get the same results in this application. From the Application Usability Testing, data is obtained that the application created can meet user needs, is easy to use, and is attractive with a percentage above 80%. Overall, this application can help the learning process of children with autism disorders and can be used as an alternative learning method.

*Keywords: Augmented-reality, Flashcards, Autism, Self-care, Learning.*



**Hak Cipta :**

1. Dilarang mengutip sebagian atau seluruh karya tulis ini tanpa mencantumkan dan menyebutkan sumber :
  - a. Pengutipan hanya untuk kepentingan pendidikan, penelitian, penulisan karya ilmiah, penulisan laporan, penulisan kritik atau tinjauan suatu masalah.
  - b. Pengutipan tidak merugikan kepentingan yang wajar Politeknik Negeri Jakarta
2. Dilarang mengumumkan dan memperbanyak sebagian atau seluruh karya tulis ini dalam bentuk apapun tanpa izin Politeknik Negeri Jakarta

## FOSTERING AUTISTIC CHILDREN TO ENLARGE THEIR SELF- CARE USING AUGMENTED REALITY (AR) FLASHCARDS DESIGN

Fadhli Haris Sandi

*Bachelor in Creative Multimedia  
Faculty of Information Science and Engineering  
Management and Science University University Drive,  
Off Persiaran Olahraga, 40100 Shah Alam, Selangor.*

*Harissandi01@gmail.com*

### ABSTRAK

Penyelidikan ini dijalankan bagi mencari kaedah pembelajaran penjagaan diri yang bersesuaian dan dapat memenuhi keperluan kanak-kanak autisme. Kaedah pembelajaran ini akan menggunakan teknologi yang dipanggil Augmented Reality yang digabungkan dengan reka bentuk Flashcards dalam penyampaian. Skop projek ini mengambil masa dalam lingkungan umur 3-7 tahun. Ini bagi membantu ibu bapa mengasuh anak-anak mereka secepat mungkin selepas mendapat tahu anak mereka mengalami gangguan autisme. Data diambil menggunakan Kaedah Kualitatif dengan Soal Selidik dan Temu bual sebagai instrumen. Ibu bapa yang mempunyai anak gangguan autisme dan guru yang mengajar di sekolah kurang upaya adalah sampel untuk soal selidik dan temu bual supaya keputusan yang diperolehi dapat memenuhi keperluan mereka. Bagi memenuhi objektif projek ini, metodologi kajian yang akan digunakan ialah Model ADDIE. Model ADDIE ialah model yang melibatkan peringkat pembangunan model dengan lima langkah/fasa pembangunan termasuk Analisis, Reka Bentuk, Pembangunan atau Pengeluaran, Pelaksanaan atau Penyampaian, dan Penilaian). Perisian yang digunakan untuk membuat aplikasi ini ialah Adobe Photoshop CC 2019, Maya 2020, dan Unity 2020.3.34f1 dan dengan bantuan Vuforia sebagai platform Augmented Reality nya. Dengan penggunaan Augmented Reality sebagai medium pembelajaran kanak-kanak, pengkaji beranggapan mereka akan mendapat keputusan yang sama dalam aplikasi ini. Daripada Ujian Kebolegunaan Aplikasi, data diperolehi bahawa aplikasi yang dibuat dapat memenuhi keperluan pengguna, mudah digunakan, dan menarik dengan peratusan melebihi 80%. Secara keseluruhannya, aplikasi ini dapat membantu proses pembelajaran kanak-kanak autisme dan boleh digunakan sebagai kaedah pembelajaran alternatif.

*Keywords: Augmented-reality, Flashcards, Autism, Self-care, Learning.*





**Hak Cipta :**

1. Dilarang mengutip sebagian atau seluruh karya tulis ini tanpa mencantumkan dan menyebutkan sumber :
  - a. Pengutipan hanya untuk kepentingan pendidikan, penelitian, penulisan karya ilmiah, penulisan laporan, penulisan kritik atau tinjauan suatu masalah.
  - b. Pengutipan tidak merugikan kepentingan yang wajar Politeknik Negeri Jakarta
2. Dilarang mengumunkan dan memperbanyak sebagian atau seluruh karya tulis ini dalam bentuk apapun tanpa izin Politeknik Negeri Jakarta

## ACKNOWLEDGEMENTS

Praise and gratitude to Allah SWT because it is only through His grace and mercy that the author will be able to complete this thesis successfully. Salawat and greetings will continue to be bestowed on the Prophet Muhammad until the end of time. By saying alhamdulillah, researchers can complete the preparation of the thesis entitled “Fostering Autistic Children To Enlarge Their Self-Care Using Augmented Reality (AR) Flashcards Design”.

In the process of doing this final project, guidance, support, motivation, and prayers from various parties are inseparable. Through this opportunity, the author would like to express his heartfelt appreciation to Miss Mazni Binti Muhd Ruzita, researcher supervisors, who guided in the preparation of the thesis and was patient in dealing with the author throughout the preparation of this thesis until it was completed. The author also wants to thank the author's parents for always supporting the author at all times. And the author would also like to thank Muthia Rachma for always giving encouragement during difficult times.

Researchers realizes that this final project is still not perfect due to limited abilities and experience. As a result, researcher anticipate constructive criticism and suggestions for improving this final project. Finally, we return all matters to Allah SWT, and the authors hope that this research will be beneficial to all parties.



## TABLE OF CONTENTS

	Page
ABSTRACT .....	iv
ABSTRAK.....	v
ACKNOWLEDGEMENTS .....	vi
TABLE OF CONTENTS .....	vii
LIST OF TABLES.....	ix
LIST OF FIGURES .....	x
CHAPTER I INTRODUCTION.....	1
A. Project Background .....	1
B. Problem Statement .....	3
C. Objectives of the Project .....	3
D. Scope of the Project .....	4
E. Significance of the Project .....	4
F. Assumptions and Limitations .....	4
CHAPTER II LITERATURE REVIEW.....	6
A. Review of Current Situation.....	6
B. Review of Related Literature .....	8
C. Review of Related Product.....	10
CHAPTER III RESEARCH DESIGN AND METHODOLOGY.....	13
A. Research Design.....	13
B. Research Instruments .....	13
1. Questionnaires.....	14
2. Interviews .....	14
C. Sample.....	15
D. Research Method.....	16
1. Analysis.....	17
2. Design.....	17
3. Development .....	18
4. Implementation .....	18
5. Evaluation .....	18
E. Project Schedule .....	19
F. User Interface Design.....	20
CHAPTER IV FINDINGS AND DISCUSSIONS.....	24
A. Project Testing.....	24

### Hak Cipta :

1. Dilarang mengutip sebagian atau seluruh karya tulis ini tanpa mencantumkan dan menyebutkan sumber :
  - a. Pengutipan hanya untuk kepentingan pendidikan, penelitian, penulisan karya ilmiah, penulisan laporan, penulisan kritik atau tinjauan suatu masalah.
  - b. Pengutipan tidak merugikan kepentingan yang wajar Politeknik Negeri Jakarta
2. Dilarang mengumumkan dan memperbanyak sebagian atau seluruh karya tulis ini dalam bentuk apapun tanpa izin Politeknik Negeri Jakarta





© Hak Cipta milik Politeknik Negeri Jakarta

**Hak Cipta :**

1. Dilarang mengutip sebagian atau seluruh karya tulis ini tanpa mencantumkan dan menyebutkan sumber :
  - a. Pengutipan hanya untuk kepentingan pendidikan, penelitian, penulisan karya ilmiah, penulisan laporan, penulisan kritik atau tinjauan suatu masalah.
  - b. Pengutipan tidak merugikan kepentingan yang wajar Politeknik Negeri Jakarta
2. Dilarang mengemukakan dan memperbanyak sebagian atau seluruh karya tulis ini dalam bentuk apapun tanpa izin Politeknik Negeri Jakarta

1. Major Items .....	24
1.1 Application.....	24
1.2 Flashcards.....	25
2. Minor Items .....	26
B. Usability Testing .....	29
1. Surveying Technique.....	29
2. Sample.....	30
C. User Acceptance Testing.....	31
1. Demographic Data.....	32
2. Application Usability Testing.....	32
CHAPTER V SUMMARY, CONCLUSION AND RECOMMENDATIONS.....	38
A. Summary .....	38
B. Conclusion.....	39
C. Recommendations .....	39
BIBLIOGRAPHY .....	40
APPENDIX A .....	42

**POLITEKNIK  
NEGERI  
JAKARTA**



## © Hak Cipta milik Politeknik Negeri Jakarta

### Hak Cipta :

1. Dilarang mengutip sebagian atau seluruh karya tulis ini tanpa mencantumkan dan menyebutkan sumber :
  - a. Pengutipan hanya untuk kepentingan pendidikan, penelitian , penulisan karya ilmiah, penulisan laporan, penulisan kritik atau tinjauan suatu masalah.
  - b. Pengutipan tidak merugikan kepentingan yang wajar Politeknik Negeri Jakarta
2. Dilarang mengemukakan dan memperbanyak sebagian atau seluruh karya tulis ini dalam bentuk apapun tanpa izin Politeknik Negeri Jakarta

Table		Page
3.1	Project Schedule	20
4.1	Demographic Data	33
4.2	Answer Values	34
4.3	Questionnaire Answer Data	34
4.4	Questionnaire Answer Data Processed	37





## © Hak Cipta milik Politeknik Negeri Jakarta

### Hak Cipta :

1. Dilarang mengutip sebagian atau seluruh karya tulis ini tanpa mencantumkan dan menyebutkan sumber :
  - a. Pengutipan hanya untuk kepentingan pendidikan, penelitian , penulisan karya ilmiah, penulisan laporan, penulisan kritik atau tinjauan suatu masalah.
  - b. Pengutipan tidak merugikan kepentingan yang wajar Politeknik Negeri Jakarta
2. Dilarang mengemukakan dan memperbanyak sebagian atau seluruh karya tulis ini dalam bentuk apapun tanpa izin Politeknik Negeri Jakarta

Figure		Page
2.1	One-on-One Technique	6
2.2	Fading Technique	7
2.3	Shabing Technique	8
2.4	Marbel Hijaiyah 4D	10
2.5	Marbel Hijaiyah 4D Menu	11
2.6	Marbel Hijaiyah 4D Rating	11
3.1	ADDIE Model	17
3.2	Start Menu	21
3.3	About	22
3.4	Main Menu	22
3.5	Self-care Explanation	23
3.6	Sub-menu	23
3.7	Specific Self-care Explanation	24
3.8	AR-Flashcards Interface	24
4.1	Application Logo	26
4.2	Flashcards	27
4.3	Infographic Poster	28
4.4	Flyer	28
4.5	Mini-flyers	29



### © Hak Cipta milik Politeknik Negeri Jakarta



#### Hak Cipta :

1. Dilarang mengutip sebagian atau seluruh karya tulis ini tanpa mencantumkan dan menyebutkan sumber :
  - a. Pengutipan hanya untuk kepentingan pendidikan, penelitian, penulisan karya ilmiah, penulisan laporan, penulisan kritik atau tinjauan suatu masalah.
  - b. Pengutipan tidak merugikan kepentingan yang wajar Politeknik Negeri Jakarta
2. Dilarang mengemukakan dan memperbanyak sebagian atau seluruh karya tulis ini dalam bentuk apapun tanpa izin Politeknik Negeri Jakarta





**Hak Cipta :**

1. Dilarang mengutip sebagian atau seluruh karya tulis ini tanpa mencantumkan dan menyebutkan sumber :
  - a. Pengutipan hanya untuk kepentingan pendidikan, penelitian, penulisan karya ilmiah, penulisan laporan, penulisan kritik atau tinjauan suatu masalah.
  - b. Pengutipan tidak merugikan kepentingan yang wajar Politeknik Negeri Jakarta
2. Dilarang mengumumkan dan memperbanyak sebagian atau seluruh karya tulis ini dalam bentuk apapun tanpa izin Politeknik Negeri Jakarta

## CHAPTER I

### INTRODUCTION

#### A. Project Background

Children with autism disorders require special attention from everyone. The reason why they need special attention is that they have different behavior, especially in social interaction. Many children with autism disorders receive negative treatment from their surrounding environment. This causes the child to feel sad, upset, even depressed and causes ignorance to himself.

There are 5 types of autism syndrome in children in this world. The first are Asperger's Syndrome, Rett Syndrome, Childhood Disintegrative Disorder (CDD), Kanner's Syndrome, and Pervasive Developmental Disorder (PDD). The five types of syndrome above have different approaches to fostering.

Symptoms of autism can usually be seen from the age of 3 years. Even some children have shown symptoms since the first 12 months of life. However, there are also some circumstances where the symptoms of autism do not appear even for 24 months or more.

After all, a child with autism is the same child as any other child, who should be treated the same. Unfortunately, educational facilities for children with autism disorders are still considered unable to meet the needs of children with autism disorders. According to researchers, before entering formal education, children must be taught about the importance of self-care. Self-care must be taught from an early age because it will greatly affect children's habits in the future.



**Hak Cipta :**

1. Dilarang mengutip sebagian atau seluruh karya tulis ini tanpa mencantumkan dan menyebutkan sumber :
  - a. Pengutipan hanya untuk kepentingan pendidikan, penelitian , penulisan karya ilmiah, penulisan laporan, penulisan kritik atau tinjauan suatu masalah.
  - b. Pengutipan tidak merugikan kepentingan yang wajar Politeknik Negeri Jakarta
2. Dilarang mengumunkan dan memperbanyak sebagian atau seluruh karya tulis ini dalam bentuk apapun tanpa izin Politeknik Negeri Jakarta

Until now, there is no learning method that can effectively teach children with autism disorders about self-care. There are several conventional methods, but parents assess these methods are still less effective for children with autism disorders.

This research was conducted to find a self-care learning method that is appropriate and can meet the needs of children with autism disorders. This learning method will use a technology called Augmented Reality combined with Flashcards design in its delivery.

Augmented Reality itself has been used as a learning medium for children because it is considered very helpful in terms of delivering material and providing new variations in learning methods so that children do not feel bored and do not get bored quickly when learning. While Flashcards are often found as a medium for playing and learning for children.

“Flashcards were first introduced by Doman in 1964. This introduction was through his book entitled "How to Teach Your Baby to Read". Or rather, from that book, flashcards became known to the public. In this book, flashcards are mentioned in chapter 7, to be exact. In the sub-chapter preparation of lesson materials.” (Akbar, 2020).

**B. Problem Statement**

The number of case findings related to differences in treatment of children with autism disorders, which resulted in decreased self-confidence in these children and ultimately resulted in their lack of concern for themselves. The above conditions can be caused by the lack of public understanding of the behavior of children with autism disorders.





**Hak Cipta :**

1. Dilarang mengutip sebagian atau seluruh karya tulis ini tanpa mencantumkan dan menyebutkan sumber :
  - a. Pengutipan hanya untuk kepentingan pendidikan, penelitian , penulisan karya ilmiah, penulisan laporan, penulisan kritik atau tinjauan suatu masalah.
  - b. Pengutipan tidak merugikan kepentingan yang wajar Politeknik Negeri Jakarta
2. Dilarang mengemukakan dan memperbanyak sebagian atau seluruh karya tulis ini dalam bentuk apapun tanpa izin Politeknik Negeri Jakarta

Therefore, the researcher found at least three problems in the current situation that need to be fixed, namely:

1. A lot of people still not understand the differences in self-care routine and behaviour of children with autism.
2. Current method not good enough to help parents to foster their child who has autism disorder.
3. Technology has not been used in current methods to enlarge autistic children self-care.

**C. Objectives of the Project**

A research study designed to help increase self-care of children with autism disorders had the following specific objectives:

1. To understand the autistic children self-care routine and their behaviour.
2. To determine the suitable learning method for children with autism disorder.
3. To propose a new learning method by using Augmented Reality (AR) flashcards design to enlarge autistic children self-care.

**D. Scope of the Project**

According to several studies in the same field, namely the study of children with autism disorders, it is said that the symptoms of autism in children can appear in the first 12-24 months. Therefore, the scope of this project takes an age range of 3-7 years. This is in order to help parents nurture their children as soon as possible after finding out that their child has autism disorder.



**Hak Cipta :**

1. Dilarang mengutip sebagian atau seluruh karya tulis ini tanpa mencantumkan dan menyebutkan sumber :
  - a. Pengutipan hanya untuk kepentingan pendidikan, penelitian , penulisan karya ilmiah, penulisan laporan, penulisan kritik atau tinjauan suatu masalah.
  - b. Pengutipan tidak merugikan kepentingan yang wajar Politeknik Negeri Jakarta
2. Dilarang mengumunkan dan memperbanyak sebagian atau seluruh karya tulis ini dalam bentuk apapun tanpa izin Politeknik Negeri Jakarta

The empirical study in this research is restricted to children with autism disorder located across Klang Valley, Malaysia, wherein the responses of 100 children were studied in an interview session.

**E. Significance of the Project**

There are still very few studies on self-care for children with autism disorders. Previously, ways to increase self-care for children with autism were rarely discussed. This research project is helping to provide a new method for increasing self-care for children with autism.

**F. Assumptions and Limitations**

In conducting this research the following assumptions were made. It was assumed that:

1. Increasing public awareness of children with autism disorders.
2. Mental health and self-confidence of children with autism disorders to be better.
3. Self-care of children with autism disorders increases with the discovery of new learning methods.

The sample selected for this study was specifically children with autism disorder. The result obtained in this study may not be applicable to children outside this designation.

Researchers come from different fields with the scope of research, namely children with autism disorders. Researchers have never studied the behavior of children with autism disorders, therefore there may be limited

knowledge about the behavior of children with autism disorders.

Cultural differences are also a limitation. Researchers come from Indonesia, while the project scope and target audience are in Malaysia, where the two countries certainly have cultural differences, although not too significant. Therefore, this project may have at least a slight difference in approach in the learning method or the language.



## © Hak Cipta milik Politeknik Negeri Jakarta

### Hak Cipta :

1. Dilarang mengutip sebagian atau seluruh karya tulis ini tanpa mencantumkan dan menyebutkan sumber :
  - a. Pengutipan hanya untuk kepentingan pendidikan, penelitian , penulisan karya ilmiah, penulisan laporan, penulisan kritik atau tinjauan suatu masalah.
  - b. Pengutipan tidak merugikan kepentingan yang wajar Politeknik Negeri Jakarta
2. Dilarang mengumumkan dan memperbanyak sebagian atau seluruh karya tulis ini dalam bentuk apapun tanpa izin Politeknik Negeri Jakarta







**Hak Cipta :**

1. Dilarang mengutip sebagian atau seluruh karya tulis ini tanpa mencantumkan dan menyebutkan sumber :
  - a. Pengutipan hanya untuk kepentingan pendidikan, penelitian, penulisan karya ilmiah, penulisan laporan, penulisan kritik atau tinjauan suatu masalah.
  - b. Pengutipan tidak merugikan kepentingan yang wajar Politeknik Negeri Jakarta
2. Dilarang mengumumkan dan memperbanyak sebagian atau seluruh karya tulis ini dalam bentuk apapun tanpa izin Politeknik Negeri Jakarta

## CHAPTER V

### SUMMARY, CONCLUSION AND RECOMMENDATIONS

#### A. Summary

Children with autism disorders should always get more attention. They are special children who also need to be treated special, but not to distinguish them from other children. Autism is a neurodevelopmental disorder that causes impaired behavior and social interactions.

Unfortunately, until now learning methods for children with autism disorders are still limited to conventional methods. Conventional methods are actually quite helpful but are considered to still not meet the needs of children with autism disorders.

This study tries to find new learning methods for children with autism. By using technology, especially Augmented-Reality-based applications combined with Flashcards, it is hoped that it can be a solution to the inadequate learning methods for children with autism.

By using the ADDIE Model research method, it is hoped that this research will produce results as expected and can be a way out as a new learning method. In addition, this research was also carried out using a qualitative design assisted by two instruments, namely questionnaires and interviews as a tool for data collection so that the research results will be more concrete and in accordance with the needs in the real world.



**Hak Cipta :**

1. Dilarang mengutip sebagian atau seluruh karya tulis ini tanpa mencantumkan dan menyebutkan sumber :
  - a. Pengutipan hanya untuk kepentingan pendidikan, penelitian, penulisan karya ilmiah, penulisan laporan, penulisan kritik atau tinjauan suatu masalah.
  - b. Pengutipan tidak merugikan kepentingan yang wajar Politeknik Negeri Jakarta
2. Dilarang mengumumkannya dan memperbanyak sebagian atau seluruh karya tulis ini dalam bentuk apapun tanpa izin Politeknik Negeri Jakarta

**B. Conclusion**

After looking at the data from the questionnaire results and has been processed using Application Usability Testing (AUT), it can be concluded several points:

1. All systems in the application work fine.
2. The application is considered easy to use and can help children's learning with a percentage above 80%.
3. The interface design of the application is considered suitable for use by children, and the color selection is also appropriate.
4. Flashcards make this application more attractive and the visuals provided are considered quite clear.
5. Overall, this application can help the learning process of children with autism disorders and can be used as an alternative learning method.

**C. Recommendations**

Based on the final year project results, there are several things that can be added to make this application more effective. Therefore, this application requires several things that can be suggested as follows:

1. Menu options can be added so that children can understand the material better. For example, such as giving short questions for children's evaluation.
2. When the user points the camera at the Flashcards, it would be better if the 3D objects that appear have animations to make them more attractive and easier for children to understand.



**Hak Cipta :**

1. Dilarang mengutip sebagian atau seluruh karya tulis ini tanpa mencantumkan dan menyebutkan sumber :
  - a. Pengutipan hanya untuk kepentingan pendidikan, penelitian, penulisan karya ilmiah, penulisan laporan, penulisan kritik atau tinjauan suatu masalah.
  - b. Pengutipan tidak merugikan kepentingan yang wajar Politeknik Negeri Jakarta
2. Dilarang mengumumkan dan memperbanyak sebagian atau seluruh karya tulis ini dalam bentuk apapun tanpa izin Politeknik Negeri Jakarta

## BIBLIOGRAPHY

1. Akbar, R (2020, June 24). Sejarah Flashcard (Kartu Kilas). <https://www.rijalakbar.id/2020/06/sejarah-flashcard-kartu-kilas.html>
2. Adhi, G (2021, January 5). Model Addie. <https://www.tripven.com/model-addie/>
3. Centers for Disease Control and Prevention (n.d.). Signs and Symptoms of Autism Spectrum Disorders. <https://www.cdc.gov/ncbddd/autism/signs.html>
4. Charlton, S. G., & O'Brien, T. G. (2002). Handbook of Human Factors Testing and Evaluation. Boca Raton: Lawrence Erlbaum Associates Publishers
5. Cherry, K (2020, November 23). How Applied Research Is Used in Psychology. <https://www.verywellmind.com/what-is-applied-research-2794820>
6. Formplus Blog. (n.d.). What is Applied Research? + [Types, Examples & Method]. <https://www.formpl.us/blog/applied-research>
7. Hidayat, C (n.d.). Model Penelitian Pengembangan ADDIE. <https://ranahresearch.com/model-penelitian-pengembangan-addie/>
8. Integrity Inc. (n.d.). What Are the 5 Types of Autism?. <https://www.integrityinc.org/what-are-the-5-types-of-autism/>
9. Langos, S. (2014). Athens as an international tourism destination: An empirical investigation to the city's imagery and the role of local DMO's. University of Derby.
10. Mbelo, F. (2018, February 5). Bimbingan dan Konseling untuk Penanganan Anak Berkebutuhan Khusus di Taman Kanak-kanak. Kompasiana. <https://www.kompasiana.com/furkanawatimbelo/5a7737e3dd0fa81fc33808e3/bimbingan-dan-konseling-untuk-penanganan-anak-berkebutuhan-khusus-di-taman-kanak-kanak>
11. Mulyadi, M. (2011). Penelitian kuantitatif dan kualitatif serta pemikiran dasar menggabungkannya. Jurnal studi komunikasi dan media, 15(1), 128-137.
12. National Science Foundation. Definitions of research and development: An annotated compilation of official sources. Updated March 2018.
13. Ndukwu, D. (2020, July 8). Questionnaire: Types, Definition, Examples & How to Design Your Own. Retrieved from KyLeads: <https://www.kyleads.com/blog/questionnaire/>



14. Peadamkar, P. (n.d.). Types of Research Methodology. Educba. Retrieved September 26, 2021, from <https://www.educba.com/types-of-research-methodology/>
15. Polsinelli, P. (2016, December 5). Why is Unity so popular for videogame development?. <https://designagame.eu/2013/12/unity-popular-videogame-development/>
16. Sugiyono, 2008. Metode Penelitian Kuantitatif, Kualitatif, dan R & D. Bandung: ALFABETA.
17. Sutopo, HB. 2006, Metode Penelitian Kualitatif, Surakarta: UNS Press.
18. Tai, A. (2020, August 14). User Acceptance Testing (UAT). Retrieved from Techopedia: <https://www.techopedia.com/definition/3887/user-acceptance-testing-uat-software-testing>
19. Techopedia Inc. (n.d.). What Does Adobe Photoshop Mean?. <https://www.techopedia.com/definition/32364/adobe-photoshop>
20. What is Usability Testing? UX(User Experience) Testing Example. (2021, May 9). Retrieved from Guru99: <https://www.guru99.com/usability-testing-tutorial.html>
21. Yaacob, A., Zaludin, F., Aziz, N., Ahmad, N., Othman, N. A., & Fakhrudin, R. A. M. (2019). Augmented Reality (AR) Flashcards As a Tool to Improve Rural Low Ability Students' Vocabulary. Universiti Utara Malaysia, 29-52.

## © Hak Cipta milik Politeknik Negeri Jakarta

### Hak Cipta :

1. Dilarang mengutip sebagian atau seluruh karya tulis ini tanpa mencantumkan dan menyebutkan sumber :
  - a. Pengutipan hanya untuk kepentingan pendidikan, penelitian, penulisan karya ilmiah, penulisan laporan, penulisan kritik atau tinjauan suatu masalah.
  - b. Pengutipan tidak merugikan kepentingan yang wajar Politeknik Negeri Jakarta
2. Dilarang mengumumkan dan memperbanyak sebagian atau seluruh karya tulis ini dalam bentuk apapun tanpa izin Politeknik Negeri Jakarta



**POLITEKNIK  
NEGERI  
JAKARTA**



Hak Cipta :

1. Dilarang mengutip sebagian atau seluruh karya tulis ini tanpa mencantumkan dan menyebutkan sumber :
  - a. Pengutipan hanya untuk kepentingan pendidikan, penelitian, penulisan karya ilmiah, penulisan laporan, penulisan kritik atau tinjauan suatu masalah.
  - b. Pengutipan tidak merugikan kepentingan yang wajar Politeknik Negeri Jakarta
2. Dilarang mengumumkan dan memperbanyak sebagian atau seluruh karya tulis ini dalam bentuk apapun tanpa izin Politeknik Negeri Jakarta

APPENDIX A

Question in Google Form

U CARE APPLICATION EVALUATION

Hello, my name is Fadhli Haris Sandi. I'm currently studying major Bachelor in Creative Multimedia at Management & Science University. This form was made for helping me to evaluate whether the 'U Care' application can be used and works as desired and can meet user needs.

You can try the application first by downloading it at the following link: [https://drive.google.com/drive/folders/1sDU1Rdijuy2xmktJS\\_2EGqG4KHRUYMI](https://drive.google.com/drive/folders/1sDU1Rdijuy2xmktJS_2EGqG4KHRUYMI)

The response you gave really helped my research in developing this learning application. Thank you!

1. Name?
2. Age?
  - 20-23
  - 24-27
  - 28-31
  - 32+
3. Gender?
  - Male
  - Female
4. Do you think this Augmented Reality-based application easy to use?
 

1	2	3	4	5	
Strongly agree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly disagree
5. Do you think the application makes it easier for children to learn?
 

1	2	3	4	5	
Strongly agree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly disagree
6. Do you think the application provides easy-to-understand information?
 

1	2	3	4	5	
Strongly agree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly disagree
7. Do you think the features on the system working properly?
 

1	2	3	4	5	
Strongly agree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly disagree
8. Do you think the buttons in the application work properly?
 

1	2	3	4	5	
Strongly agree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly disagree
9. Do you think the Flashcard details displayed in the application are clear?



© Hak Cipta milik Politeknik Negeri Jakarta

Hak Cipta :

1. Dilarang mengutip sebagian atau seluruh karya tulis ini tanpa mencantumkan dan menyebutkan sumber :
  - a. Pengutipan hanya untuk kepentingan pendidikan, penelitian, penulisan karya ilmiah, penulisan laporan, penulisan kritik atau tinjauan suatu masalah.
  - b. Pengutipan tidak merugikan kepentingan yang wajar Politeknik Negeri Jakarta
2. Dilarang mengumumkannya dan memperbanyak sebagian atau seluruh karya tulis ini dalam bentuk apapun tanpa izin Politeknik Negeri Jakarta

Strongly agree    1    2    3    4    5    Strongly disagree

10. Do you think the 3D Objects from Flashcards can help to better understand the explanation?

Strongly agree    1    2    3    4    5    Strongly disagree

11. Do you think this system has a suitable color combination?

Strongly agree    1    2    3    4    5    Strongly disagree

12. Do you think the design of this application look attractive for children?

Strongly agree    1    2    3    4    5    Strongly disagree

13. Do you think this learning application is helpful?

Strongly agree    1    2    3    4    5    Strongly disagree

