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# i-JaMCSIIX 2022

International Jasin Multimedia & Computer Science Invention and Innovation Exhibition

## EXTENDED ABSTRACT BOOK

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# **i-JaMCSIIX** **2022**

International Jasin Multimedia & Computer Science Invention and Innovation Exhibition

Extended abstract

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i-JaMCSIIX

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# Contents

No.	Registration ID	Project Title	Page
1	JM006	Hiding Information Digitally Under Picture (HIDUP) Using Image Steganography	1
2	JM009	Learning Shapes and Colours using JomLearn & Play Application for Children	5
3	JM010	A Novel Quality Grading Determination using Boxplot Analysis and Stepwise Regression for Agarwood Oil Significant Compounds.	9
4	JM011	A Novelty Classification Model for Varied Agarwood Oil Quality Using The K-Nearest Neighbor Algorithm	13
5	JM012	The Development of Web-Based Student Leadership Program Management System for 'Unit Kepimpinan Pelajar'	16
6	JM020	Jom Solat-iVAK: An Interactive Android Mobile Application in Learning Wudhu and Salah for Children with Learning Disabilities	20
7	JM024	Gold Price Forecasting by Using ARIMA	24
8	JM025	Recycle Now: Learning the 3R of Waste Management Through Game-Based Learning	28
9	JM031	Go Travel Application	32
10	JM032	SmartPark	36
11	JM033	iKEN 3D Environment Mobile Application	40
12	JM034	Click Car Services	44
13	JM035	Smart Vector Backpack	47
14	JM036	MY Ole-Ole Application	51
15	JM040	SH Jacket	55
16	JM041	FemaleSafe2Go	59
17	JM042	Avalyn	63
18	JM043	MyConvenient Travel Application	67
19	JM044	Visnis Apps	71
20	JM045	Cyclo Application	74
21	JM046	i-seeuWatch	78

22	JM047	ArenaSport Application	82
23	JM048	Melastomaceae species : A New Potential of Antioxidant Agent	86
24	JM049	Travesy	90
25	JM051	Borneo Food Hunter App	94
26	JM052	NIXON PACK	98
27	JM053	Ecoin Sustainable Smartwatch	102
28	JM054	SpaceBook	105
29	JM061	Nafas Face Mask	109
30	JM062	Handy Scrubby	113
31	JM064	POMCUT (PORTABLE MULTI-COOKING UTENSIL)	116
32	JM065	4 in 1 Tumbler	120
33	JM072	Understanding Social Media Influence In Reviving The Trishaw Or "Beca" As A Popular Tourism Attraction In Melaka.	124
34	JM074	First Aid Stick	127



# Hiding Information Digitally Under Picture (HIDUP) Using Image Steganography

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**Abstract**— Hiding Information Digitally Under Picture (HIDUP) Using Image Steganography system is a project that provides the user with the ability to hide information within an image. HIDUP is different from any current image steganography system available in the market as it implements two different encryption algorithms, which are Libsodium and Bcrypt, to provide more security. HIDUP system can provide photographers or digital artists to embed a new digital watermarking onto their image. This functionality will help them store their signature information into the picture without directly destroying the image quality. This project uses the Waterfall Methodology model because of its simpleness in managing each phase, with distinct deliverables and activities. These phases are Requirement Gathering and Analysis Phase, Design Phase, and Implementation Phase. The Requirement Gathering and Analysis Phase ensures that all information is gathered to gain knowledge from all potential users of the system. It helps to identify the system's features by analyzing all the requirements that have been collected. After that, the Design Phase ensures that the system's overall design, including the databases, is determined before starting the next phase. Finally, the system is being developed in the Implementation Phase. The main strength of the HIDUP system is that it can successfully integrate Image Steganography with two distinct cryptography algorithms. This feature has led to creating a system that can produce a highly secured image that could store messages hiddenly under it. Moreover, user will also be notified by email when dedicated image is being sent to them.

**Keywords**—Image Steganography, Libsodium, Bcrypt, encryption algorithm

## I. INTRODUCTION

As of today, steganography may be used as a type of digital watermarking, in which a hidden trademark is embedded in images, audio or video. Due to current market demands for digital watermarking, it is gaining new attention, especially in media fingerprinting. Steganography provides an advantage over cryptography in that it prevents the intended hidden message from drawing attention to itself as a matter of scrutiny.

In this digitalization era, the increasing demands from people to secure their data or confidential information are significantly crucial. The organization would sell users personal data, or even hackers could get their data by hacking activity. Although organizations have used various security techniques to secure secret messages, the threat still exists. For example, on 7th April 2021, Facebook declared a leak of 533 million users' data online leaked to the Internet. This data includes personal data such as names, email addresses, phone numbers and locations [1]. Based on survey that has been distributed it is found that people have problems with their data being leaked or breached regardless of age group. Fig 1 shows the respondents knowledge about being victim of data breach. The responses show that more than 80% of people do not have high confidence that their messages online are being revealed. Fig 2 shows the respondents confidence about their data being leaked. This is concerning since the number is significantly increased. Furthermore, up to 35% of people either have their data been breached or did not even know their data are saved online. This fact proves that people do not have high confidence and fear their data being leaked while being on the Internet. Lastly, the survey shows that people are willing would use a new and advanced secured system, which means that people are still open to trying any new system available that could replace their old system.

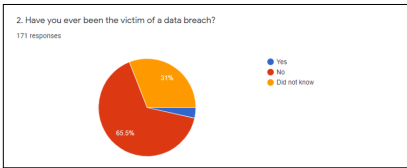


Fig 1 Respondents result knowledge on data breach

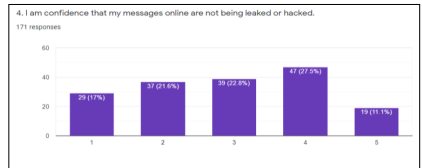


Fig 2 Respondents confidence of data being leaked

A steganalysis system is a system that can detect hidden messages that have been using steganography. This has led to the current steganography system being no longer secured. Hence, a new method of hiding data must be made to ensure people can send messages without the worry of it being hacked or leaked. Since personal information is privately crucial to anyone, a reliable and advanced way of communication via the Internet must be established [2]. Current image steganography technology that is being massively used is not reliable and secure enough. A layer of security needs to be added like cryptography to ensure the image is secured.

Hiding Information Digitally Under Picture (HIDUP) system is a web-based system that allows users to hide information within an image. HIDUP is different from the current image steganography system available in the market as it implements two different encryption algorithms, which are Libsodium and Bcrypt, to provide more security. Libsodium is a library designed to perform and simplify cryptography. It was newly made, released back in 2014, and Frank Denis wrote it in C language. It uses SHA-2 hash functions and AES block cypher algorithms [3]. The most crucial advantage of Libsodium is that it was designed to guard against side-channel attacks. This is a critical point for security since most attacks are motivated by implementation problems rather than algorithmic vulnerabilities [4].

Bcrypt is a hashing algorithm for passwords based on the Blowfish block cypher. It was designed by Niels Provos and David Mazieres back in 1999. Reason that the Bcrypt was created is to withstand brute force attacks and to remain stable amid hardware advancements [5]. The Bcrypt function is the default password hash algorithm in OpenBSD and was previously the default in some Linux distributions, including SUSE Linux.

Additionally, since HIDUP is a web-based system, it also has registration and login functionality. This functionality provides a management system for all the images created. HIDUP also implements a reliable steganography algorithm, Least Significant Bit (LSB), to produce those steganography images. It manipulates the pixel of an image, which are the bit value of the digital cover image, to embed the encrypted hidden code. The encrypted message bit will be inserted in the picture pixel's least significant bit.

## II. OBJECTIVES

There are three objectives in this research and all the objectives listed tend to be achieved. The objectives are as follows:

- i. To identify and analyze requirements for an Image Steganography system capable of concealing a secret message within an image.
- ii. To design an Image Steganography web-based system.
- iii. To develop a web-based system that can scan steganography images and decode the hidden message successfully.

## III. METHODS

This project uses the Waterfall Methodology model because of its simpleness to manage each phase, with distinct deliverables and activities. These phases are Requirement Gathering and Analysis Phase, Design Phase, and Implementation Phase. The Requirement Gathering and Analysis Phase ensures that all information is gathered to gain knowledge from all potential users of the system. It helps to identify the system's features by analyzing all the requirements that have been collected. After that, the Design Phase ensures that the system's overall design, including the databases, is determined before starting the next phase. The final phase is the Implementation Phase, which is the development of the system itself. The requirements analysis, design and implementation of the HIDUP system are fully explained in the Software Requirements Specification (SRS) and Software Design Document (SDD) documents.

### A. Phase I: Requirement Gathering and Analysis

The requirement gathering and analysis phase gathers information regarding completing the system, which will become the high-level requirements. These requirements must be analyzed to become specific stakeholder-approved requirements, measurable and testable. Most requirements gathered to complete the HIDUP system are from interviews with experts and external literature reviews on the related topics. At the end of this phase, several requirements diagram were produced. Fig 3 show the use case diagram of HIDUP.

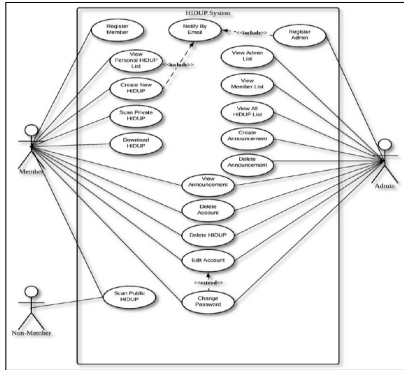


Fig 3 Use Case Diagram for HIDUP System

**B. Phase II: Design**

A logical solution is defined in the design phase, as it needs to be depicted using various design tools. These include the system architectural description diagram, design class diagram, package diagram, multilayer sequence diagram, and entity-relationship diagram (ERD).

**C. Phase III: Implementation**

The Implementation Phase is the final process of development, also known as coding. This is where all the requirements are gathered, and the design is aligned to develop a whole system solution. This will also be the last phase of the original waterfall methodology used by the HIDUP system,

**IV. RESULTS AND FINDINGS**

HIDUP system is successfully developed after going through all the development phases. User can use HIDUP system to encrypt their message to only dedicated recipient. The receiver of the image need to use the system to decrypt message that come together with the image.

Fig 4 show the interface to create a HIDUP image. Users can create a new HIDUP image by submitting details, including an image, title, type, and the messages to be hidden. This can be done in the creation form, as shown in Fig 4. After entering all the valid details of the HIDUP image, the user needs to click the “Create HIDUP” button. Then, the system will check if the uploaded image is in the supported format. Only images with Graphic Interchange Format (GIF), Portable Network Graphics (PNG) and Joint Photographic Experts Group (JPEG/JPG) format can be accepted.

The cryptography and steganography process will occur, starting with the encrypted message using the Libsodium algorithm. Once the user done creating the HIDUP image, the HIDUP system will insert all the HIDUP information details into the database. The unique ID generated by the database of the inserted row will then be encrypted using the Bcrypt algorithm. The encrypted ID, which contains the hidden message, will be stored hiddenly into the HIDUP image, using the Least Significant Bit (LSB) steganography technique. The Libsodium. After all these processes are completed, the HIDUP image will be stored in the database accordingly, and the user can download it right away.

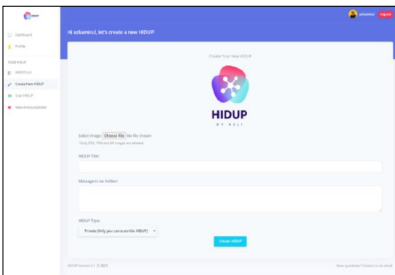


Fig 4 Create HIDUP

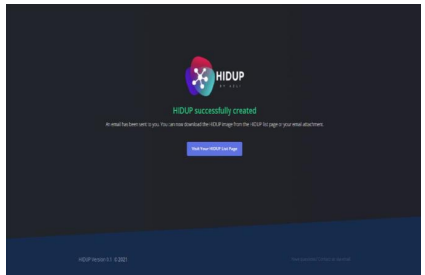


Fig 5 Successful Message

Once the new HIDUP is successfully created, a success message prompt will be shown to the user, as in Fig 5. However, if the HIDUP creation is unsuccessful, mainly due to uploading an unsupported image, a failure message prompt will be shown to the user.

## V. CONCLUSIONS

The main strength of the HIDUP system is that it can successfully integrate Image Steganography with two distinct cryptography algorithms. This feature has led to creating a system that can produce a highly secured image that could store messages hiddenly under it.

## ACKNOWLEDGMENT

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## REFERENCES

- [1] A. Holmes, "533 million Facebook users' phone numbers and personal data have been leaked online," 2021.
- [2] L. Tawalbeh, F. Muheidat, M. Tawalbeh, and M. Quwaider, "IoT privacy and security: Challenges and solutions," *Appl. Sci.*, vol. 10, no. 12, pp. 1–17, 2020, doi: 10.3390/AP10124102.
- [3] J.-K. Zinzindohoué, K. Bhargavan, J. Protzenko, and B. Beurdouche, "Hac!\*,<sup>\*</sup>" *Proc. 2017 ACM SIGSAC Conf. Comput. Commun. Secur. - CCS '17*, pp. 1789–1806, 2017, [Online]. Available: <http://dl.acm.org/citation.cfm?doid=3133956.3134043>.
- [4] S. Chen, R. Wang, X. F. Wang, and K. Zhang, "Side-channel leaks in web applications: A reality today, a challenge tomorrow," *Proc. - IEEE Symp. Secur. Priv.*, pp. 191–206, 2010, doi: 10.1109/SP.2010.20.
- [5] K. Malvoni, S. Designer, and J. Knezovic, *Are Your Passwords Safe: Energy-Efficient Bcrypt Cracking with Low-Cost Parallel Hardware*. 2014.

## Learning Shapes and Colors using JomLearn & Play Application for Children

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**Abstract**—Learning shapes and colors are the basic cognitive development for children. Children learn best through sorting size, shapes, and colors. Nowadays, most of the applications available are using English language. This study found that there are very limited applications using Malay language. The current existing applications are available in Indonesia language. “JomLearn & Play” is the application focus on children to learn the basic shapes and colors using Malay language. The method used is ADDIE model consists of analysis, design, development, implementation, and evaluation. The “JomLearn & Play” application can help for children in early stage to learn about shapes and colors.

**Keywords**—JomLearn & Play, shapes, colors, Malay language, ADDIE model

### I. INTRODUCTION

Cognitive development is the construction of thought processes, including remembering, problem solving, and decision-making [1]. It allows the children to understand the relationship between ideas, to grasp the process of cause and effect and to improve their analytical skills [2]. Learning shapes and colors is a great way to develop children’s cognitive skills. The children’s visual processing begins in two keys areas, which are shapes and colors. First comes shapes, then comes colors! [3] Through this mobile application, it will help the children to understand the concept of shape and color.

The mobile application developed, in parallel with Malaysian education development plan 2015 to 2025 which is utilizing ICT to improve the learning quality in Malaysia. The used of ICT in learning process does not reach satisfactory level, both in terms of quality and quantity. ICT will help to strengthen teaching and learning process in education areas [4]. The survey found that, this mobile application can make learning process becomes interactive and fun to the children. This mobile application is built in Malay language. This is due to the study found that mobile application to learn shapes and colors are not available in Malay language.

### II. MATERIALS

#### A. Shapes and Colors

JomLearn & Play application is an interactive application that can be accessed using mobile devices. This application focused on the shapes and colors specifically for preschool student who age below 6 years old. The apps focus on preschool student because an early childhood education is carried out as an effort to assist children in increasing their talent and interest of each child [5].

For children ages 4 to 6 years old, the basic lessons are about color, alphabet, number and shape [6]. Color is a popular aspect of the world for kid, and children are mindful of colors as a distinct realm, know color words and responds to color name and questions [7]. Naming colors is cognitively complex task to young children [8]. JomLearn & Play application helps kids to select and identify colors for things and its attributes around them easily.

Shape is a great way to give kids some vocabulary for describing the world around them [6]. Most of the children takes a longer time to grasp the concept of shapes [8]. Thus, teaching shapes is an important educational activity [6] to children as the are many types of shapes around them which adapted from the basic shapes.

Shape and colors are very important in developing learning media for kindergarten students [5] - [7]. Related to this, this project will be focusing on the basic shape and color for children in identifying and classifying visual information through mobile learning method. The use of technology helps a lot to keep kids interested as a successful strategy [5].

### B. Existing Applications

There are many apps in English Language that concern about colors and shapes individually. However, there are only few that focus on colors and shapes separately using Malay Language. *Mengenal Warna, Belajar Bentuk dan Warna and Belajar Bentuk* are the examples of mobile apps for kids who age 3 years old and above using Indonesian Language. Thus, JomLearn is the apps that have both; color and shape, focus for Malaysian. The apps use Malay Language to be easily understood by preschool children. This application allows kids to learn first and interactively play with it with the addition of audio in Malay Language.

### C. Mobile Application in Childhood Education

In early childhood, the use of electronic devices, enabled with internet connectivity, has been widespread in the everyday lives of western society. There are numerous explanations why parents use devices to encourage young children to use them. While it has advantages, it is evident that internet access actually has detrimental impacts on young children's growth and development processes [9]. Research has revealed that young children are very engaged with the apps and love to play with them for various amounts of time depending on their needs and interests and the content and structure of the application [10]. A mobile application is a computer program designed to run on mobile devices such as smartphones and tablet computers. A mobile application may also be known as an application or smartphone application [10]. The use of smart mobile devices among children is also growing exponentially as children have more access to smartphones through their parents. The ease of use, portability, speed and responsiveness of the smart mobile devices and especially tablets were said to make it an ideal learning tool [9].

## III. METHODS

JomLearn & Play application is developed using ADDIE model. According to [11], ADDIE model is one of the systematic learning design models. ADDIE model is structured with sequences of systematic activities in an effort to solve learning problems. ADDIE model is simple, linear, and easy to understand, and it is suitable to use in mobile development applications [11]. This study developed a prototype for Android mobile platform to learn basic shapes and colors. This model consists of five stages namely analysis, design, development, implementation, and evaluation as shown in Fig. 1. Fig. 1 depicts the phases of developing the JomLearn & Play App. The explanation of each stage is described below.

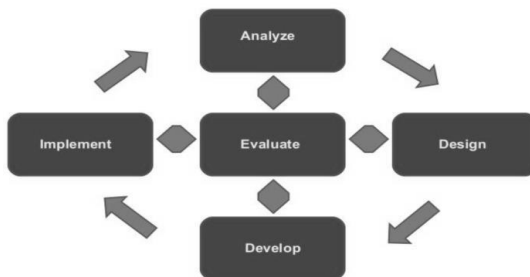


Fig. 1. ADDIE Model

### A. Analysis

During this initial stage, the potential requirements of the application are methodically analysed and written down in a specification document that serves as the basis for all future development. The result is typically a requirements document that defines what the application should do, but not how it should do it. The system will be analysed in order to properly generate the models and business logic that will be used in the application. At this stage, the objective, problem statement and environment are being clarified in order to understand the project goal.

### B. Design

Design is the second stage in ADDIE model which is at this stage covers technical design requirements such as sketches storyboard for JomLearn & Play App, the programming language that can be used, data layers, services, etc. A design specification will typically be created that outlines how exactly the business logic covered in the analysis will be technically

implemented. In this stage, the structure and flow of the project must be clearly stated which is include framework, object, icon, and interface layout.

### C. Development

In the development stage, the Build Box framework is a medium that is used to develop JomLearn & Play App. Build Box is a drag and drops game engine and one of the no-code game development platforms. It is focused on game creation without programming. Android Studio will be used to convert the app to the Android platform so that it can be installed in a smartphone that using an android operating system.

### D. Implementation

JomLearn & Play App will be testing at this stage. Implementation is a stage in which JomLearn & Play App is installed into smartphones. At this stage, JomLearn & Play App has been tested and working smoothly. On the start-up and main page of JomLearn & Play App, the "JomLearn & Play" and start button will be displayed and introduce the application in the form cartoon character.

### E. Evaluation

During this stage, JomLearn & Play App is installed on different smartphones with different android versions. The evaluation stage entails not just the evaluation and deployment of the application, but also subsequent support and maintenance that may be required to keep it functional and up to date.

## IV. RESULTS AND FINDINGS

The test was conducted to 10 children's as a respondent to evaluate the JomLearn & Play App. The findings of the survey are presented and discussed under two sections as below.

### A. Respondents Demographics

Demographic information consists of respondents gender and age. The result of respondents gender as shown in the Fig. 2.

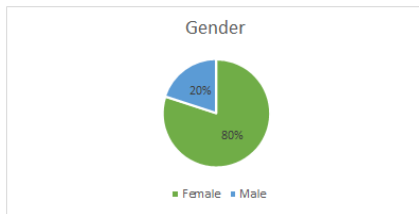


Fig. 2: Respondents gender

Fig. 2 shows the respondents gender. 80% (8 responses) were female while 20% (2 responses) were male children.

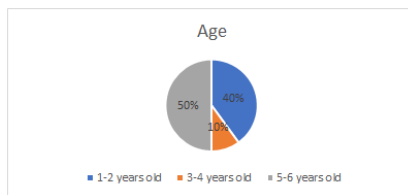


Fig. 3: Respondents age

Fig. 3 shows the age of the respondents. The results of the survey indicates 40% (4 responses) of the respondents were 1-2 years old, 10% (1 response) were 3-4 years old and the other 50% (5 responses) were 5-6 years old.

### B. Respondents opinion on the "JomLearn & Play" application

This section contained 4 questions and was composed based on the previous research. It distributed to the respondents in order to get their opinions on the "JomLearn & Play" application as shown in Table 1.

TABLE 1: RESPONDENTS OPINION ON THE "JOMLEARN & PLAY" APPLICATION  
(1 = STRONGLY DISAGREE, 2 = DISAGREE, 3 = NEUTRAL, 4 = AGREE, 5 = STRONGLY AGREE)

Questions/Scales	1	2	3	4	5
The game is fun.	0	0	0	70	30
My kid would like to play the game again.	0	0	0	60	40
"JomLearn & Play" app helps my kid to improve his/her understanding in basic shape and color.	0	0	0	70	30
"JomLearn & Play" app helps my kid to improve his/her understanding in Bahasa Malaysia language.	0	0	0	60	40

From the results presented in Table 1, it revealed mostly of the childrens agreed this game is fun which out of 10 childrens, 70% (7 responses) were "Agree" and 30% (3 responses) were "Strongly agree". None of them said this game was not fun. Besides, parents clarified their kids would like to play the game again which 60% (6 responses) answered with "Agree", and 40% (4 responses) answered with "Strongly agree". Next, majority of the parents agreed "JomLearn & Play" app helps their kids to improve his/ her understanding in basic shape and color. The results are 70% (7 responses) agree and 30% (3 responses) strongly agree. This survey also revealed majority of the parents agreed "JomLearn & Play" app helps their kids to improve his/ her understanding in Bahasa Malaysia language. 60% (6 responses) answered with "Agree" and 40% (4 responses) answered with "Strongly agree".

### C. Respondents opinion on additional features

The survey indicated majority of the parents agreed additional features such as alphabets and numbers to be added in "JomLearn & Play" application.

## V. CONCLUSIONS

JomLearn & Play application enables children to immerse themselves in a process of learning environment development via mobile application anytime and anywhere. The application could help children to learn basic shapes and colors using Malay language by learning while playing with it. The application would show the result based on the questions accordingly to measure their understanding. During the testing, this application can perform the activities as expected without any bugs and errors. Moreover, parents are able to guide their children using the application easily without any problems. As the result of users' evaluation, JomLearn & Play application can enrich children language in early stage of children development. This application currently could be installed in Android Operating System smartphone. For future work, this application will add more features for children learning materials and also able to run in crossed platform smartphone operating systems.

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## REFERENCES

- [1] Cognitive development: Encyclopedia of Children's Health, 2022. Available online at <http://www.healthofchildren.com/C/Cognitive-Development.html> (accessed August 25, 2022).
- [2] Amanda Morin, (April 27, 2020). "Why cognitive skill milestones are important". Available online at <https://www.verywellfamily.com/what-are-cognitive-skills-620847> (accessed August 25, 2022).
- [3] Learning shapes and colors: 10 sorting and matching milestones for toddlers, 2022. Available online at <https://www.adam-mila.com/milestones/cognitive-development/sorting-matching-shapes-colors/> (accessed by August 26, 2022).
- [4] Kementerian Pendidikan Malaysia (2013), *Pelan Pembangunan Pendidikan Malaysia 2013-2025 (Pendidikan Prasekolah hingga Lepas Menengah)*: pg. 42. Available online at <https://www.moe.gov.my/mat-turun-penerbitan-dan-jurnal/1818-pelan-pembangunan-pendidikan-2013-2025/file> (accessed by August 26, 2022).
- [5] Mamat, N., Kamaruddin, K., Ali, S. R., & Mohamed Noh, N. (2020). The Integration of Information and Communication Technology (ICT) in Teaching and Learning in Government and Private Preschools in Malaysia. *International Journal of Academic Research in Business and Social Sciences*, 10(11), 104–112. <https://doi.org/10.6007/ijarbs/v10-i11/7881>
- [6] Yaacob, N. I., Aisyah, N., Abdullah, M., Mansor, A., & Mohd, J. (2021). *Shapes Learning for Kids : Ana & The Shape 's City*. 1–3.
- [7] Zaeni, I. A. E., Akbar, M. I., Kirana, K. C., & Anzani, D. R. (2020). *Development of Colour and Shape Learning Device for Kindergarten Students*. 487(Ecpe), 132–137. <https://doi.org/10.2991/assehr.k.201112.025>
- [8] Katie. (2018, May 28). *Why learning colors and shapes is so important for young children*. Gift of Curiosity. <https://www.giftofcuriosity.com/why-learning-colors-and-shapes-is-so-important-for-young-children/>
- [9] I. A. E. Zaeni, M. I. Akbar, C. K. Kirana & D.R. Anzani, "Development of Colour and Shape Learning Device for Kindergarten Students" *Advances in Social Science, Education and Humanities Research*, volume 487, 2020.
- [10] S. J. Papadakis & M. Kalogiannakis, "Mobile educational applications for children: What educators and parents need to know" *International Journal of Mobile Learning and Organisation*, Vol. 11, No. 3, pp.256–277, January 2017
- [11] M. R. Samsudin, R. Sulaiman, T. T. Guan, A. M. Yusof, & M. F. C. Yaacob, "Mobile Application Development Trough ADDIE Model" *International Journal of Academic Research in Progressive Education and Development*, 10(2), 1017–1027, June 2021.