

ASA APPLICATION (ARFF SMART APPLICATION) AS LEARNING MEDIA TO IMPROVE THE COMPETENCE OF ARFF PERSONNEL

Muhammad Iqbal Dwi Saputra, Wildan Nugraha*, Sukahir, Parjan, Direstu Amalia

Politeknik Penerbangan Surabaya, Jalan Jemur Andayani I No 73, Kota Surabaya, 60236

**Corresponding Author. Email: wildan.nugraha@poltekbangplg.ac.id*

Abstract

The ARFF unit is responsible for incidents and accidents at the airport and its surroundings. They have skills such as the use of fire extinguishers, safety equipment operation, and evacuation measures. This preparedness is enhanced through the ARFF Smart Application (ASA) to improve ARFF learning competencies at I Gusti Ngurah Rai Airport. The research used a waterfall research and development (R&D) model with observation as the data collection method. Development involves communication, planning, modeling, construction, and implementation stages. Validation was conducted with a questionnaire according to ISO 25010, measuring the functionality, usability, compatibility, and performance efficiency of the application. Functionality testing involved six testers (3 media experts and 3 material experts), with 92% of the results showing excellent quality. Usability testing involved 37 users with an excellent 95.40% rating in ease of use, learning, and satisfaction. Application compatibility was tested on various Android devices. Performance efficiency testing showed efficient performance in execution time, CPU usage, and memory. ARFF Smart Application fulfills all four aspects of the ISO 25010 standard with an assessment of "very feasible" and is suitable for use in learning by personnel in classroom activities.

Keywords: Learning Media, ARFF, ASA, ISO 25010

INTRODUCTION

Aviation safety in Indonesia has become a top priority in flight operations due to the high risk of fatalities in aircraft accidents. Data shows that the number of air transport passengers in Indonesia has increased significantly. The development of air transport has had a positive impact on regional development and the national transport system. In the face of this growth, improving aviation safety is a top priority, and such improvements are part of the Road Map to Zero Accident programme. The ARFF unit, commonly referred to as Aircraft Rescue and Fire Fighting (ARFF), is the unit responsible for saving lives and property from events and accidents at the airport and its surroundings. In carrying out their main duties, ARFF personnel need to have relevant competencies, according to (Prasetyo, 2019) competencies can include knowledge, skills, and personal behaviours such as leadership. This means

that ARFF personnel must have adequate knowledge of aircraft accident handling, first aid measures, and fire fighting related to aircraft. The skills required by ARFF personnel include the ability to use fire extinguishers, operate safety equipment, and perform first aid measures appropriately and effectively (Siahaan, 2019).

In previous research conducted by (Gunadi, 2020), it shows that the level of satisfaction with the use of learning media reaches a value of 80%, which in this case gets an effective value while in research (Sarita et al., 2021) states that the provision of educational media makes an important contribution to learning success and has had a significant impact in the world of education where in this study researchers get a value of 85% where the use of learning applications is very effective in supporting teaching and learning activities. The digitalisation of education has changed the way education is delivered to be more dynamic and flexible so that it can increase motivation and enthusiasm for learning. The ARFF Smart Application

(ASA) allows users to access content relevant to ARFF through their mobile devices such as learning materials, personnel records, and other features. This research has a high novelty value because it is the first application made specifically at the ARFF unit of I Gusti Ngurah Rai Airport. ASA application provides an interactive learning experience and allows ARFF personnel to access relevant content directly through their mobile devices. ASA is expected to be continuously utilised in recording data and information on ARFF personnel and is also a valuable innovation in supporting the management and evaluation of personnel within the ARFF Unit at I Gusti Ngurah Rai Airport.

LITERATURE REVIEW

Learning Media in the Era of Society 5.0

Learning media can directly have a different and interesting effect on students (Faqih, 2021). The use of such media is important so that the learning process in the classroom can run smoothly and achieve the learning objectives set (Masykur et al., 2017). In the context of education in the era of Society 5.0, multimedia learning media refers to the concept of learning that places the human position at the center of integrating technology. Educators have autonomy in choosing learning strategies that can encourage the active involvement of learners (Sururuddin et al., 2021).

Kodular

Kodular is a website that offers various tools for creating Android applications using the drag-and-drop block programming concept (Setiawan, 2018). Block programming is the main feature offered by Kodular, where users can create Android applications without the need to write program code manually (Setiawan, 2020).

IDE (Integrated Development Environment)

IDE (Integrated Development Environment) is software that provides various features and facilities to support software development (Pawana et al., 2021). IDE provide various tools, such as code editors, compilers, and debuggers, which are useful in the software development process (Piao et al., 2021).

Flowchart

Flowchart is a form of visualization consisting of interconnected symbols that are used to represent the flow of information and processing in an algorithm (Sekarningrum, 2022).

ISO 25010

ISO 25010 is an international standard for software and software quality evaluation and systems. This standard is also known as the SQuaRE (Systems and Software Quality Requirements and Evaluation) model. This model describes product quality in software (Aggrey, 2020).

METHOD

This research uses a research and development (R&D) approach. The ASA application is designed and developed using web software development known as Kodular. Based on context and objectives, the development methodology used is a linear, sequential approach, or what is often referred to as a (waterfall) model with the Pressman 2015 model (Pressman, 2015).

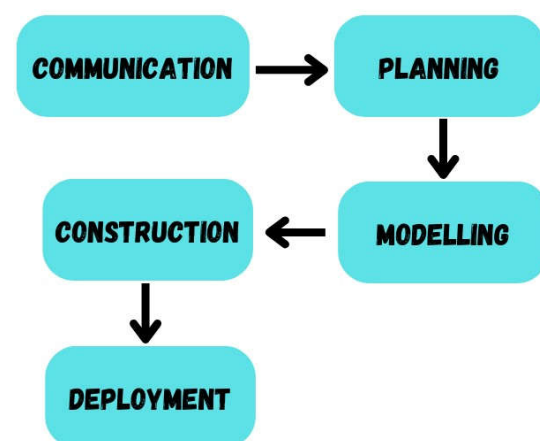


Figure 1. Waterfall Method According to Pressman 2015.

The development procedure is the set of stages used by researchers in developing products consisting of predetermined flows. The procedures used in this study include the following:

a) **Communication**, at this stage, the researcher determines the idea and title of the project to be developed by observing the research location. In addition, several ideas that could be incorporated into the project were searched for and analyzed (Ronald et al., 2018).

b) **Planning**, at this stage, researchers determine related research topics that have been found during the communication stage. Furthermore, they set criteria to find articles relevant to the topic (Choifah et al., 2022). The design results can be described using a Data Flow Diagram (DFD). DFD is a structured analysis and design tool used by system analysts to visually understand systems and subsystems (Samsinar dan Putrianti, 2015).

c) **Modelling**, at this stage, the author begins to build a model of the application system. This includes making flowcharts that must be prepared. Furthermore, the application system design is made in accordance with the design and model that has been made previously (Yadhika Rizky, 2019).

d) **Construction stage**, the process of converting the design into a language that can be understood by machines (Ronald et al., 2018). After coding is complete, testing of the system and code that has been created is carried out.

function and another. A system testing conducted in this stage is in accordance with ISO 25010. The system is prepared for user testing if it meets the requirements and requires revision. In this research, there are four types of tests covering several aspects, namely functional suitability, compatibility, usability, and performance efficiency. Each test generates points based on the usability of the application

e) The **Deployment stage** is the last stage carried out in making this application. The purpose of this deployment stage is to distribute the applications we have made so that they can be used by both individuals and groups (Rumengan et al., 2021).

A. Data Collection

The methods used in this research are questionnaires and observations. Questionnaires and surveys are used to test usability, functionality of media tests, and material tests. Observation aims to make observations of the work process that is being done or is ongoing (Sugiyono, 2014). To test aspects of compatibility and performance efficiency, the observation method is used for direct observation of the subjects involved.

Functional Suitability Aspects, Functional suitability is the capacity of software product features to fulfil user needs. The following is a lattice of instruments for media experts and material experts (Ridwan & Prasetyawan, 2017).

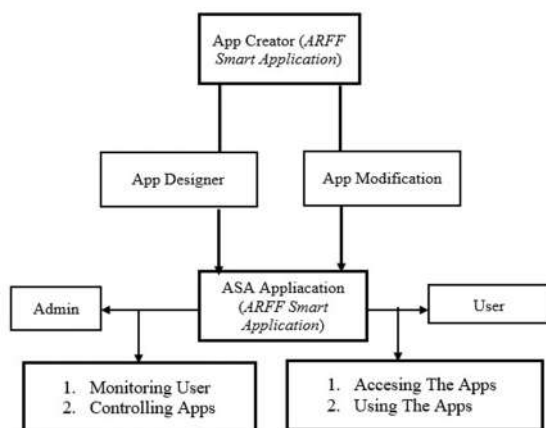


Figure 2. Data Flow Diagram

Construction stage is the stage to execute the results that have been obtained at the modeling stage, this construction stage is carried out to provide command functions to each of the previously created designs so that it becomes a structured program and has a link between one

Table 1. Expert Instrument

No.	Sub-Characteristics	Activities/Menu	Item No.	Number of Questions
1.	Suitability	Open learning media	1	1
		Main page	2	5
		Material pages	3	10
		Regulation Page	6	3
		Indendent Module Page	7	3
		Report Page	8	3
		Independent Module Page	9	3
2.	Accuracy	Application Exit Confirmation Page	10	1
		Quiz page	4	2
		Personel Training Record Page (TRP)	5	2
3.	Maintanainbility	Modularity	11	1
		Reusability	12	1
		Modifiability	13	1
		Visuality	15	2

Compatibility Aspect, the *compatibility* testing aspect involves using a number of Android smartphone device elements with varying screen sizes and screen densities (Nurdin, 2017). Starting with Android devices such as the Redmi Note 9 Pro, Samsung A33, and Realme C17 devices.

Usability Aspect, the usability testing research instrument uses USE questionnaires, which consist of 30 statements divided into 4 categories of *usefulness*, *ease of use*, *ease of learning*, and *satisfaction* (Sufandi et al., 2022). **Performance Efficiency Aspect**, this test is used to measure how long it takes to open a page. By utilizing the Testdroid program, application performance efficiency testing is carried out. Access speed and data processing speed while running are some of the elements assessed (Rozi et al., 2021). This test is used to measure how much memory and processor are used.

B. Data Analysis Techniques

Functional Suitability Aspect Analysis, In the functionality aspect, the analysis technique used is descriptive analysis. This technique involves calculating and elaborating data in detail to provide a clear picture of the object or phenomenon under study. Then, the value will be converted into qualitative data by referring to the score to value conversion table. This table is used to describe and display value conversions:

Table 1. Score to Value Conversion Table

Score Interval	Value	Category
$X > Mi + 1.8 SBi$	A	Excellent
$Mi + 0.6 SBi < X \leq Mi + 1.8 Sbi$	B	Good
$Mi - 0.6 SBi < X \leq Mi + 0.6 Sbi$	C	Good enough
$Mi - 1.8 SBi < X \leq Mi - 0.6 Sbi$	D	Not Good
$X \leq Mi - 1.8 Sbi$	E	Very Not Good

With caption:

X = actual (empirical) score

Mi = ideal mean, calculated using the formula:
 $Mi = 1/2$ (ideal maximum score + ideal minimum score)

Sbi = ideal standard deviation, determined by the formula:

$SBI = 1/6$ (ideal maximum score minus ideal minimum score)

For media experts, the maximum ideal score is 1, so the Mi and SBI values are obtained as follows:

$$Mi = 1/2 (1+0) = 0.5$$

$$SBI = 1/6 (1-0) = 0.167$$

Based on the results of Mi and SBI calculations, the conversion table is obtained as follows:

Table 2. Media Expert Spec Values

Criterion	Score Account	Result
Excellent	$X > 0.5 + (1.8 \times 0.167)$	$X > 0.8$
Good	$0.5 + (0.6 \times 0.167) < X \leq 0.5 + (1.8 \times 0.167)$	$0.6 < X \leq 0.8$
Good enough	$0.5 - (0.6 \times 0.167) < X \leq 0.5 + (0.6 \times 0.167)$	$0.4 < X \leq 0.6$
Less	$0.5 - (1.8 \times 0.167) < X \leq 0.5 - (0.6 \times 0.167)$	$0.2 < X \leq 0.4$
Very Lacking	$X \leq 0.5 - (1.8 \times 0.167)$	$X \leq 0.2$

Then, for the analysis of aspects of the material, conversion formulas and tables are used. In the material aspect, the rating scale used is a scale of 1 to 5. Therefore, the calculation is carried out as follows:

$$Mi = 1/2 (5+1) = 3$$

$$SBI = 1/6 (5-1) = 0.67.$$

Based on the calculation results, an appropriate value conversion table is used to describe the results.

Table 3 Material Expert Criteria

Criterion	Account	Score	Percentage
Excellent	$X > 3 + (1.8 \times 0.67)$	$X > 4.2$	$X > 84\%$
Good	$3 + (0.6 \times 0.67) < X \leq 3 + (1.8 \times 0.67)$	$3.4 < X \leq 4.2$	$68\% < X \leq 84\%$
Good enough	$3 - (0.6 \times 0.67) < X \leq 3 + (0.6 \times 0.67)$	$2.6 < X \leq 3.4$	$52\% < X \leq 68\%$
Less	$3 - (1.8 \times 0.67) < X \leq 3 - (0.6 \times 0.67)$	$1.8 < X \leq 2.6$	$36\% < X \leq 52\%$
Very Lacking	$X \leq 3 - (1.8 \times 0.67)$	$X \leq 1.8$	$X \leq 36\%$

Compatibility Aspect Analysis, analysis of the quality of *compatibility* aspects is carried out through testing applications on various screens and Android-based smartphone devices. Furthermore, the calculation of the percentage score of the test results is carried out and matched with the assessment scale to determine the level of quality of the application compatibility aspect.

$$Percentage = \frac{\text{The Observed Score}}{\text{The Expected Score}} \times 100\%$$

Eligibility categories based on criteria stated by Arikunto in 2009 in the journal (Widodo & Nugroho, 2019) as follows:

Table 4. Feasibility Asesment

Assessment Percentage	Interpretation
81% - 100%	Very Worth It
61% - 80%	Proper
41% - 60%	Pretty Decent
21% - 40%	Less Decent
0% - 20%	Very Less Feasible

Usability Aspect Analysis aim to conduct the feasibility assesment, This analysis was conducted to determine the average answer based on the assessment of each answer from the USE questionnaire filled out by respondents. The list of affirmative likert scale questions is below. Usability analysis was conducted to determine the average answer based on the assessment of each answer from the USE questionnaire filled out by respondents. The list of affirmative likert scale questions is below.

Table 5. Likert Scale Questions

Alternative Answers	Value
Strongly Disagree	1
Disagree	2
Disagree Less	3
Agree	4
Totally Agree	5

Then after getting the score, the presentation is calculatedas in the compatibility aspect formula. After obtaining the presentation score then compare it with the table of interpretcriteria asi score (Priambodo, 2019) in table 7.

Table 6. Feasibility Asesment

Assessment Percentage	Interpretation
81% - 100%	Very Worth It
61% - 80%	Proper
41% - 60%	Pretty Decent
21% - 40%	Less Decent
0% - 20%	Very Less Feasible

RESULTS AND DISCUSSION

First stage, is the communication stage carried out by obtaining information through observation where at this stage the author makes observations to personnel at the ARFF

unit at I Gusti Ngurah Rai Airport in order to get information related to how to carry out classroom activities in daily training activities.

Second stage, the planning stage (planning) is carried out to provide an overview at each stage that will be carried out when developing an application, the planning carried out includes preparing everything needed in making applications starting from schedule planning in application development.

Third stage, a modeling stage is carried out by utilizing the materials that have been provided and planning in each task. So at the next stage is to make the right model to be able to provide an overview with the application being worked on. These stages include the following: a) a system flow chart (flowchart) is a chart that displays a workflow that occurs in the system as a whole and describes the sequence of events that exist in the system. This flow chart diagram in the app describes the flow of the app access process. b) Design View (ASA), In this stage, the author designs a learning application system which includes the main display and menu display model.

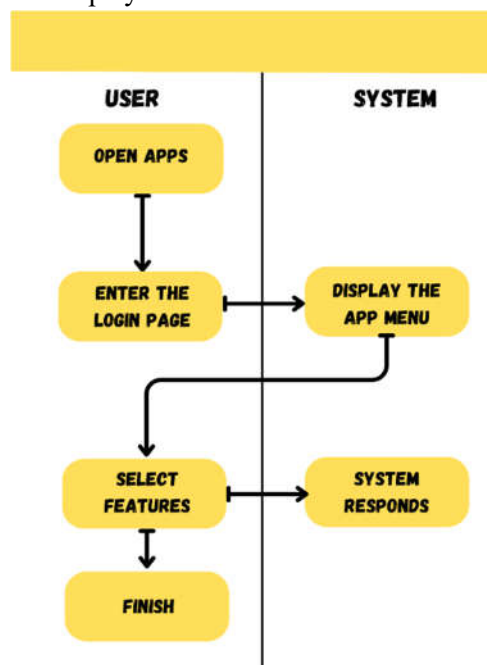


Figure 3. Flowchart

Following is the design menu and sub-menu of the *ARFF Smart Application*:

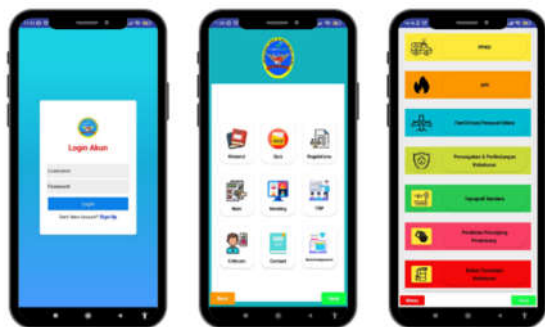


Figure 4. Display on ASA Application

Fourth stage, at this *stage of construction*, the website used to create or develop applications is codular. In testing this application, feasibility tests are carried out in accordance with the ISO 25010 standard which will be explained below.

a) Testing *Functional Suitability* aspects, this testing involves the use of questionnaires containing questions regarding the functionality of learning media and learning materials. The questionnaire was given to two media expert respondents and three material expert respondents. The accumulated assessment results get a score of 76. To calculate the functionality suitability aspect, the following formula is used.

$$X \text{ Value} = \frac{\text{Number Of Score Obtained}}{\text{Total Score}} = \frac{76}{76} = 1$$

The x value of 1 is obtained to check the element of suitability of the functionality of the media expert based on the calculations mentioned above. Based on these results, it can be concluded that all functionality in the learning media application has successfully carried out system instructions.

Table 7. Material Expert Assessment Results

No.	Aspects Content	Average Learning	
1.	Sum	46	60
2.	Average	4,6	4,6
Category			
	Excellent	Excellent	Excellent
3.	Percentage	92%	92%

Criterion		
Excellent	Excellent	Excellent

In the table above, the results of the evaluation of learning media by material experts showed that the quality aspect of the material content obtained an average score of 4.6 with the category "Very Good" with a score of 92. In the following graph, the conclusion of the material expert's assessment is displayed.

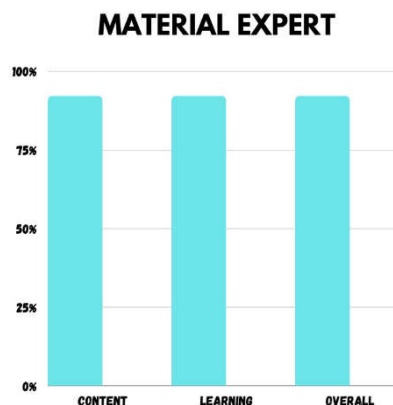


Figure 5. Material Expert Assessment Results

b) *Compatibility Aspect Testing Analysis*, Applications are tested for compatibility by running on multiple *platforms*. An Android-based smartphone used to conduct testing includes Redmi Note 9 Pro, Samsung A33 and Realme C17. The results of the compatibility aspect test are in the following Table 9.

Table 8. Compatibility Test Results

No.	Device	Compatibility
1.	Redmi Note 9 Pro	Runs well without any bugs or errors in the application
2.	Realme C17	Runs well without any bugs or errors in the application
3.	Samsung A33	Runs well without any bugs or errors in the application

There are three different types of testing devices, as shown by the table above. The compatibility percentage is then determined using the test results of the three devices.

Table 9. Compatibility Calculation

Testing	Maximum Value	Walk	Fail
Run the app on the vice Value	3	3	0
	Total	3	0

With a maximum value of 3 and a total value of 3 based on the test results in the table, the following *compatibility aspect* percentages are calculated using the formula:

$$\text{Percentage} = \frac{3}{3} \times 100\% = 100\%$$

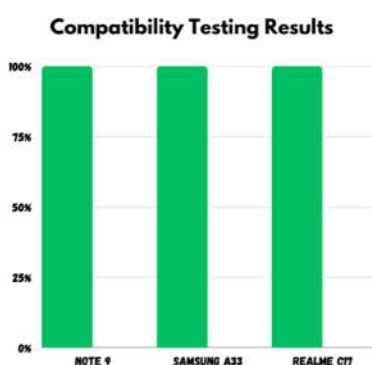


Figure 6. Compatibility Test Results

c) Usability Aspect Testing Analysis, the *usability* aspect test involved 37 users. This test uses the

USE Questionnaire instrument which consists of 30 statements, each question has its own points and has been tested for validity. The results of respondents' assessment of the application can be seen in the following Table 11.

Table 10. Usability Aspects Test Results

Indicators	Value Score	Score Value Maximum	Percentage	Category
Usefulness	1562	1665	93,81%	Very Worth It
Ease Of Use	1945	2035	95,57%	Very Worth It
Ease Of Learning	713	740	96,35%	Very Worth It

Satisfaction	1075	1113	96,84%	Very Worth It
SUM	5295	5550	95,40%	Very Worth It

d) Performance Efficiency Aspect Test Analysis, Testing aspects of performance *efficiency* is carried out to test *performance*. Aspects tested include execution time, CPU usage, and memory usage.

Table 11. Time Execution

No.	Application Process	Time Required
1.	Install Application (<i>Installing</i>)	46 Seconds
2.	Application Launching	3 Seconds
3.	(Application Test) <i>Test execution</i>	5 Minutes
4.	<i>Test Cases passed</i>	1/1

Testing aspects of performance efficiency shows that the application performs well and meets the standards set.

Table 12. Performance Efficiency Results

No.	Desired results
1	<i>Installing application, launching application, test execution, test execution, experiencing problems.</i>
2.	This application can operate without experiencing a lack of memory.
3.	The maximum CPU usage in the application does not exceed the limit.

Fifth Stage, This *deployment* stage is carried out to distribute or disseminate products that have been made in the form of learning media in the form of ".apk" files.

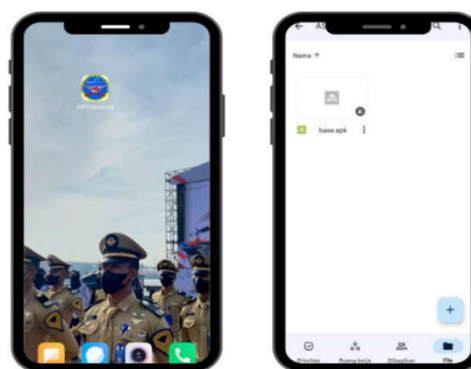


Figure 7. Application Distribution

CONCLUSION

The design of Android-based ASA applications through the stages of *communication, planning, modeling, construction*, and emerged in response to the need for digital learning media. ASA learning media for the Android platform in *classroom* activities has been declared to meet eligibility standards in accordance with ISO 25010. This standard tests several aspects of the application, including *functional suitability, compatibility, usability, and performance efficiency*. The test results showed that this application had a high rating on the *compatibility* aspect with the "Very Decent" category, while the *functional suitability* aspect received the lowest rating with the "Very Decent" category. Thus, it can be concluded that this ASA application can be used well by personnel in *classroom* activities. This research need further development of ASA learning media applications with the addition of features to support *classroom* activities. The application needs to be improved in terms of material by making updates related to ARFF Units. It is important to develop the application so that it can be used by IOS users other than Android users.

REFERENCES

- [1] Choifah, C., Suyitno, A., & Pujiastuti, E. (2022). Systematic Literature Review: Upaya Meningkatkan Kemampuan Berpikir Kreatif pada Pembelajaran Matematika. *Jurnal Cendekia: Jurnal Pendidikan Matematika*, 6(3). <https://doi.org/10.31004/cendekia.v6i3.1057>
- [2] Faqih, M. (2021). Efektivitas Penggunaan Media Pembelajaran Mobile Learning Berbasis Android Dalam Pembelajaran Puisi. *Konfiks Jurnal Bahasa an Sastra Indonesia*, 7(2). <https://doi.org/10.26618/konfiks.v7i2.4556>
- [3] Gunadi, G. (2020). Rancang Bangun Aplikasi Media Pembelajaran Mengenal Nama Hewan Dalam Dua Bahasa Berbasis Android Menggunakan Thunkable. *Infotech: Journal of Technology Information*, 6(1), 35–42. <https://doi.org/10.37365/jti.v6i1.77>
- [4] Masykur, R., Nofrizal, N., & Syazali, M. (2017). Pengembangan Media Pembelajaran Matematika dengan Macromedia Flash. *Al-Jabar: Jurnal Pendidikan Matematika*, 8(2). <https://doi.org/10.24042/ajpm.v8i2.2014>
- [5] Nurdin, M. A. (2017). Analisis Dan Pengembangan Aplikasi Inhouse Klinik Perusahaan Menggunakan Framework Codeigniter, Studi Kasus PT. Reckitt Benckiser Indonesia. *Jurnal Informatika Terpadu*, 3(1). <https://doi.org/10.54914/jit.v3i1.99>
- [6] Pawana, I. G. N. A., Gunawan, H., & Paramartha, A. (2021). Integrated Development Environment Untuk Pengembangan Smart System/ IoT Berbasis Chip ESP32. *TIERS Information Technology Journal*, 2(2). <https://doi.org/10.38043/tiers.v2i2.3313>
- [7] Peters, E., & Aggrey, G. K. (2020). An ISO 25010 based quality model for ERP systems. *Advances in Science, Technology and Engineering Systems*, 5(2). <https://doi.org/10.25046/aj050272>
- [8] Piao, Y. C. K., Ezzati-Jivan, N., & Dagenais, M. R. (2021). Distributed architecture for an integrated development environment, large trace analysis, and visualization. *Sensors*, 21(16). <https://doi.org/10.3390/s21165560>
- [9] PRASETIYO, A. Y. (2019). Efek Mediasi Kepuasan Kerja pada Pengaruh Praktek Sumber Daya Manusia Terhadap Kinerja Karyawan. *Equator Journal of Management and Entrepreneurship (EJME)*, 7(4). <https://doi.org/10.26418/ejme.v7i4.32889>
- [10] Pressman 2015:42. (2015). Pressman [2015:42]. *BABII Dasar Teiri*, 124 (Motion Imaging Journal,SMPTE).

- [11] Priambodo, W. (2019). Pengaruh Motivasi Kerja Terhadap Kinerja Karyawan Di Cv. Surya Prima Solusindo Surabaya. *Accounting and Management Journal*, 3(1). <https://doi.org/10.33086/amj.v3i1.1189>
- [12] Ridwan, M., & Prasetyawan, P. (2017). Rancang Bangun Aplikasi Permainan Adventure of Frunimal Untuk Edukasi Bahasa Inggris Berbasis Android. *Simetris : Jurnal Teknik Mesin, Elektro Dan Ilmu Komputer*, 8(2). <https://doi.org/10.24176/simet.v8i2.1599>
- [13] Ronald, A., Yesmaya, V., S, T. R., & Steven, D. kalasen J. (2018). Perancang Aplikasi Chemistor:Chemistry Tutorial dengan Menggunakan WEBGL dan HTML5. *Jurnal Teknik Dan Ilmu Komputer*. <http://ejournal.ukrida.ac.id/ojs/index.php/JTIK/article/view/1493>
- [14] Rozi, F., Kurniawan, R. R., & Sukmana, F. (2021). Pengembangan Media Pembelajaran Pengenalan Bangun Ruang Berbasis Augmented Reality Pada Mata Pelajaran Matematika. *JUPI (Jurnal Ilmiah Penelitian Dan Pembelajaran Informatika)*, 6(2). <https://doi.org/10.29100/jipi.v6i2.2180>
- [15] Rumengan, A., Mewengkang, A., & Kaparang, D. R. (2021). Sistem Informasi Manajemen Kearsipan Berbasis WEB. *Edutik : Jurnal Pendidikan Teknologi Informasi Dan Komunikasi*, 1(6). <https://doi.org/10.53682/edutik.v1i6.3296>
- [16] Samsinar dan Putrianti. (2015). Analisa Dan Perancangan Sistem. *Karakteristik Sistem*, 2(18).
- [17] Sarita, V. R., Jati, S. S. P., & Ayundasari, L. (2021). Pengembangan bahan ajar e-handout berbasis Kodular materi Istana Gebang untuk pembelajaran Sejarah di SMA Negeri 1 Blitar. *Jurnal Integrasi Dan Harmoni Inovatif Ilmu-Ilmu Sosial (JIHIS)*, 1(12). <https://doi.org/10.17977/um063v1i12p1265-1276>
- [18] Sekarningrum, A. (2022). *Flowchart adalah : Pengertian, Jenis, simbol, manfaat dan 3 contohnya*. 5 Agustus 2022. <https://www.ekrut.com/media/flowchart-adalah>
- [19] Setiawan, D. (2018). Dampak Perkembangan Teknologi Informasi dan Komunikasi Terhadap Budaya. *JURNAL SIMBOLIKA: Research and Learning in Communication Study*, 4(1). <https://doi.org/10.31289/simbollika.v4i1.1474>
- [20] Setiawan, R. (2020). Rancang Bangun Media Pembelajaran Berbasis Android Tanpa Coding Semudah Menyusun Puzzle. *Jurnal Sistem Informasi Dan Sains Teknologi*, 2(2). <https://doi.org/10.31326/sistek.v2i2.729>
- [21] Siahaan, J. (2019). Kompetensi SDM Bidang Kebandarudaraan. *Warta Penelitian Perhubungan*, 24(6). <https://doi.org/10.25104/warlit.v24i6.1039>
- [22] Sufandi, U. U., Priono, M., Aprijani, D. A., Wicaksono, B. A., & Trihapningsari, D. (2022). Uji Usability Fungsi Aplikasi Web Sistem Informasi Dengan Use Questionnaire (Studi Kasus : Aplikasi Web Sistem Informasi Tiras dan Transaksi Bahan Ajar). *Jurnal Pendidikan Teknologi Dan Kejuruan*, 19(1).
- [23] Sugiyono. (2014). Memahami penelitian kualitatif. 2014/Sugiyono. In *Bandung: Alfabeta*.
- [24] Sururuddin, M., & Dkk. (2021). Strategi Pendidik Dengan Media Pembelajaran Berbasis Multimedia Untuk Menghadapi Era Society 5.0. *Jurnal DIDIKA : Wahana Ilmiah Pendidikan Dasar*, 7(1).
- [25] Widodo, N., & Nugroho, S. (2019). Peningkatan Pemahaman Kurikulum 2013 bagi Guru Sekolah Dasar. *BERDIKARI : Jurnal Inovasi Dan Penerapan Ipteks*, 7(2). <https://doi.org/10.18196/bdr.7270>
- [26] Yadhika Rizky F, -. (2019).

*Pengembangan Aplikasi Sumber Belajar
Terbuka Berbasis Website Untuk Siswa
SMK. <http://repository.upi.edu>*