Journal of Artificial Intelligence and Engineering Applications

Website: https://ioinformatic.org/

15th February 2026. Vol. 5. No. 2; e-ISSN: 2808-4519

# Development of an Android-Based Learning Media to Enhance Students' Understanding of Microsoft Office Applications

**Malfred Ndima Runu Meha[1]*, Anini Aha Pekuwali [2], Murry Albert Agustin Lobo[3]**

[1,2,3]*Department of Informatics Engineering, Universitas Kristen Wira Wacana Sumba, Indonesia*
ndimameha@gmail.com[1*]

**Abstract**

The rapid development of information technology has significantly influenced learning methods in secondary education. However, the learning process of Information and Communication Technology (ICT) subjects in several schools is still constrained by limited computer facilities and learning resources. This study aims to develop an Android-based learning media to enhance students' understanding of Microsoft Office applications, namely Microsoft Word, Microsoft Excel, and Microsoft PowerPoint, for eighth-grade students at SMP Muhammadiyah Waingapu. The learning media was developed using the Multimedia Development Life Cycle (MDLC) method, which consists of concept, design, material collecting, assembly, testing, and distribution stages. The application was implemented using Unity and the C# programming language. To evaluate its effectiveness, a one-group pre-test and post-test design was employed involving 30 students. In addition, usability evaluation was conducted using the System Usability Scale (SUS). The results show a significant improvement in students' learning outcomes, with the average score increasing from 60 in the pre-test to 90 in the post-test, yielding an N-Gain value of 0.75, categorized as high. Furthermore, the usability evaluation resulted in a SUS score of 91.67, indicating excellent usability. These findings demonstrate that the developed Android-based learning media is effective and suitable for supporting ICT learning, particularly in schools with limited computer facilities.

***Keywords***: *Android-based learning media; Microsoft Office; MDLC; System Usability Scale; ICT education*

## 1. Introduction

In the information era, the ability to access and manage data effectively has become increasingly important. Technology enables institutions to collect, store, and analyze data in real time, supporting evidence-based decision making and continuous innovation in products, services, and processes. In education, technological advancement plays a vital role in improving learning effectiveness and institutional performance. However, many schools still face challenges in implementing technology-based learning due to limited infrastructure and learning resources. Based on interviews with an ICT teacher at SMP Muhammadiyah Waingapu, the learning process for junior high school students, particularly in Microsoft Office subjects, is constrained by the limited availability of textbooks and learning media. In many cases, one textbook must be shared by two to five students, which restricts access to learning materials and reduces learning effectiveness. As a result, students experience difficulties in understanding the basic functions of Microsoft Word, Excel, and PowerPoint, leading to suboptimal learning outcomes. The lack of adequate computer laboratory facilities further limits students' opportunities for hands-on practice, making conventional learning methods less effective. Therefore, alternative learning media are required to support students' understanding independently of school computer facilities. Android-based learning media offer a practical solution, as mobile devices are widely accessible and allow students to learn flexibly anytime and anywhere. By integrating interactive features such as simulations and practice-based exercises, Android-based applications can help students better understand Microsoft Office applications without relying on physical computer laboratories. This study aims to develop an Android-based learning media to introduce and improve students' understanding of Microsoft Office applications at SMP Muhammadiyah Waingapu. The development process employs the Multimedia Development Life Cycle (MDLC) method, which provides a structured and user-oriented framework for multimedia application development. Through systematic stages of planning, design, development, testing, and evaluation, the MDLC method ensures that the resulting learning media meets user needs and learning objectives. The developed application is expected to enhance students' learning outcomes, support ICT teachers in the instructional process, and provide a flexible and effective learning solution in environments with limited computer facilities.

## 2. literature study

Learning media is a tool to help teachers convey information in learning activities [1]. Microsoft Office, the most widely used office application suite in the business world, plays an important role in preparing students for the real world of work. The use of Microsoft Office applications is more than just document editing and covers various aspects that support work productivity and efficiency [2]. Android is a mobile operating system. Android does not differentiate between core applications with third party applications. Application Programming Interface (API) provided offers access to hardware, as well as data [3]. Unity is a cross-platform game engine and integrated development environment that supports rapid development of interactive 2D and 3D applications. A software (software) used to develop interactive learning media based on multiplatform applications [4]. C# is a platform of.NET and has been used for desktop application development [5].

## 3. Previous Research

Previous studies have demonstrated the effectiveness of technology-based learning media in improving students' understanding and learning outcomes. The research conducted by Komang Agus Widiana, I Putu Suka Arsa, and Agus Adiarta focused on developing Android-based Microsoft Word media for Simulation and Digital Communication subjects. Using the R&D method with Sugiyono's 10 steps, this media was declared feasible (81.67%) by media experts and very feasible (96.67%) by material experts. User response was also positive, with the majority of students (10 out of 15 respondents) giving very high category assessments. These findings strengthen the role of mobile applications as a portable and attractive learning medium for vocational school students [6]. Research conducted by Ayu Firdayanti and Meliyanti at SD MI Sunan Muria, Cilimus Village aims to overcome students' limited understanding and skills in operating Microsoft Office computers and software. Through methods that include problem identification, program design, and implementation with a practicum approach, this program has succeeded in significantly increasing students' understanding of the basic elements of computers as well as their mastery of using Microsoft Word, Excel, and PowerPoint. In addition, there has been an increase in practical skills, digital literacy, and students' interest and motivation in utilizing information technology. The evaluation results show that this program is effective in improving students' digital competencies in rural areas, so that it can prepare them to face technological challenges in the future [7]. Safrinus Gulo developed PowerPoint-based interactive media for junior high school mathematics learning with the DDD-E (Decide, Design, Develop, Evaluate) development model. The media produced is not only declared very valid (average 95%) by expert validators, but is also very practical according to students (95.45%) and teachers (99.09%), and is effectively demonstrated by achieving classical learning completion of 90.91%. This proves that PowerPoint, with its creative and structured utilization, can be a very valid, practical and effective medium [8]. Research conducted by Serli Indriani Laoli and Yearning Harefa highlights further innovation by integrating Augmented Reality (AR) into PowerPoint media for social studies learning [5]. With the Borg and Gall model R&D method, the final product gets very valid valid validation (100%) of all aspects (materialists, media, language and teachers). This media also received a very good response (90%) from students in field tests and achieved learning completion of 75%, which was classified as effective [5]. This integration of AR technology shows great potential in creating more immersive learning experiences [9]. In research [10] developing Android-based learning media for class X graphic design subjects using development research methods using procedural models. The research results showed that the media developed was declared feasible based on expert assessment and field tests, with an average score of 80.05 from students and 78–80 from experts, making it feasible to apply in learning.

## 4. Research Methodology

### 4.1. Development Method

This study employed the Multimedia Development Life Cycle (MDLC) method, which is suitable for developing interactive multimedia applications. The MDLC stages include concept, design, material collecting, assembly, testing, and distribution. This structured approach ensures that the developed learning media meets user needs and educational objectives.

### 4.2. System Implementation

The application was developed using Unity as the main development platform and C# as the programming language. The learning media includes instructional materials, visual illustrations, interactive exercises, quizzes, and score displays covering Microsoft Word, Excel, and PowerPoint. The application was designed to operate offline to accommodate students with limited internet access

### 4.3. Evaluation Method

To measure learning effectiveness, a one-group pre-test and post-test design was applied involving 30 eighth-grade students. The improvement in learning outcomes was analyzed using gain score and normalized gain (N-Gain). Usability evaluation was conducted using the System Usability Scale (SUS) questionnaire to assess ease of use and user satisfaction.

## 5. Results and Discussion

### 5.1. Learning Media Implementation

The developed Android-based learning media consists of three instructional modules: Microsoft Word, Microsoft Excel, and Microsoft PowerPoint. Each module provides structured learning materials, visual explanations, interactive quizzes, and score feedback. The

application is designed to operate offline to accommodate limited internet access. Figure 4.1 shows the main interface of the learning media, which allows users to access materials and evaluations efficiently.


**Fig. 1:** Main interface of the Android-based learning media

The home view is the application start page which functions as the main navigation center. On this page, the Learning Office application title is displayed as well as a voice icon to adjust the audio. The main menu consists of four buttons, namely Study, Practice, Quiz, and Exit.

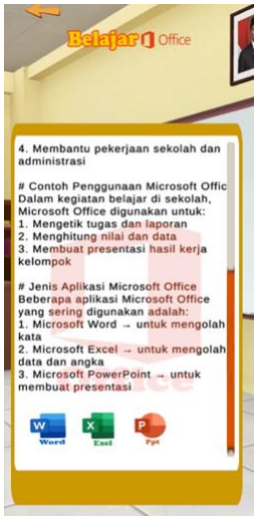


**Fig. 2:** Office Introduction Menu

The Microsoft Office introductory view helps students understand the meaning, benefits, and types of Microsoft Office applications. This page explains the role of Microsoft Office in learning activities in schools, such as calculating grades and data, typing assignments and reports, and making presentations. Additionally, the main types of Microsoft Office applications, such as Microsoft Word, Microsoft Excel, and Microsoft PowerPoint, are displayed along with their basic functions. The presentation of the material is made easy to use, and the visual icons of Word, Excel, and PowerPoint help students understand it.

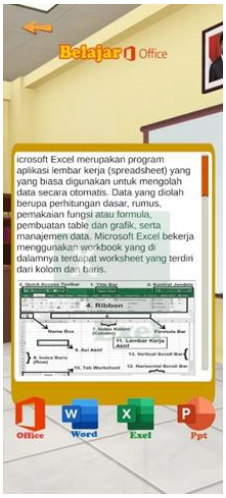


**Fig . 3:** Excel Learning Menu

Excel Learning Display helps students learn about Microsoft Excel introduction. This page provides a brief explanation of Microsoft Excel, a number processing application (spreadsheet), which is used to perform calculations, process data, create tables and graphs, and use formulas and functions. The goal of this presentation is to help students understand the Microsoft Excel display structure before starting to use it by showing the Microsoft Excel interface with its main parts, such as ribbons, worksheets, columns, rows, and formula bars.


**Fig. 4:** Word Learning Menu

The Learn Word view provides a brief explanation of the word processing applications used to create and edit documents such as letters, tasks, and reports. Apart from that, you can see examples of Microsoft Word interfaces with the main components, such as title bars, ribbons, toolbars, and others.

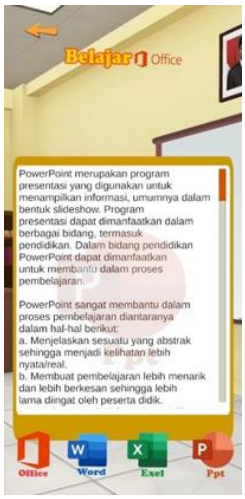


**Fig. 5:** PPT Learning Menu

Students can view Microsoft PowerPoint introductory materials through the PowerPoint Learning View. This page provides a brief explanation of PowerPoint as a presentation application, which allows you to create and display material in slides.

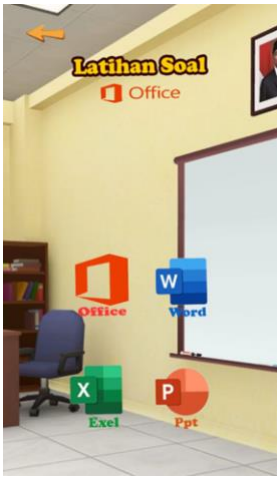


**Fig. 6:** Question Practice Menu

The Question Practice Menu is a feature designed to measure students' understanding after studying the Microsoft Office material available in the application. This is the main exercise menu that functions as a link to practice questions based on the type of Microsoft Office application. In this menu, students can choose practice questions according to the application they want to study, namely Microsoft Word, Microsoft Excel, and Microsoft PowerPoint.

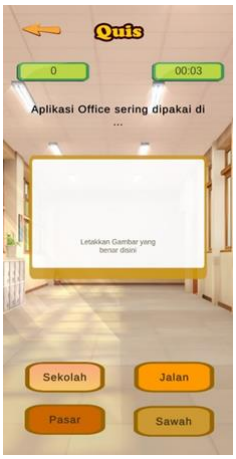


**Fig. 7:** Quiz Work Menu

In this quiz menu to answer questions, users drag and drop. That is, long press on the answer, then direct the pressed answer to the contact of the question. After the answer is in contact, the answer question is released. The process of checking whether the answer is correct or not will be verified after the answer is directed to the question contact.


**Fig 8:** Score Menu

The Quiz Score Display Menu is a menu that displays the final results of the quiz work by students. Scores are displayed in the form of numerical scores that reflect the level of student mastery of the Microsoft Office material they have studied.

## 5.2. Pre-Test and Post-Test Results

**Table 1:** Pre-test and Post-test result

| No | Pre-test | Post-test |
|---|---|---|
| 1 | 58 | 88 |
| 2 | 60 | 90 |
| 3 | 62 | 92 |
| 4 | 59 | 89 |
| 5 | 61 | 91 |
| 6 | 60 | 90 |
| 7 | 58 | 88 |
| 8 | 62 | 92 |
| 9 | 59 | 89 |
| 10 | 61 | 91 |
| 11 | 60 | 90 |
| 12 | 58 | 88 |
| 13 | 62 | 92 |
| 14 | 59 | 89 |

| | | |
|---|---|---|
| 15 | 61 | 91 |
| 16 | 60 | 90 |
| 17 | 58 | 88 |
| 18 | 62 | 92 |
| 19 | 59 | 89 |
| 20 | 61 | 91 |
| 21 | 60 | 90 |
| 22 | 58 | 88 |
| 23 | 62 | 92 |
| 24 | 59 | 89 |
| 25 | 61 | 91 |
| 26 | 60 | 90 |
| 27 | 58 | 88 |
| 28 | 62 | 92 |
| 29 | 59 | 89 |
| 30 | 61 | 91 |
| Mean | 60 | 90 |

The average pre-test score ($X_1$) obtained by the students was 60, indicating a low initial understanding of Microsoft Word, Excel, and PowerPoint. After the implementation of the Android-based learning media, the average post-test score ($X_2$) increased to 90, showing a substantial improvement in learning outcomes.

**Gain Score Calculation:**

$$Gain = X_1 - X_2$$
$$Gain = 90 - 60 = 30$$

This result indicates an average score increase of 30 points.

Percentage of Improvement:

$$Persentase = \frac{X_1}{X_2 - X_1} \times 100\%$$
$$Persentase = \frac{30}{60} \times 100\% \ = \ 50\%$$

Normalized Gain (N-Gain):

$$N - Gain = \frac{X_2 - X_1}{100 - X_1}$$
$$N - Gain = \frac{30}{40} \ = \ 0.75$$

Based on the N-Gain criteria, a value of 0.75 falls into the high category, indicating that the Android-based learning media is highly effective in improving students' understanding of Microsoft Office applications. These results confirm that the developed learning media is suitable for use as an alternative ICT learning solution in schools with limited computer facilities.

### 5.3. System Usability Scale (SUS) Evaluation

The System Usability Scale (SUS) was used to evaluate the feasibility, ease of use, and user satisfaction of the Microsoft Office educational game. SUS, developed by John Brooke in 1986, is a widely adopted usability evaluation method due to its simplicity, reliability, and applicability across various interactive systems. The SUS questionnaire consists of 10 statements rated using a five-point Likert scale, as presented in Table 2.

**Table 2:** SUS Scoring Scale

| **No** | **Pre-test** |
|---|---|
| Strongly Agree (SA) | 5 |
| Agree (A) | 4 |
| Neutral (N) | 3 |
| Disagree (D) | 2 |
| Strongly Disagree (SD) | 1 |

The SUS questionnaire responses from 12 respondents (10 students and 2 teachers) were collected and analyzed. Each respondent's total score was multiplied by 2.5 to obtain a final SUS score on a scale of 0–100. The detailed results are shown in Table 3.

**Table 3:** SUS Questionnaire Results and Scores

| **Responden** | | Q1 | Q2 | Q3 | Q4 | Q5 | Q6 | Q7 | Q8 | Q9 | Q10 | X | X*2,5 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Siswa-siswi** | R1 | 4 | 3 | 3 | 4 | 3 | 3 | 4 | 4 | 3 | 4 | 35 | 87,5 |
| | R2 | 4 | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 3 | 3 | 34 | 85 |
| | R3 | 3 | 4 | 4 | 4 | 3 | 4 | 4 | 3 | 4 | 4 | 37 | 92,5 |
| | R4 | 4 | 4 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 39 | 97,5 |
| | R5 | 4 | 3 | 4 | 4 | 3 | 3 | 4 | 3 | 3 | 4 | 35 | 87,5 |
| | R6 | 4 | 4 | 4 | 4 | 4 | 4 | 3 | 4 | 4 | 3 | 38 | 95 |
| | R7 | 4 | 4 | 3 | 4 | 4 | 4 | 4 | 4 | 3 | 3 | 37 | 92,5 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Guru** | R8 | 4 | 3 | 4 | 4 | 4 | 3 | 3 | 4 | 4 | 4 | 37 | 92,5 |
| | R9 | 4 | 3 | 3 | 4 | 3 | 3 | 4 | 3 | 4 | 4 | 35 | 87,5 |
| | R10 | 3 | 4 | 4 | 4 | 3 | 4 | 3 | 4 | 4 | 4 | 37 | 92,5 |
| | R11 | 4 | 4 | 4 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 39 | 97,5 |
| | R12 | 4 | 4 | 3 | 4 | 3 | 3 | 4 | 4 | 4 | 4 | 37 | 92,5 |
| **Rata-rata** | | | | | | | | | | | | | **91,67** |

The average SUS score was calculated using the following formula:

$$\bar{x} = \frac{x_1 + x_2 + x_3 + \cdots + x_n}{n}$$

$$\bar{x} = \frac{97{,}5 + 85 + 92{,}5 + 97{,}5 + 87{,}5 + 95 + 92{,}5 + 92{,}5 + 87{,}5 + 92{,}5 + 97{,}5 + 92{,}5}{12}$$

$$\bar{x} = \frac{1100}{12}$$

$$\bar{x} = 91{,}67$$

The average SUS score of 91.67 falls within the range of 85–100, which corresponds to the "Best Imaginable" category. This result indicates that the Microsoft Office educational game has excellent usability, is easy to use, visually appealing, and provides a positive user experience without significant usability issues.

## 6. Conclusion

This study concludes that an Android-based learning media for introducing Microsoft Office applications was successfully developed using the Multimedia Development Life Cycle (MDLC) method, which includes the stages of concept, design, material collection, development, testing, and distribution. The application covers Microsoft Word, Excel, and PowerPoint materials aligned with the ICT curriculum for eighth-grade students. The inclusion of interactive features such as learning modules, practice exercises, quizzes, and score displays enables students to learn independently despite limited computer facilities. The pre-test and post-test results demonstrate a significant improvement in students' understanding, with the average score increasing from 60 to 90 and an N-Gain value of 0.75, indicating high effectiveness. Furthermore, the System Usability Scale (SUS) evaluation yielded an average score of 91.67, categorized as "Best Imaginable," confirming that the application has excellent usability and is well accepted by both students and teachers. Overall, the developed Android-based learning media is feasible and effective as a supporting tool for ICT learning, particularly in improving students' understanding of Microsoft Office applications.

## References


[1] H. D. K. Ririn Windawati, "Pengembangan Game Edukasi Berbasis Android untuk Meningkatkan Hasil Belajar Siswa," JURNAL BASICEDU, vol. 5, no. 2, pp. 1027 - 1038, 2021.

[2] A. P. Z. S. K. S. S. N. N. C. S. D. S. Ahmad Fauzan A, "PEMANFAATAN APLIKASI MICROSOFT OFFICE UNTUK MENDUKUNG KEGIATAN PRAKTEK KERJA INDUSTRI," Jurnal Media Akademik (JMA), vol. 3, no. 1, pp. XX-XX, 2025.

[3] I. B. G. A. K. J. A. P. W. A. Ni Kadek Ceryna Dewi, "RANCANG BANGUN APLIKASI MOBILE SISKA BERBASIS ANDROID," SINTECH JOURNAL, vol. 1, no. 2, pp. 100-107, 2018.

[4] I. W. I. P. L. Khoirul Anafi, "PENGEMBANGAN MEDIA PEMBELAJARAN MODEL ADDIE MENGGUNAKAN SOFTWARE UNITY 3D," Jurnal Education and development, vol. 9, no. 4, pp. 433-438, 2021.

[5] "PERANCANGAN DAN IMPLEMENTASI CALIFORNIA BEARING RATIO (CBR) DENGAN MENGGUNAKAN C# DAN ARDUINO," JURNAL RESPONSIF, vol. 6, no. 1, pp. 54-62, 2024.

[6] I. P. S. A. A. A. Komang Agus Widiana, "PENGEMBANGAN MEDIA PEMBELAJARAN MICROSOFT WORD BERBASIS ANDROID," Jurnal Pendidikan Teknik Elektro Undiksha, vol. 9, no. 1, pp. 40-47, 2020.

[7] M. Ayu Firdayanti, "PENGENALAN ELEMEN KOMPUTER DAN PELATIHAN DASAR MICROSOFT OFFICE PADA SISWA SISWI SD MI SUNAN MURIA DI DESA CILIMUS," Jurnal Pengabdian Kepada Masyarakat, vol. 3, no. 2, pp. 311-316, 2023.

[8] A. O. H. Safrinus Gulo, "Pengembangan Media Pembelajaran Interaktif Berbasis Powerpoint," EDUCATIVO: JURNAL PENDIDIKAN, vol. 1, no. 1, pp. 291-299, 2022.

[9] Y. H. Serli Indriani Laoli, "PENGEMBANGAN MEDIA PEMBELAJARAN MICROSOFT POWER POINT BERBASIS AUGMENTED REALITY UNTUK MENINGKATKAN HASIL BELAJAR SISWA KELAS VII DI SMP NEGERI 1 HILIDUHO," JURNAL Edueco Universitas Balikpapan, vol. 6, no. 2, pp. 188-197, 2023.

[10] J. Kuswanto, "PENGEMBANGAN MEDIA PEMBELAJARAN BERBASIS ANDROID MATA PELAJARAN DESAIN GRAFIS KELAS X," Jurnal Ilmiah Edutic, vol. 6, no. 2, pp. 78-84, 2020.