

The Application of Interactive E-Module Based on Android to Enhance Students' Learning Outcome (A Useful Learning App in the Covid-19 Era)

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Abstract

Teaching and learning activities are currently adapting to the changing times and circumstances. The contemporary education system employs technology that facilitates teachers and students in teaching and learning activities and encourages students to engage in active and creative learning. Since the beginning of 2020, the COVID-19 virus has hindered face-to-face learning in schools. Consequently, learning activities have been conducted online for nearly a year using existing technologies. This demands independent student learning. This research seeks to develop Android-based interactive e-module products, assess the viability of Android-based interactive e-modules, and compare student learning outcomes before and after utilizing Android-based interactive e-modules for online learning. This research and development employed a modified version of the Borg and Gall Research and Development paradigm. Shapiro-Wilk testing was utilized for data analysis. The outcomes of this research and development were e-modules on the topic of Office Technology that have been deemed highly valid by subject matter and media experts and are acceptable for use in teaching and learning activities. After adopting Android-based interactive e-modules, students' learning results met or exceeded rigorous standards, as determined by a trial involving 26 students. Based on the study's findings, it can be stated that the Android-based interactive e-module is a viable and effective learning resource for enhancing student learning outcomes in Office Technology courses.

Keywords

Research and Development, E-Modul, Learning Outcome, Office Technology.

1. Introduction

The outbreak of the Covid-19 virus at the end of 2019 brought about numerous educational institutions to implement online learning and temporarily suspend face-to-face learning to limit the virus's spread (Sadikin, 2020). (Zhafira, 2020). During the COVID-19 pandemic, the online learning at home approach is one of the initiatives to minimize public physical activity and avoid the transmission of the virus to teachers and students (Oktawirawan, 2020). Using online or remote learning methods poses barriers such as students being unable to readily oversee learning activities, obtaining learning materials, and understanding the subject when studying alone (Alanezi, 2020), Napitupulu, 2020). Students feel the benefits of online learning, such as not having to attend class in person and independent study being encouraged (Sadikin & Hamidah, 2020). (Narmaditya, Prayitno, Wibowo, & Agustina, 2020).

The requirement for suitable learning resources when online learning activities are required to support learning activities more effectively than face-to-face learning. E-Modules are learning resources that are simple for students

to employ during online learning activities. (Arianti & Nugraha, 2019), (Linda, Herdini, S., & Putra, 2018), (Nurhasnah, Kasmita, Aswirna, & Abshary, 2020), (Khoiriyah & Pratikto, 2021), (Fahmi, 2020). Attractive images, easy-to-understand learning films, and engaging practice questions encourage students to participate actively in their learning activities (Fathoni & Marpanaji, 2018), (Herawati & Muhtadi, 2018), (Alshaya & Oyaid, 2018). E-modules equipped with audio-visual technology are anticipated to attract students, hence creating conducive and effective teaching and learning activities (Roro, Rahada, & Arsyad, 2022). (Sri, Dewi, Ayu, & Lestari, 2020). E-Modules as instructional materials in online learning activities aim to increase student motivation, independent thinking, and skill development (Sugihartini & Jayanta, 2017). (Carina, 2019). Similarly, Isnaeni and Agustina (2018) write that it is envisaged that student learning outcomes will improve with the aid of e-module teaching materials. According to research conducted by Kusuma and Wayan (2018), e-module teaching materials make it easier for students to study independently wherever and whenever, hence enhancing student learning achievement. According to Herawati and Muhtadi (2018), e-modules as instructional tools that are effective and simple to utilize in learning activities can enhance students' conceptual understanding.

Based on the findings of interviews with Office Technology subject instructors at SMK Cendika Bangsa Malang, Office Technology learning activities are conducted online using google classroom with power point media or through google form. Limited learning resources, a lack of comprehension of the presented material, and the absence of creativity in the creation of learning resources delay students' comprehension of the subjects being taught. Thus, the academic achievement of certain students has not increased.

2. Methods

In this development, the researcher utilized a modified version of the Borg and Gall model to conduct research and development. Several factors, including research requirements, limited budget, time, and energy, need the simplification of procedures. Methods of research and development are illustrated in Figure 1 below.

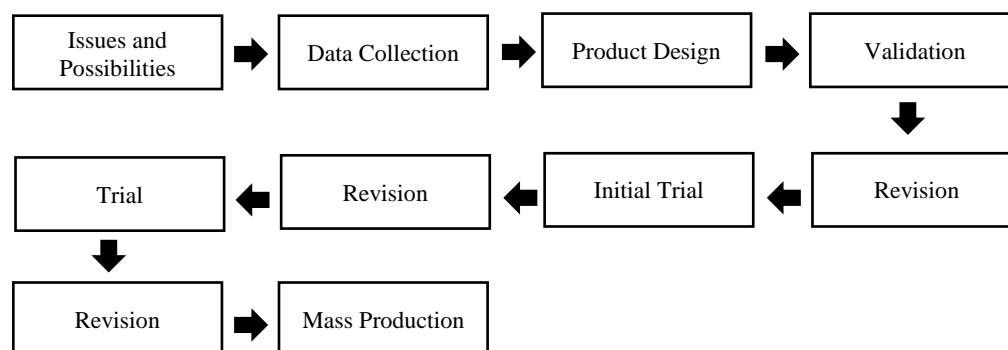


Figure 1. Research Procedure

The initial phase in this study and development was to identify the possibilities and issues in school, specifically SMK Cendika Bangsa Malang. In the second stage, the researcher collected information regarding the lesson topics and material. The layout design of the e-module was tailored to the needs analysis during the preliminary stage. In the third stage, the framework developed to provide solutions to the problems identified in the potential and problem stages will be implemented and data will be collected so that a final product may be produced later. In the fourth stage of the developed e-module, the validator conducted a feasibility test, consisting of the validation of material experts and media experts. The fifth stage entailed revising the media depending on the findings of validation by material and media experts. In the sixth step, students from class X OTKP 2 participated in a limited-group test of the revised product. The seventh stage was the second revision following a limited group test to improve the generated product. Students from class X OTKP 2 participated in a pre- and post-testing trial at the eighth stage. The

ninth stage was the last product modification to finalize the developed product. The eleventh step involved mass manufacture and distribution of the product to teachers and students.

This research and development have gathered both qualitative and quantitative data. Criticism and ideas from material and media experts, as well as students, were collected in the form of qualitative data. While the quantitative data comprised of the validation results of media and subject matter experts, student assessments, and statistics on student learning outcomes. The N-gain method was applied to quantitative data to determine changes between pre- and post-test student learning outcomes.

5. Results and Discussion

This research and development developed an Android-based interactive e-module for Office Technology subject. The following is an illustration of the Android-based interactive e-module content that has been developed.



Figure 2 Android-based Interactive E-Module Interface

The menu display offers explanations of the lesson basic competence; basic competence 3.1 to 3.5. It also includes an explanation of how to create a clear and engaging Power Point presentation, as well as independent practice questions, game elements that facilitate easy comprehension of the lesson, and evaluation questions. The exercises are accessible online because they are immediately linked to the Google form. The exercises consist of cognitive and psychomotor domain questions.

Furthermore, the subject matter and media experts, and prospective users validated the developed android-based interactive e-module. The validation results are presented in Table 1 on the following page.

Tabel 1 Validation Results

No.	Validation	Percentage	Criteria
1.	Subject matter expert	97,3%	Highly valid
2.	Media expert	96%	Highly valid
3.	Users	97%	Highly valid
	Average	96,7%	Highly valid

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Based on Table 1, it is known that the average validation result is 96.7 percent, which corresponds to the Highly Valid criterion, thus it can be inferred that the developed e-module is suitable for u teaching and learning activities of Office Technology subject. There are number of things that must be took into account and revised further to polish the product before it was

tested on students. Based on the validation results, it can be determined that the generated product was highly valid and implementable in learning activities.

During the research, introduction and comprehension of the produced e-module media were conducted. After introducing the developed interactive e-module, students were required to complete an evaluation form. The interactive e-module learning media based on Android has a huge file size and has numerous features that make it easier for students to improve their cognitive and psychomotor learning results. The researchers employed the normality test and the results of the Shapiro-Wilk test to determine the difference in cognitive learning outcomes between the experimental class and the control class. Students responded positively to Android-based interactive e-module, stating that the e-modules were engaging, entertaining, and not tedious, and that they aided in the learning process. Nevertheless, numerous barriers were identified, such as the size of the e-module, thus users are encouraged to use a smartphone with at least 2 GB of RAM.

5.1 Normality Testing

The results of the normality test of student learning outcomes in the pre-test and post-test are presented in Table 2 below.

Table 2. Normality Testing Results

Tests of Normality						
Cognitive Learning Outcomes	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	df	Sig.
<i>Pretest</i>	.185	26	.022	.924	26	.057
<i>Posttest</i>	.150	26	.138	.929	26	.074

If the significance value is more than 0.05, the data are classified as normally distributed. According to the preceding table, the obtained significance value for the pre-test is 0.057 and for the post-test it is 0.074. All of the investigated data can be inferred to be normally distributed.

5.2 Paired Sample T-Test

The paired sample t-test was performed to determine the differences in student learning outcomes prior to and after using the produced e-module, as shown in Table 3 on the following page.

Table 3 Paired Sample T-Test Results of Cognitive Learning Outcomes

Paired Samples Test								
	Paired Differences					T	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error	95% Confidence Interval of the Difference				
			Mean	Lower	Upper			
Pretest - Posttest	-17.11538	8.14531	1.59743	-20.40535	-13.82542	-10.714	25	.000

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Table 3 shows the results of sig. (2 tailed) was 0.000 where the value is less than 0.05. This indicates that there are disparities in the cognitive learning results of students using the Android-based e-module instructional media that have been developed.

5.3 Result

In the meantime, researchers utilized the normality test and the results of the Shapiro-Wilk test to determine the difference in psychomotor domain between pre- and post-test learning outcomes.

a) Normality Testing

The test for normality was conducted to verify the normality of the data received from the product trial. Before and after utilizing android-based e-module instructional media, the worth of student psychomotor learning outcomes is evaluated. Table 4 displays the following details.

Table 4 Normality Testing

Tests of Normality							
Hasil Belajar Psikomotorik	Ranah	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Pretest		.160	26	.086	.927	26	.065
Posttest		.194	26	.013	.933	26	.093

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If the significance value is more than 0.05, the data are classified as normally distributed. According to the table above, the obtained significance value for the pre-test was 0.065 and for the post-test was 0.064. All the investigated data can be inferred to be normally distributed.

b) *Paired Sample T-Test*

The paired sample t-test was conducted to examine the changes in the psychomotor domain learning outcomes of students before and after utilizing the created Android-based e-module. Table 5 summarizes the subsequent data.

Table 5 Paired Sample T-Test Of Psychomotoric Learning Outcomes

Paired Samples Test								
	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
<i>Pretest - Posttest</i>	-19.23077	8.90980	1.74736	-22.82952	-15.63202	-11.006	25	.000

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In Table 5, the result of sig. (2 tailed) was 0.000, indicating that the value is less than 0.05. This demonstrates that there are differences in the psychomotor learning results of students after using the Android-based e-module instructional media.

c) *N-gain results*

The average improvement test was conducted to measure the increase in student learning outcomes prior to and following the use of Android-based e-module instructional media. It is presented in Tables 6 on the following page.

Table 6 N-Gain Results

	Σ Pre-Test	Σ Post-Test	Category
Learning Outcomes	3090	4035	
$\langle g \rangle = \frac{(\text{Posttest score} - \text{Pretest score})}{(\text{Ideal score} - \text{Pretest score})}$	945/2110		High
$\langle g \rangle$	0,45		

Table used by permission ©Rosalia,A. K. 2022. Hasilujin-gain.

According to Table 6, there are changes in student learning results between before and after using the produced Android-based e-module instructional media. The resulting n-gain value was 0.5, indicating that the increase in student learning outcomes falls within the high range. The statistics gathered indicate that there are differences between the pretest and posttest scores of students in class X OTKP 2, with the posttest scores (after utilizing the media) being higher than the pretest scores (before using the media). In accordance with Herawati and Muhtadi's (2018) research, there are differences in student learning outcomes between the pretest and posttest, with a significant value of $0.000 < 0.05$, indicating that e-module media is utilized well for student learning activities. In accordance with the research conducted by Fathoni and Marpanaji (2018), the average value of the N-gain between the pretest and posttest in the experimental class was greater than in the control class after the deployment of the newly designed instructional media. This is also consistent with research conducted by Masruroh and Agustina

(2021), which indicates that e-module media can increase student learning outcomes, as indicated by better average posttest scores than pretest scores.

6. Conclusion

This research and development developed android-based interactive e-modules utilizing Adobe In Design for Office Technology subjects. It was specifically designed for Basic Competence 3.1 Understanding office technology, office automation, and virtual offices up to Basic Competence 3.5. Utilizing the functionality of presentation software. The produced e-module was suitable for implementation in teaching and learning activities based on the validation results from subject matter experts, media experts, and limited user subject assessments. The N-Gain test results of 0.5 suggest that Android-based interactive e-modules are successful for increasing student learning outcomes. In a qualitative evaluation, students responded positively to the Android-based interactive e-module, stating that it was simple to comprehend, visually appealing, and enjoyable to use for independent study. Users of the e-module are suggested to utilize a mobile device with at least 2 GB of RAM for optimal performance.

References

- Alanezi, Y. H. (2020). Future of Mobile Learning During and After Global (Covid-19) Pandemic: College of Basic Education as Case. *Journal of Education and Practice*, 11(17), 1–12. <https://doi.org/10.7176/jep/11-17-01>
- Alshaya, H., & Oyaid, A. (2017). Designing and Publication of Interactive E-Book for Students of Princess Nourah Bint Abdulrahman University: An Empirical Study. *Journal of Education and Practice*, 8(8), 41–57. Retrieved from <http://ezproxy.lib.uconn.edu/login?url=https://search.ebscohost.com/login.aspx?direct=true&db=eric&AN=EJ1138827&site=ehost-live>
- Arianti, A., & Nugraha, J. (2019). Pengembangan electronic modul berbasis editor eclipse pada kompetensi dasar memahami teknologi perkantoran, otomatisasi perkantoran, dan kantor virtual kelas x di smk negeri 1 Lamongan. *Jurnal Pendidikan Administrasi Perkantoran*, 7(3), 98–104.
- Carina, A. (2019). Developing Interactive E-book as Material Technology Coursebook by Flipbook Maker Software. *Journal of Education and Practice*, 10(24), 11–17. <https://doi.org/10.7176/jep/10-24-03>
- Masruroh, D., & Agustina, Y. (2021). E-modul berbasis Android sebagai pendukung pembelajaran daring dan upaya untuk meningkatkan hasil belajar peserta. 1(6), 559–568. <https://doi.org/10.17977/um066v1i62021p559-568>
- Fahmi, R. (2020). Pengembangan E-Modul Berbasis Web Pada Mata Pelajaran Pembuatan Busana Industri. 3(3), 508–515.
- Fathoni, M. I., & Marpanaji, E. (2018). Pengembangan e-book interaktif mata pelajaran teknologi informasi dan komunikasi (TIK) untuk SMK kelas X. *Jurnal Inovasi Teknologi Pendidikan*, 5(1), 70–81. <https://doi.org/10.21831/jitp.v5i1.17149>
- Herawati, N. S., & Muhtadi, A. (2018). Pengembangan modul elektronik (e-modul) interaktif pada mata pelajaran Kimia kelas XI SMA. *Jurnal Inovasi Teknologi Pendidikan*, 5(2), 180–191. <https://doi.org/10.21831/jitp.v5i2.15424>
- Isnaeni, I., & Agustina, Y. (2018). an Increase in Learning Outcome Students Is Through the Development of Archive E-Module Based on the Flipbook With Discovery Learning Model. *Jurnal Pendidikan Bisnis Dan Manajemen*, 4(3), 125–129. <https://doi.org/10.17977/um003v4i32018p125>
- Khoiriyah, S., & Pratikto, H. (2021). Meningkatkan hasil belajar peserta didik dengan menggunakan E - modul berbasis Flipbook (E - modul otomatisasi tata kelola kepegawaian yang bermanfaat di era Covid - 19). 1(6), 526–537. <https://doi.org/10.17977/um066v1i62021p525-537>
- Kusuma, I wayan, dkk. (2018). Pengembangan E-Modul Pada Mata Pelajaran Administrasi Server Berbasis Project Based Learning Kelas XI Teknik Komputer Dan Jaringan di SMK Negeri 3 Singaraja I. *Jurnal Nasional Pendidikan Teknik Informatika* /, 7(2), 12–24.
- Linda, R., Herdini, H., S, I. S., & Putra, T. P. (2018). Interactive E-Module Development through Chemistry Magazine on Kvisoft Flipbook Maker Application for Chemistry Learning in Second Semester at Second Grade Senior High School. *Journal of Science Learning*, 2(1), 21. <https://doi.org/10.17509/jsl.v2i1.12933>
- Napitupulu, R. M. (2020). Dampak pandemi Covid-19 terhadap kepuasan pembelajaran jarak jauh. *Jurnal Inovasi Teknologi Pendidikan*, 7(1), 23–33. <https://doi.org/10.21831/jitp.v7i1.32771>
- Narmaditya, B. S., Prayitno, P. H., Wibowo, A., & Agustina, Y. (2020). Blended Synchronous Learning and Students' Critical Thinking Ability: Lesson from Covid-19. *JPBm (Jurnal Pendidikan Bisnis Dan Manajemen)*, 6(3), 112–119. Retrieved from <http://journal2.um.ac.id/index.php/jpbm/article/view/17054>
- Nurhasnah, N., Kasmita, W., Aswirna, P., & Abshary, F. I. (2020). Developing Physics E-Module Using “Construct 2” to Support Students' Independent Learning Skills. *Thabiea : Journal Of Natural Science Teaching*, 3(2), 79. <https://doi.org/10.21043/thabiea.v3i2.8048>

- Oktawirawan, D. H. (2020). Faktor Pemicu Kecemasan Siswa dalam Melakukan Pembelajaran Daring di Masa Pandemi Covid-19. *Jurnal Ilmiah Universitas Batanghari Jambi*, 20(2), 541.
<https://doi.org/10.33087/jiubj.v20i2.932>
- Roro, R., Rahada, R., & Arsyad, M. (2022). *Pengembangan Media Pembelajaran Modul Elektronik (E-Modul) Berbasis Flip Pdf Professional Pada Materi Sistem Peredaran Darah Manusia Kelas XI SMA. 1*(2).
- Sadikin, A., & Hamidah, A. (2020). Pembelajaran Daring di Tengah Wabah Covid-19. *Biodik*, 6(2), 109–119.
<https://doi.org/10.22437/bio.v6i2.9759>
- Sri, M., Dewi, A., Ayu, N., & Lestari, P. (2020). *E-Modul Interaktif Berbasis Proyek Terhadap Hasil. 4*, 433–441.
- Sugihartini, N., & Jayanta, N. L. (2017). Pengembangan E-Modul Mata Kuliah Strategi Pembelajaran. *Jurnal Pendidikan Teknologi Dan Kejuruan*, 14(2), 221–230. <https://doi.org/10.23887/jptk-undiksha.v14i2.11830>
- Zhafira, N. H., Ertika, Y., & Chairiyaton. (2020). Persepsi Mahasiswa Terhadap Perkuliahan Daring Sebagai Sarana Pembelajaran Selama Masa Karantina Covid-19. *Jurnal Bisnis Dan Kajian Strategi Manajemen*, 4, 37–45.