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Android-Based E-Module in Basic Culinary Arts for Vocational High School Students

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ABSTRAK

Masalah yang dihadapi dalam pembelajaran Dasar Tata Boga di SMK adalah keterbatasan media pembelajaran yang efektif dan mudah diakses oleh siswa. Penelitian ini bertujuan untuk mengembangkan media pembelajaran E-Modul berbasis Android pada Mata Pelajaran Dasar Tata Boga dengan materi Peralatan Pengolahan Makanan dan Teknik Pengolahan Makanan menggunakan model pengembangan 4-D. Penelitian ini terbatas pada tiga langkah model pengembangan, yaitu: Define, Design, dan Development. Subjek penelitian terdiri dari 2 orang ahli materi dan 1 orang ahli media. Teknik pengumpulan data dilakukan dengan menggunakan angket untuk menilai kualitas materi dan kualitas media. Data yang diperoleh dianalisis dengan teknik statistik deskriptif. Hasil penelitian menunjukkan bahwa media pembelajaran E-Module berbasis Android yang dikembangkan telah divalidasi oleh ahli materi dan ahli media. Hasil validasi ahli materi menunjukkan persentase kelayakan sebesar 90% dengan kriteria "Sangat Layak", sementara hasil validasi ahli media memperoleh persentase kelayakan sebesar 94% dengan kriteria "Sangat Layak". Berdasarkan hasil validasi tersebut, dapat disimpulkan bahwa media pembelajaran E-Module berbasis Android pada Mata Pelajaran Dasar Tata Boga dengan materi Peralatan Pengolahan Makanan dan Teknik Pengolahan Makanan layak digunakan dalam proses pembelajaran.

ABSTRAK

The challenges faced in teaching Basic Culinary Arts in vocational high schools (SMK) include the limited availability of effective learning media that can be easily accessed by students. This study aims to develop an Android-based E-Module learning media for the subject of Basic Culinary Arts, focusing on Food Processing Equipment and Food Processing Techniques, using the 4-D development model. This study is limited to three stages of the development model: Define, Design, and Development. The subjects of this study consisted of 2 content experts and 1 media expert. Data were collected using questionnaires to assess the quality of the content and media. The obtained data were analyzed using descriptive statistical techniques. The results indicate that the Android-based E-Module learning media developed has been validated by content and media experts. The content expert validation yielded a feasibility percentage of 90%, categorized as "Very Feasible," while the media expert validation showed a feasibility percentage of 94%, categorized as "Very Feasible." Based on these validation results, it can be concluded that the Android-based E-Module for Basic Culinary Arts, covering Food Processing Equipment and Food Processing Techniques, is suitable for use in the learning process.

1. INTRODUCTION

Technological developments are the basis for the development of educational. The development of ICT has had a big impact in the world of education on students through technology such as telephones, computers, internet and email (Agustina et al., 2023; Ningsihg & Mahyuddin, 2021). The development of this technology, it is hoped that the teaching and learning process can take place effectively so that learning success is achieved. One of the determining factors for learning success is the existence of learning media that is easy for students to use to increase learning efficiency so that learning objectives can be achieved (Ariyani et al., 2022; Muhtar et al., 2020). In activities, learning media has a very important role. Learning media are certain tools used to convey material to students so that students can understand quickly and

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receive knowledge from the teacher (Alfiyanti & Umam, 2022; Ariyani et al., 2022; Kolopita et al., 2022; Muhtar et al., 2020; Squire, 2022). Learning media can be defined as anything that can send or express messages from a source in a structured and effective manner, providing a friendly environment for recipients to carry out learning activities effectively and efficiently. Appropriate learning media really helps the effectiveness of the learning process and helps teachers in providing explanations of the learning material that will be delivered (Mabsutsah & Yushardi, 2022; Sapriyah, 2019; A. P. Wulandari et al., 2023).

However, the current problem is that many teachers still have difficulty in developing appropriate learning media for students. Previous findings also revealed that many schools still lack supporting learning media. (Andriani & Suratman, 2021; Cholid & Ambarwati, 2021; Erna et al., 2021). Based on observations and the results of interviews with the Head of the Culinary Department as well as the accompanying teacher for Basic Culinary subjects, the school did not provide textbooks for students so that each student only had notes based on what was conveyed by the teacher. In delivering the material, the teacher only uses PowerPoint media but this is felt to be lacking due to the lack of additional learning media as independent learning media outside of school learning. In fact, culinary basic courses are very important in the Culinary Department, the material taught in culinary basics can underlie other courses so that if students have optimal learning outcomes then this can make these courses produce maximum grades. Another problem is that there are still many students who don't focus on studying because there are other activities outside of school hours such as working and helping parents. All students already have smartphones with the Android operating system, but they have not been utilized optimally as effective learning media. With the existence of interesting and interactive Android-based learning media, it is hoped that it can encourage students to make maximum use of smartphones, such as accessibility that allows learning anytime and anywhere, as well as independence in learning at their own pace. E-modules use interactive media such as videos and quizzes which make learning more interesting. Additionally, e-modules come with a variety of additional resources and enable personalized learning according to individual needs and interests. The progress monitoring feature helps students see their progress. E-modules are also more cost efficient compared to textbooks or face-to-face classes.

Based on this, the solution offered is to develop learning media that facilitate students in learning. One of the media that can be used is the Android-Based Electronic Module in the Basic Culinary Arts Course.Learning media is needed because it can trigger students' attention in capturing the material better so they don't get bored quickly in the teaching and learning process (Naila Muna & Wardhana, 2022; Ulfa et al., 2023; Zaini & Dewi, 2017). Currently, learning media is becoming increasingly important because learning activities focus more on process skills and active learning. To receive this material, media is needed that can attract students' interest. One of the media that can be developed is an electronic module (e-module). E-modules are independent teaching materials designed in electronic form which are equipped with various video tutorials, animations and audio to broaden the learning experience (Aufa et al., 2021; M. A. Putri & Purmadi, 2020; Sofyan et al., 2019). Each learning activity has a relationship as navigation which makes students more interactive (Aufa et al., 2021; Munandar et al., 2021; Munzil et al., 2022). The use of electronic modules in the learning process will foster creativity, productive thinking habits, create active, effective, innovative, and fun conditions, and can develop literacy skills in students (Aufa et al., 2021; M. A. Putri & Purmadi, 2020; Sofyan et al., 2019). Students' skills can be improved through e-module learning (Dankbaar et al., 2017; Munzil et al., 2022). E-modules are effective for improving student skills by providing interesting videos for students (Darmaji et al., 2019; Strataki, 2022).

The use of Android-based smartphones that provide e-module applications is a technology that supports education effectively. The use of mobile technology can encourage educators to think about existing pedagogical patterns and participate in science and technology learning (Burden & Kearney, 2016; Delita et al., 2022). Android is an operating system for tablets and smartphones that can be represented as a link between devices and their users, namely applications available on devices It is run by its users. The use of Android-based e-modules can save students time in accessing learning materials and become a space for students to study independently and Android-based e-modules are also easily accessible anywhere and anytime (Asrial et al., 2019; Helleve et al., 2020; Hermawan et al., 2022; Matsun et al., 2021; Sanova et al., 2022; Strataki, 2022). Android-based e-modules can train students' critical thinking concepts (Cahyani & Jayanta, 2021; Kass-Hanna et al., 2022; Muhtar et al., 2020). The presence of an Android-based e-module can be an effective and fun alternative learning resource (Liao et al., 2014). This research aims to develop innovative learning media that is interactive and can be accessed via android devices, thereby facilitating the teaching and learning process and increasing student involvement and motivation. This e-module allows access to material anytime and anywhere, making learning more flexible and helping students understand basic culinary concepts better through multimedia such as videos, images and animations. The novelty of this research includes the integration of mobile technology, interactive approaches, user-friendly design, independent learning. By using this e-module, it is hoped that the quality of learning will increase,

the learning process will become easier, and the use of technology in education can be further optimized, in line with the demands of the times and the needs of the current digital generation.

2. METHOD

This research was conducted at SMK Gelora Jaya Nusantara Medan. The implementation of media development is carried out in odd semesters. This study uses a 4-D development model which includes Define, Design, Development, and Disseminate (Thiagarajan, 1974). This research is limited to the Development stage. Research steps starting from define. This stage carried out a needs analysis to determine the level of needs of educators and students for Android-Based E-Module learning media. The next step is design. This stage is carried out by making flowcharts and storyboards as a guide in developing the appearance of Android-Based E-Modules so that the process is well structured. The applications used in making Android-based E-Modules include Picsart, PowerPoint, iSpring Suite 10 and APK Builder Pro 3.0.2. After the design phase, the next step is development. At this stage the learning media will be tested by 3 experts, consisting of 1 media expert and 2 material experts. This stage aims to obtain input until the media actually meets user needs and is suitable for use. Data collection techniques at the analysis stage were conducted by interviews and questionnaires to analyze the needs of lecturers and students. At the design stage, data collection was conducted by library research to develop flowcharts and storyboards. At the development stage, data collection was conducted using a media feasibility questionnaire given to 2 material experts and 1 media expert. Media needs analysis questionnaire showed in Table 1. Expert questionnaire showed in Table 2.

Table 1. Media Needs Analysis Questionnaire

No	Aspect
1	suitability of material to competencies and learning objectives
2	Availability of learning media
3	Student interest in the existence of learning media
4	utilizing android in searching for learning information
5	Student interest in the development of android-based emodule media
6	The desired appearance of learning media

Table 2. Expert Questionnaire

No	Expert	Aspect
1	Subject matter expert	Content Eligibility Aspect
2		Presentation Aspect
3		Language Aspect
4	Media expert	Content Eligibility Aspect
5		Graphic aspect

The data collected from media experts and material experts were analyzed using descriptive statistical techniques. The scale in this study refers to the Likert Scale, where each is made using a scale of 1-5 categories of answers given a score or weight, namely the number of scores or weights between 1 to 5, with details as written in Table 3. The techniques used to analyze the data are qualitative descriptive analysis, quantitative analysis, and inferential statistics. Qualitative descriptive analysis is used to manage data in the form of input provided by experts. Quantitative descriptive analysis is used to manage data in the form of scores provided by experts.

Table 3. Criteria for Assessment of Android-Based E-Module Learning Media

Score	Criteria	Percentage
5	Very good	79 - 95
4	Good	64 - 78
3	Moderate	49 - 63
2	Less good	34 - 48
1	Very poor	19 – 33

(Sidin et al., 2022)

3. RESULT AND DISCUSSION

Results

The first step in developing an Android-based e-module is define, namely conducting a needs analysis by distributing questionnaires directly to 1 teacher and distributing Google form links to 26 students. The results of the needs analysis conducted by teachers (100%) and students (>50%) show that teachers and students at SMK Gelora Jaya Nusantara Medan really need Android-based E-Module media in the learning process. Therefore, the research was continued with the design stage of Android-based e-module media. After conducting a needs analysis, the next stage is the design stage. at this stage what is done is to make flowcharts and storyboards as a guide in developing the appearance of Android-Based E-Modules. The display of the Android-based e-module design showed in Figure 1.

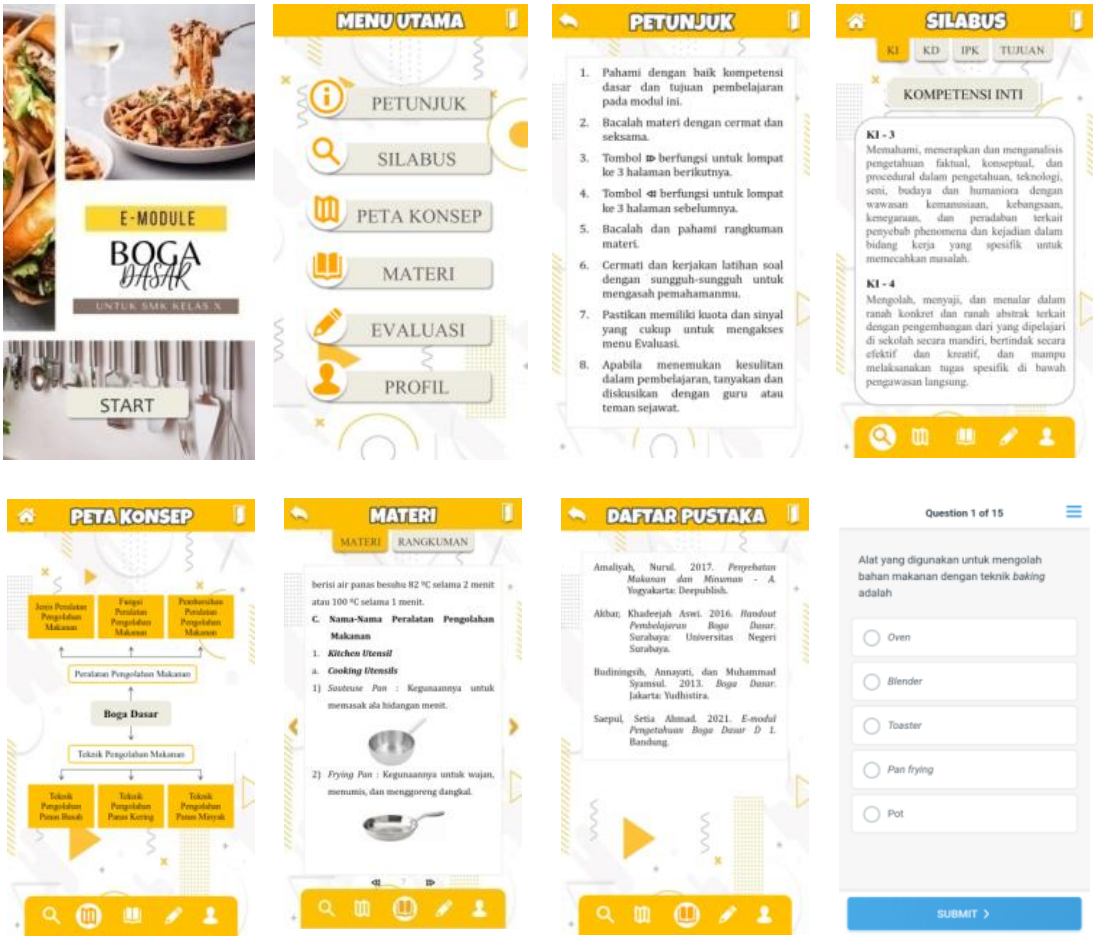

Figure 1. Android-Based E-Module Display

The Third stage is the development stage. This stage aims to see the feasibility of the android-based e-module. At this stage, the learning media will be tested by 3 experts, consisting of 1 media expert and 2 material experts. Based on suggestions from material and media experts, several stages of improvement are carried out in order to produce media that is suitable for use in learning. Based on the results of the material expert validation in Stage I, it can be seen in Table 3 that the average value of content feasibility is 82% (Very Good), presentation is 80% (Very Good), and language is 80% (Very Good), so that the average feasibility value Android-Based E-Module media material in Stage I was 81% with Very Good criteria. Material Expert Assessment Results Stage I showed in Table 4.

Table 4. Material Expert Assessment Results Stage I

Category	Average (%)	Criteria
Content Eligibility Aspect	82%	Very good
Presentation Aspect	80%	Very good
Language Aspect	80%	Very good
Average	**81%**	**Very good**

From the results of material validation, several revisions to the material can be seen, namely selecting the latest material sources; Videos should come from the same source and the grammar should be corrected with good and correct grammar. After revision, the results of the material expert validation in Stage II can be seen in Table 4, the average content feasibility value is 87% (Very Good), presentation is 95% (Very Good), and language is 87% (Very Good), so that the average the average feasibility value of Android-Based E-Module media material in Stage II is 90% with Very Good criteria. Material Expert Assessment Results Stage II showed in Table 4.

Table 4. Material Expert Assessment Results Stage II

Category	Average (%)	Criteria
Content Eligibility Aspect	87%	Very good
Presentation Aspect	95%	Very good
Language Aspect	87%	Very good
Average	**90%**	**Very good**

Based on the results of media expert validation in stage I, an average content feasibility value of 89% (Very Good) and 84% graphics (Very Good) was obtained, so that the average feasibility value of Android-Based E-Module media in Stage I was 86.5% with Very Good criteria. Media Expert Assessment Results Stage I showed in Table 5.

Table 5. Media Expert Assessment Results Stage I

Category	Average (%)	Criteria
Content Eligibility Aspect	89%	Very good
Graphic aspect	84%	Very good
Average	**86.5%**	Very good

In the results of the first stage of media validation, several things need to be revised, namely that the videos for each material should be unified from one source; the duration of the video should not be too long; the entire background on each material should be replaced with a matching colour; Menu layout and writing improvements are not the same. After revision, the validation results of media experts in Stage II obtained an average content feasibility value of 94% (Very Good) and 94% graphics (Very Good), so that the average feasibility value of Android-Based E-Module media in Phase II was 94 % with Very Good criteria. Media Expert Assessment Results Stage II showed in Table 6. From the data above, it can be seen that the results of the revised media validation in the second stage showed very good results with an average assessment of 94% in the very good category.

Table 6. Media Expert Assessment Results Stage II

Category	Average (%)	Criteria
Content Eligibility Aspect	94%	Very good
Graphic aspect	94%	Very good
Average	**94%**	Very good

Discussion

Android-Based Electronic Modules in Basic Culinary Arts Courses show very good results. The existence of technology in the world of education provides opportunities for educators to integrate ICT into the learning process, thereby creating a more interactive, dynamic, and adaptive learning experience (Afrianti & Musril, 2021; Hanannika & Sukartono, 2022; Herliani & Wahyudin, 2018). Developing Android-based e-modules is one innovative way to integrate ICT into learning. Electronic modules are a form of presentation of independent teaching materials that are systematically arranged, presented in electronic format, and equipped with presentation of usage tutorials, animations, audio, and videos to enrich students' learning experiences (Muzijah et al., 2020; Nurhandayani et al., 2022; F. Wulandari et al., 2021). Through e-modules, students can access learning content that is presented more dynamically and interactively, thus overcoming the limitations of print media (Muzijah et al., 2020; Sari & Ali, 2019).

Android-based e-modules attract more students' attention because they contain text, images, videos, and navigation buttons that attract students' attention. Students who are interested and pay attention to learning materials can generate learning motivation to achieve learning goals (Afrianti & Musril, 2021; Hanannika & Sukartono, 2022; Herliani & Wahyudin, 2018; Priyanthi et al., 2017; Winatha et al.,

2018). This can be seen in students who are more enthusiastic and involved in learning activities. Students show increased participation and more significant curiosity, especially when the e-module is accompanied by quizzes, discussions, and educational games (Buchori & Rahmawati, 2017; I. T. Putri et al., 2020). In addition, e-modules can be accessed anywhere and anytime. Students can repeat their learning independently. Independent learning can foster a sense of responsibility, solve problems, make decisions, think creatively and critically, and foster self-confidence (Muzijah et al., 2020; Sari & Ali, 2019).

The results of this study are relevant to the results of previous studies, which stated that e-modules attract students' attention and are effective for use in learning (Ellysia & Irfan, 2021; Kimianti & Prasetyo, 2019; Latifah et al., 2020). The study's results also showed that e-module media is suitable for learning (Nikita et al., 2018; Pramana et al., 2020). Android-based e-modules have several advantages that make them increasingly in demand in the world of education, especially in the context of digital learning. Android-based e-modules can be accessed anytime and anywhere if the user has an Android device and an internet connection. E-modules can be downloaded so that they can be used without having an internet quota. This dramatically supports flexible learning so that students can learn at their own pace, repeating material that has not been understood without the time pressure that usually occurs in the classroom (Nikita et al., 2018; Pramana et al., 2020; Muzijah et al., 2020; Sari & Ali, 2019). Android-based e-modules have interactive features such as videos, animations, interactive quizzes, and simulations, making the learning process more interesting and enjoyable. In addition, Android-based e-modules are equipped with features for online discussions or forums, which facilitate collaboration and interaction between students and teachers, and quizzes are used to evaluate learning outcomes.

In this study, the development of Android-based e-modules has several limitations, including the specifications and quality of Android devices owned by students. Low specifications will cause media access to not run smoothly because the developed e-modules contain many multimedia features. In addition, ample storage space is also needed because many multimedia features are used in the e-module. Android-based electronic modules can be optimally utilized in learning by integrating them into the curriculum through a hybrid approach that combines independent learning and face-to-face interaction. The use of technology must be balanced with attention to data privacy and security. With the right strategy, Android-based electronic modules can improve the quality and flexibility of learning. This study implies that teachers and students can utilize Android-based e-modules as tools in learning activities that can be used online or offline, independently and face-to-face in class. For further research, it is recommended to examine the effectiveness of using Android-based e-modules in improving learning outcomes.

4. CONCLUSION

Based on the research results, it can be concluded that an Android-based E-Module media has been developed for the Basic Culinary course, especially in the material of Food Processing Equipment and Food Processing Techniques. Based on validation by material experts, the Android-based E-Module media for the Basic Culinary course material in Food Processing Equipment and Food Processing Techniques obtained a high percentage of feasibility. In addition, according to media experts, the feasibility of the Android-based E-Module media is also considered very good. This study implies that teachers and students can utilize Android-based e-modules as tools in learning activities, both online and offline.

5. REFERENCES

Afrianti, S., & Musril, H. A. (2021). Perancangan Media Pembelajaran TIK Menggunakan Aplikasi Autoplay Media Studio 8 di SMA Muhammadiyah Padang Panjang. *Jurnal Informatika Upgris*, *6*(2), 2–7. https://doi.org/10.26877/jiu.v6i2.6471.

Agustina, W., Degeng, I. N. S., Praherdhiono, H., & Lestari, S. R. (2023). The effect of blended project-based learning for enhancing student's scientific literacy skills: An experimental study in University. *Pegem Journal of Education and Instruction*, *13*(1), 223–233. https://doi.org/10.47750/PEGEGOG.13.01.24.

Alfiyanti, Y., & Umam, N. K. (2022). Penerapan Kata Baku dalam Pembelajaran Bahasa Indonesia Menggunakan Media APK. Baku VS Tidak Baku di Kelas IV UPT SD Negeri 53 Gresik. *Jurnal Ilmiah PGSD FKIP Universitas Mandiri*, *08*(02), 2119–2129. https://doi.org/10.36989/didaktik.v8i2.528.

Andriani, R., & Suratman, A. (2021). Media pembelajaran berbasis andrioid untuk meningkatkan motivasi dan hasil belajar siswa. *Jurnal Analisa*, *7*(1), 56–65. https://doi.org/10.15575/ja.v7i1.10654.

Ariyani, F., Putrawan, G. E., Riyanda, A. R., Idris, A. R., Misliani, L., & Perdana, R. (2022). Technology and minority language: an Android-based dictionary development for the Lampung language maintenance in Indonesia. *Tapuya: Latin American Science, Technology and Society*, *5*(1).

https://doi.org/10.1080/25729861.2021.2015088.
Asrial, A., Syahrial, S., Kurniawan, D. A., Subandiyo, M., & Amalina, N. (2019). Exploring obstacles in language learning: Prospective primary school teacher in Indonesia. *International Journal of Evaluation and Research in Education (IJERE*, *8*(2), 249. https://doi.org/10.11591/ijere.v8i2.16700.
Aufa, M. N., Rusmansyah, R., Hasbie, M., Jaidie, A., & Yunita, A. (2021). The Effect of Using e-module Model Problem Based Learning (PBL) Based on Wetland Environment on Critical Thinking Skills and Environmental Care Attitudes. *Jurnal Penelitian Pendidikan IPA*, *7*(3), 401–407. https://doi.org/10.29303/jppipa.v7i3.732.
Buchori, A., & Rahmawati, N. D. (2017). Pengembangan E-Modul Geometri Dengan Pendekatan Matematika Realistik Di Sekolah Dasar. *Sekolah Dasar: Kajian Teori Dan Praktik Pendidikan*, *26*(1), 23–29. https://doi.org/10.17977/um009v26i12017p023.
Burden, K., & Kearney, M. (2016). Future Scenarios for Mobile Science Learning. *Research in Science Education*, *46*(2), 287–308. https://doi.org/10.1007/S11165-016-9514-1/METRICS.
Cahyani, N. L. aParamita, & Jayanta, I. N. L. (2021). Digital Literacy-Based Learning Video on the Topic of Natural Resources and Technology for Grade IV Elementary School. *Jurnal Ilmiah Sekolah Dasar*, *5*(3), 538. https://doi.org/10.23887/jisd.v5i3.37918.
Cholid, N., & Ambarwati, H. (2021). Pengembangan Media Pembelajaran Berbasis Android Kodular Materi Zakat Mata Pelajaran Fikirh untuk Meningkatkan MOtivasi di Madrasah Ibtidaiyah. *IOP Conference Series: Earth and Environmental Science*, *1796*(1), 125–136. https://doi.org/10.1088/1742-6596/1796/1/012078.
Dankbaar, M. E. W., Richters, O., Kalkman, C. J., Prins, G., Ten Cate, O. T. J., Merrienboer, J. J. G., & Schuit, S. C. E. (2017). Comparative effectiveness of a serious game and an e-module to support patient safety knowledge and awareness. *BMC Medical Education*, *17*(1), 1–10. https://doi.org/10.1186/S12909-016-0836-5/FIGURES/3.
Darmaji, Astalini, Kurniawan, D. A., Parasdila, H., Iridianti, Susbiyanto, Kuswanto, & Ikhlas, M. (2019). E-Module based problem solving in basic physics practicum for science process skills. *International journal of online and biomedical engineering*, *15*(15), 4–17. https://doi.org/10.3991/ijoe.v15i15.10942.
Delita, F., Berutu, N., & Nofrion. (2022). Online Learning: the Effects of Using E-Modules on Self-Efficacy, Motivation and Learning Outcomes. *Turkish Online Journal of Distance Education*, *23*(4), 0–3. https://doi.org/10.17718/tojde.1182760.
Ellysia, A., & Irfan, D. (2021). Pengembangan e-Modul Dengan Flip PDF Professional pada Mata Pelajaran Dasar Listrik dan Elektronika. *Voteteknika (Vocational Teknik Elektronika dan Informatika)*, *9*(3), 91–96. https://doi.org/10.24036/voteteknika.v9i3.113525.
Erna, M., Irfandi, I., & Rasmiwetti, R. (2021). Development of Learning Media Based on Autoplay Chemistry to Improve Students' Communicative Characters on Chemistry. *JTP - Jurnal Teknologi Pendidikan*, *22*(3), 167–181. https://doi.org/10.21009/jtp.v22i3.17823.
Hanannika, L. K., & Sukartono, S. (2022). Penerapan Media Pembelajaran Berbasis TIK pada Pembelajaran Tematik di Sekolah Dasar. *Jurnal Basicedu*, *6*(4), 6379–6386. https://doi.org/10.31004/basicedu.v6i4.3269.
Helleve, I., Grov Almås, A., & Bjørkelo, B. (2020). Becoming a professional digital competent teacher. *Professional Development in Education*, *46*(2), 324–336. https://doi.org/10.1080/19415257.2019.1585381.
Herliani, A. an, & Wahyudin, D. (2018). Pemetaan kompetensi teknologi informasi dan komunikasi (tik) guru pada dimensi pedagogik. *Jurnal Penelitian Ilmu Pendidikan*, *11*(2), 134–148. https://doi.org/10.21831/JPIPFIP.V11I2.19825.
Hermawan, R., Munadi, S., Leva, M., & Safitri, O. (2022). The Using of Students' Modules and Role on Learning Achievement in Covid-19 Pandemic. *Jurnal Iqra' : Kajian Ilmu Pendidikan*, *7*(1), 139–155. https://doi.org/10.25217/JI.V7I1.2191.
Kass-Hanna, J., Lyons, A. C., & Liu, F. (2022). Building financial resilience through financial and digital literacy in South Asia and Sub-Saharan Africa. *Emerging Markets Review*, *51*, 100846. https://doi.org/10.1016/j.ememar.2021.100846.
Kimianti, F., & Prasetyo, Z. K. (2019). Pengembangan E-Modul Ipa Berbasis Problem Based Learning Untuk Meningkatkan Literasi Sains Siswa. *Kwangsan: Jurnal Teknologi Pendidikan*, *7*(2), 91. https://doi.org/10.31800/jtp.kw.v7n2.p91--103.
Kolopita, C., Katili, M. R., & Yassin, R. M. T. (2022). Pengaruh Media Pembelajaran Terhadap Hasil Belajar Siswa Pada Mata Pelajaran Komputer dan Jaringan Dasar. *Inverted: Journal of Information Technology Education*, *2*(1), 1–12. https://doi.org/10.37905/inverted.v2i1.13081.
Latifah, N., Ashari, & Kurniawan, E. S. (2020). Pengembangan e-modul fisika untuk meningkatkan

kemampuan berpikir kritis peserta didik. *Jurnal Inovasi Pendidikan Sains*, *01*(01).

Liao, J., Wang, M., Ran, W., & Yang, S. J. H. (2014). Collaborative cloud: a new model for e-learning. *Innovations in Education and Teaching International*, *51*(3), 338–351. https://doi.org/10.1080/14703297.2013.791554.

Mabsutsah, N., & Yushardi, Y. (2022). Analisis Kebutuhan Guru terhadap E Module Berbasis STEAM dan Kurikulum Merdeka pada Materi Pemanasan Global. *Jurnal Pendidikan MIPA*, *12*(2). https://doi.org/10.37630/jpm.v12i2.588.

Matsun, M., Hadiati, S., & Pramuda, A. (2021). Development of Arduino-Based Electrical Practicum e-Module. *Radiasi : Jurnal Berkala Pendidikan Fisika*, *14*(2), 120–126. https://doi.org/10.37729/radiasi.v14i2.1040.

Muhtar, N. A., Nugraha, A., & Giyartini, R. (2020). Pengembangan Media Pembelajaran IPA berbasis Information Communication and Technology (ICT. *PEDADIDAKTIKA: Jurnal Ilmiah Pendidikan Guru Sekolah Dasar*, *7*(4), 20–31. https://doi.org/10.17509/pedadidaktika.v7i4.26455.

Munandar, R. R., Cahyani, R., & Fadilah, E. (2021). Pengembangan e-modul sigil software untuk meningkatkan hasil belajar siswa di masa pandemi Covid-19. *BIODIK: Jurnal Ilmiah Pendidikan Biologi*, *7*(4), 191–202. https://doi.org/10.22437/bio.v7i4.15204.

Munzil, M., Affriyenni, Y., Mualifah, S., Fardhani, I., Fitriyah, I. J., & Muntholib, M. (2022). Development of problem based learning based e-modules in the form of flipbooks on environmentally friendly technology materials as an independent learning material for students especially online learning. *Jurnal Pendidikan Sains Indonesia*, *10*(1), 37–46. https://doi.org/10.24815/jpsi.v10i1.21807.

Muzijah, R., Wati, M., & Mahtari, S. (2020). Pengembangan E-modul Menggunakan Aplikasi Exe-Learning untuk Melatih Literasi Sains. *Jurnal Ilmiah Pendidikan Fisika*, *4*(2), 89. https://doi.org/10.20527/jipf.v4i2.2056.

Naila Muna, K., & Wardhana, S. (2022). Pengembangan Media Pembelajaran Video Animasi dengan Model ADDIE pada Pembelajaran Bahasa Indonesia Materi Perkenalan Diri dan Keluarga untuk Kelas 1 SD. *EduStream: Jurnal Pendidikan Dasar*, *5*(2), 175–183. https://doi.org/10.26740/eds.v5n2.p175-183.

Nikita, P. M., Lesmono, A. D., & Harijanto, A. (2018). Pengembangan e-modul materi fluida dinamis untuk meningkatkan kemampuan berpikir kritis siswa SMA kelas XI. *Jurnal Pembelajaran Fisika*, *7*(2), 175–180. https://doi.org/10.19184/jpf.v7i2.7925.

Ningsihg, S. Y., & Mahyuddin, N. (2021). Desain e-module tematik berbasis kesantunan berbahasa anak usia dini di taman kanak-kanak. *Jurnal Pendidikan Anak Usia Dini*, *6*(1), 137.

Nurhandayani, E. F., Mulyono, D., & Yanto, Y. (2022). Pengembangan E-Modul Matematika Materi Barisan dan Deret dengan Pendekatan Problem Based Learning (PBL) Kelas XI SMA. *Jurnal Pendidikan Matematika (Judika Education)*, *5*(2), 126–137. https://doi.org/10.31539/judika.v5i2.4588.

Pramana, M. W. A., Jampel, & Pudjawan, K. (2020). Meningkatkan Hasil Belajar Biologi Melalui E-Modul Berbasis Problem Based Learning. *Jurnal Edutech Undiksha*, *8*(2), 17. https://doi.org/10.23887/jeu.v8i2.28921.

Priyanthi, K. A., Agustini, K., & Santyadiputra, G. S. (2017). Pengembangan E-Modul Berbantuan Simulasi Berorientasi Pemecahan Masalah Pada Mata Pelajaran Komunikasi Data (Studi Kasus : Siswa Kelas XI TKJ SMK Negeri 3 Singaraja). *Kumpulan Artikel Mahasiswa Pendidikan Teknik Informatika (KARMAPATI)*, *6*(1), 40. https://doi.org/10.23887/karmapati.v6i1.9267.

Putri, I. T., Aminoto, T., & Pujaningsih, F. B. (2020). Pengembangan e-modul fisika berbasis pendekatan saintifik pada materi teori kinetik gas. *Edufisika: Jurnal Pendidikan Fisika*, *5*(1), 1–11. https://doi.org/10.15548/nsc.v5i1.894.

Putri, M. A., & Purmadi, A. (2020). Pengaruh Media Pembelajaran E-Modul Berbasis Sigil Terhadap Motivasi Belajar Siswa pada Mata Pelajaran Desain Grafis. *Jurnal Teknologi Pendidikan : Jurnal Penelitian Dan Pengembangan Pembelajaran*, *5*(2), 174–180. https://doi.org/10.33394/JTP.V5I2.3073.

Sanova, A., Bakar, A., Afrida, A., Kurniawan, D. A., & Aldila, F. T. (2022). Digital Literacy on the Use of E-Module Towards Students' Self-Directed Learning on Learning Process and Outcomes Evaluation Cources. *JPI (Jurnal Pendidikan Indonesia*, *11*(1), 154–164. https://doi.org/10.23887/jpi-undiksha.v11i1.36509.

Sapriyah. (2019). Media Pembelajaran Dalam Proses Belajar Mengajar. *Prosiding Seminar Nasional Pendidikan FKIP Universitas Sultan Agung Tirtayasa*, *2*(1), 470–477.

Sari, Y. P., & Ali, R. (2019). Implementasi Sistem Pelaporan Sarana Dan Prasarana Kegiatan Belajar Mengajar Berbasis Android (Studi Kasus : Institut Informatika Dan Bisnis Darmajaya. *Jurnal Informatika*, *19*(1), 47–53. https://doi.org/10.30873/JI.V19I1.1500.

Sidin, U. S., Bakri, H., & Azlina, N. (2022). Pengembangan Aplikasi E-Module Mata Pelajaran Teknologi Jaringan Berbasis Luas Berbasis Android di SMK Negeri 2 Pinrang. *Journal of Embedded Systems,*

Security and Intelligent Systems, *3*(1), 65–73. https://doi.org/10.26858/jessi.v3i1.26108.

Sofyan, H., Anggereini, E., & Saadiah, J. (2019). Development of E-Modules Based on Local Wisdom in Central Learning Model at Kindergartens in Jambi City. *European Journal of Educational Research*, *8*(4), 1137–1143. https://doi.org/10.12973/eu-jer.8.4.1137.

Squire, K. D. (2022). From virtual to participatory learning with technology during COVID-19. *E-Learning and Digital Media*, *19*(1), 55–77. https://doi.org/10.1177/20427530211022926.

Strataki, A. (2022). An evaluation of educational apps for preschool-age children in Android and iOS. *Advances in Mobile Learning Educational Research*, *2*(1), 278–288. https://doi.org/10.25082/AMLER.2022.01.012.

Thiagarajan, S. (1974). *Instructional Development for Training Teachers of Exceptional Children: A Sourcebook. Council for Exceptional Children, 1920 Association Drive*.

Ulfa, M., Yusuf, P. N. Y., & Sirait, R. (2023). Upaya Meningkatkan Kemampuan Membaca Permulaan Siswa melalui Media Big Book. *Tematik: Jurnal Penelitian Pendidikan Dasar*, *2*(1), 1–5. https://doi.org/10.57251/tem.v2i1.862.

Winatha, K. R., Suharsono, N., & Agustin, K. (2018). Pengembangan E-Modul Interaktif Berbasis Proyek Mata Pelajaran Simulasi Digital. *Jurnal Pendidikan Teknologi dan Kejuruan*, *15*(2), 188–199. https://doi.org/10.23887/jtpi.v8i1.2238.

Wulandari, A. P., Salsabila, A. A., Cahyani, K., Nurazizah, T. S., & Ulfiah, Z. (2023). Pentingnya Media Pembelajaran dalam Proses Belajar Mengajar. *Journal on Education*, *5*(2), 3928–3936. https://doi.org/10.31004/joe.v5i2.1074.

Wulandari, F., Yogica, R., & Darussyamsu, R. (2021). Analisis Manfaat Penggunaan E-Modul Interaktif Sebagai Media Pembelajaran Jarak Jauh Di Masa Pandemi Covid-19. *Khazanah Pendidikan*, *15*(2), 139–144. https://doi.org/10.30595/JKP.V15I2.10809.

Zaini, H., & Dewi, K. (2017). Pentingnya Media Pembelajaran Untuk Anak Usia Dini. *Raudhatul Athfal: Jurnal Pendidikan Islam Anak Usia Dini*, *1*(1). https://doi.org/10.19109/ra.v1i1.1489.