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Research Article

Developing a Smart Apps Creator-Based Digital Handout for Vocational Creative Projects and Entrepreneurship Education

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Abstract
Amid rapid technological advancement, vocational education requires innovative learning strategies to address evolving student needs. This study aims to develop a digital handout using smart apps creator (SAC) for the subject of creative projects and entrepreneurship, specifically focusing on promotional media marketing. Following the ADDIE model, the research successfully completed the analysis, design, and development phases, which involved a limited trial with 36 vocational students at SMKN 2 Mojokerto. Data collection utilized validation instruments adapted from Indonesian National Education Standards Board guidelines. Findings indicate that the SAC-based digital handout is highly feasible, with average validation scores reaching 95% from the content specialist, 98% from the media expert, and 96% from the language expert. Furthermore, student response during the field trial reached 91.05%, placing the product in the highly practical category. This interactive resource effectively minimizes classroom boredom, enhances learning engagement through mobile access, and proves highly appropriate for vocational instructional implementation in the current digital era.

Keywords: digital handout, smart apps creator, innovative learning, learning strategies

INTRODUCTION

The Industrial Revolution 4.0 has transformed the educational landscape, necessitating a shift toward digital-based learning environments (El Koshiry & Tony, 2025). The integration of interactive multimedia frameworks significantly enhances student learning interest by delivering educational content through more flexible and dynamic channels (Bahri et al., 2024). In vocational education, specifically within the creative project and entrepreneurship (CPE) subject, explaining complex marketing promotion content requires interactive media that goes beyond static printed resources. Traditional handouts often fail to maintain student engagement, especially for digital-native learners who require interactive and mobile-friendly instructional resources.

Developing Android-based learning software through platforms like Smart Apps Creator (SAC) offers high usability and provides students with visually structured learning experiences (Asmawadi et al., 2025). From a cognitive development perspective, learning environments must be designed to allow students to actively construct knowledge through direct interaction with their tools (Piaget, 1952). This view aligns with instructional design principles stating that a structured and progressive curriculum is essential to stimulate intellectual development (Bruner, 1963). In the digital era, these theoretical foundations support the transition toward modernized electronic handouts that

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successfully embed numerical and digital literacy into vocational subjects (Gusteti et al., 2023). The use of interactive platforms like smart apps creator allows for a non-linear learning experience that fits the digital-native learning style (Sitanggang, 2023). Consequently, there is a critical need for innovative tools that align with vocational competencies (Wiro'i & Sulistyowati, 2021).

Furthermore, a systematic review of educational trends in Indonesia underscores that the utilization of information technology has become a cornerstone of modern schooling (Widodo et al., 2020), which fosters critical thinking skills and problem-solving capacities necessary for higher and vocational achievements (Liu & Pásztor, 2022). Empirical findings also demonstrate that interactive applications built with SAC can optimize students' cognitive learning outcomes and self-reliance (Ramadhani & Sugianto, 2023).

Despite the importance of digitalization, many vocational classrooms still lack specialized media for promotional marketing materials. This study addresses this gap by developing a digital handout using SAC. The primary objectives are to describe the development process using the ADDIE model, validate its feasibility through expert judgment (material, media, and language), and assess student responses through a limited trial. The integration of technology in educational content creation also empowers instructors to enhance creativity and instructional responsiveness, allowing learning materials to be continuously adapted to evolving learner needs and contemporary educational demands (Juliana & Sulistyowati, 2023). From an instructional design perspective, systematic technology-based development frameworks further ensure that digital learning resources remain effective, efficient, and learner-centered (Branch, 2009).

In the context of Indonesian vocational education, vocational high schools (SMK) play a pivotal role in preparing graduates with practical skills applicable to the workforce (Sakdiah et al., 2023). Recent governmental initiatives have aimed to elevate vocational education quality through programs such as the SMK centers of excellence and the transformation of selected schools into SMK with enhanced standards and facilities (Ningrum & Sulistyowati, 2024). In alignment with these initiatives, the Indonesian government has incorporated the CPE course into the vocational high school curriculum as a foundational subject to equip students with the competencies necessary to initiate their own businesses upon graduation (Yusri & Sulistyowati, 2020).

The CPE course is designed to equip students with entrepreneurial competencies to innovate and develop market-responsive products. It extends beyond theoretical frameworks to prepare students for real-world business scenarios and promote entrepreneurial initiatives. A critical component of this course is understanding marketing promotion media, which aligns students' skills with current business and technological trends (Wiro'i & Sulistyowati, 2021). However, initial field observations reveal challenges including limited availability of updated teaching materials and minimal use of digital learning applications, particularly for marketing promotion content. Constraints such as time and resource shortages hinder teachers' ability to develop innovative digital tools, highlighting a pressing need for targeted educational innovations.

This study responds to these challenges by focusing on the development of a digital handout tailored to the CPE course's marketing promotion media topic. The rationale for this focus stems from the topic's relevance and complexity, as effective marketing today spans offline and online channels and demands ongoing technological adaptation. To bridge this gap, instructional materials must evolve beyond static documents into dynamic application formats. In vocational education settings, interactive

digital learning resources are highly required to substitute static textbook formats and match practical job competencies (Wu, 2024). This research addresses the challenge by introducing a digital handout designed to make entrepreneurship topics more digestible. The proposed digital handout aims to enhance student mastery of essential marketing concepts and skills, thereby supporting their preparation for careers in business and promotion (Wulandari & Sulistyowati, 2022).

The development leverages SAC, a no-code software platform by u-Smart Technology Co., Ltd. (Taiwan), which facilitates the creation of user-friendly, responsive applications accessible on multiple platforms including iOS, Android, web, and desktop. Furthermore, the technical architecture of SAC optimizes the integration of diverse multimedia formats, offering seamless navigation that accommodates non-linear learning pathways for students (Al-Ansi et al., 2021). This digital handout will comprise comprehensive educational content, interactive quizzes, and assessments presented in an attractive, learner-centered design to maximize engagement. Furthermore, it provides 24/7 access, fostering autonomous and flexible learning beyond the traditional classroom setting.

Previous studies have demonstrated the effectiveness of SAC in developing valid digital learning media, primarily focusing on comprehensive instructional applications (Ardiansyah & Indrakusuma, 2024). Recent data confirms that integrating Smart Apps Creator into the curriculum upgrades students' conceptual understanding and critical thinking skills (Diyana & Artanti, 2025). Other research highlights the benefits of multimedia-based e-modules developed using platforms such as book creator to enhance content delivery (Juliana & Sulistyowati, 2023). Previous implementations of SAC across various practical courses have shown exceptional validity and positive responses from both teachers and students (Pratama & Mutadi, 2021). In mathematics education, the application of Adobe Flash Professional CS6 has successfully produced interactive e-modules that enhance students' spatial and conceptual understanding (Ilmi et al., 2020). Similarly, other studies have utilized SAC to develop trigonometry learning media, proving that mobile platforms increase engagement in complex subjects (Tanju et al., 2024).

In the context of local culture and arts, mobile applications designed via SAC have been effective in delivering specialized regional music materials (Kotsopoulos et al., 2024). Furthermore, this platform has also been implemented in basic graphic design subjects within vocational high schools to support visual competencies (Irpan & Lutfi, 2024). To meet the dynamic challenges of Education 4.0, smartphone-based interactive multimedia using SAC has been adopted to foster autonomous learning environments (Muzakkir et al., 2022). The software serves as a validated framework for creating robust mobile learning prototypes tailored to modern classrooms (Puspitasari et al., 2022). Recent innovations also demonstrate that advanced multimedia developed through SAC 3.0 provides excellent clarity and structure for abstract instructional topics (Rahma et al., 2024).

Furthermore, empirical implementation of SAC-based mobile applications reveals a significant impact on stabilizing students' cognitive retention and helping them synthesize intricate learning indicators (Pratama et al., 2023). The design of mobile learning applications using SAC satisfies technical instructional criteria and establishes a creative environment for autonomous study (Rukoyah & Bektiningsih, 2024). It needs to be noted, research on SAC-based digital handouts as concise and flexible learning resources remains limited, particularly in vocational CPE contexts. This study addresses

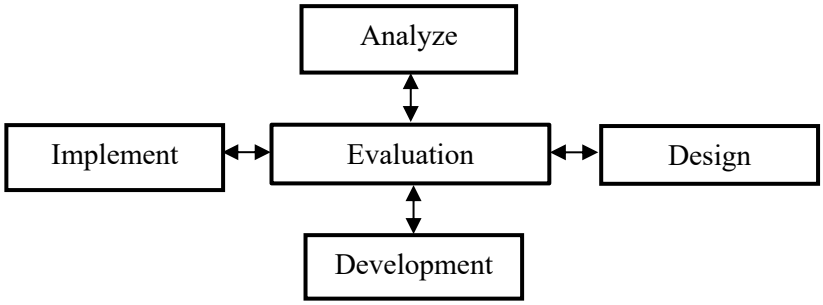
this gap by developing SAC-based digital handouts that integrate interactivity and multimedia, offering a novel and context-specific contribution to vocational education.

The present article outlines the design and development of the SAC-based digital handout in the Sharia Banking Services program. The objectives include creating effective digital learning materials, evaluating their feasibility through expert and student assessments, and examining acceptance and usability from the student perspective. This study addresses key issues such as the demand for flexible learning aligned with the Merdeka Curriculum, scarcity of adequate traditional textbooks, lack of effective digital learning tools for CPE, and the absence of SAC-based applications in this domain. The digital handout supports offline access to learning materials alongside online access to supplementary videos, references, and quizzes. Evaluation metrics concentrate on acceptance, comprehension, and usage as indicators of the handout's feasibility and potential impact.

METHOD

This research is a research and development (R&D) study using the ADDIE development model, which according to (Sugiyono, 2019), is a structured method for producing and testing the feasibility of educational products. In vocational education, utilizing the ADDIE model to structure interactive mobile learning successfully bridges the gap in digital competency and enhances practical student engagement (Efendi & Wulandari, 2025). The study specifically focuses on the analysis, design, and development phases. The ADDIE framework is particularly suited to this educational innovation, as it ensures iterative refinement and practical feasibility throughout the instructional design process. The study specifically focuses on the analysis, design, and development phases. To ensure replicability, the validation instruments were adapted from (BSNP, 2016) standards using a 4-point Likert scale. The validation indicators are summarized in Table 1. Furthermore, a limited trial was conducted with 36 students as a formative evaluation within the development phase to gather empirical data on user responses. Figure 1 describes the research stages based on the ADDIE model.

Figure 1
ADDIE model development framework



The scope of this research was limited to the development phase, as it aimed to assess the feasibility rather than the effectiveness of the developed product. The study was conducted at SMKN 2 Mojokerto, involving a sample of 36 students from the Class XI Sharia Banking Services (LPS) program. Data were collected through observation, expert validation sheets, questionnaires, and documentation. The research instruments

included material, media, and language validation sheets completed by expert validators, as well as student response questionnaires aimed at gauging learners' reactions to the developed digital handout.

Table 1
Summary of validation indicators

Experts/Respondents	Indicators
Material Expert	Content accuracy, curriculum relevance, and depth of marketing topics.
Media Expert	Visual design (layout, color), navigation efficiency, and SAC interactivity.
Language Expert	Readability, sentence structure, and conformity to linguistic standards.
Student Response	Ease of use, visual appeal, and clarity of instructional material.

Source: Processed by researcher (2025)

The utilization of multiple data collection techniques allowed for methodological triangulation, thereby enhancing the overall credibility, validity, and reliability of the research findings. The validation data and student response results were analyzed using percentage-based feasibility and response scores. The interpretation of the results was based on criteria from Likert and Guttman scales, with the feasibility categories defined as follows:

$$\text{Feasibility Percentage} = \frac{Total\ Validation\ Score}{\text{Highest Score}} \times 100\%$$

Table 2
Expert validation interpretation criteria

Percentage	Criteria
0-20%	Not feasible
21-40%	Less feasible
41-60%	Moderately feasible
61-80%	Feasible
81-100%	Highly feasible

Source: Riduwan (2013)

Students' responses were analyzed based on their feedback on the developed digital handout, using the criteria of the Guttman scale as provided in Table 3.

Table 3
Guttman scale criteria

Criteria	Score
No	0
Yes	1

Source: Riduwan (2013)

Based on the collected data, the analysis was conducted using the following formula:

$$\text{Response Percentage} = \frac{\text{The number of students who answered 'Yes}}{\text{Total students}} \times 100\%$$

The analysis results can be concluded and interpreted based on the criteria of the student response questionnaire (see Table 4)

Table 4
Criteria for interpreting student responses

Percentage	Criteria
0-20%	Not feasible
21-40%	Less feasible
41-60%	Moderately feasible
61-80%	Feasible
81-100%	Highly feasible

Source: Riduwan (2013)

RESULT

The results of this study are organized around three main research questions: the process of developing the digital handout, the feasibility evaluation of the digital handout, and the analysis of student responses through a questionnaire.

Development Process

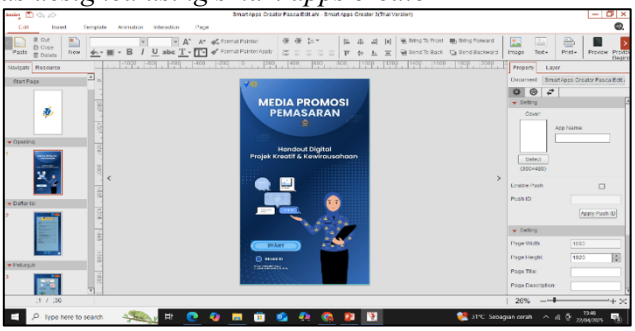
First, the development of the Smart Apps Creator (SAC)-based digital handout followed the ADDIE model, which includes five phases: analysis, design, development, implementation, and evaluation. This study focused on the first three phases, concluding at the development stage. During the analysis phase, the researcher identified several issues in the field. Observations revealed that it required innovative, effective, and flexible learning materials that provide easy access anytime and anywhere. Additionally, the curriculum analysis confirmed the use of the Merdeka Curriculum with a project-based learning model, involving a thorough review of learning outcomes, lesson planning, content framework, and evaluation design. Student analysis indicated a class size of 36 students aged 16 to 17, all equipped with personal smartphones and school-provided internet access.

Second, the design phase involved structuring the digital handout content in accordance with the learning objectives and outcomes of the Creative Projects and Entrepreneurship (CPE). The material included topics such as the concept and objectives of promotion, promotional media types and functions, marketing mix, types of marketing promotion, criteria for selecting promotional media, marketing content creation, and entrepreneur business ideas suitable for adolescents. The delivery strategy incorporated multimedia elements including images, colors, evaluation questions, video links, and online references. Visual design decisions covered layout, font style and size, color schemes, and icons tailored to vocational students. Finally, these components were integrated to develop the SAC-based digital handout.

Third, in the development phase, a prototype of the digital handout was created using SAC. The prototype underwent validation by three experts—content specialist, media expert, and language expert—whose feedback guided product refinement. Following expert evaluation, a revised prototype was tested with 36 students through

questionnaires assessing usability and effectiveness. The collected data informed further improvements, resulting in a more feasible and user-friendly final product.

Figure 2
The digital handout was designed using smart apps creator



Expert Validation Results

The feasibility results of the digital handout development were obtained from assessments conducted by three experts using a checklist with a 5-point scale for each indicator. The experts also provided comments and suggestions as part of the evaluation process to determine the feasibility of the handout. Content validation was conducted by a lecturer in Business Education at Universitas Negeri Surabaya, media validation by a lecturer in Educational Technology, and language validation by a lecturer in Indonesian Language at the same university. The feasibility assessment results are shown in Table 5.

Table 5
Expert validation results

Validation	Percentage	Criteria
Material Expert Validation	95%	Highly feasible
Media Expert Validation	98%	Highly feasible
Language Expert Validation	96%	Highly feasible

Source: Processed by researcher (2025)

The average validation score of 95% indicates that the SAC-based digital handout is 'highly feasible' for classroom use. Expert feedback included themes such as improving video contrast and streamlining navigation icons.

Student Responses

Following the expert validation process, revisions were made, and a second prototype was developed. This prototype was tested on 36 students. The following are the results of the student response questionnaire (see Table 6).

Table 6
Field trial results

Component	Percentage	Criteria
Material Content Aspect	89%	Highly feasible
Presentation Aspect	88%	Highly feasible
Language Aspect	89%	Highly feasible
Graphical Aspect	98,8%	Highly feasible

Source: Processed by researcher (2025)

The student response score reached 91.05%, placing it in the 'very good' category. This high percentage indicates that students found the SAC-based digital handout highly engaging and intuitive. Key factors contributing to this positive response include the ease of navigation, the interactive elements that prevent boredom, and the accessibility of marketing materials through their smartphones. Students particularly appreciated the integration of multimedia, such as instructional videos and interactive quizzes, which facilitated a better understanding of the promotional marketing content compared to traditional printed handouts.

DISCUSSION

This study addressed three main research questions: the development process of a digital handout using Smart Apps Creator (SAC), the feasibility of the resulting product, and student responses regarding its usability and effectiveness. The development process, guided by the ADDIE model, systematically produced a prototype tailored to the Creative Projects and Entrepreneurship (CPE) subject, specifically the topic of marketing promotion media. This aligns with prior studies highlighting the utility of systematic instructional design in creating effective digital learning resources (Branch, 2009; Wiro'i & Sulistyowati, 2021).

The analysis phase revealed a gap in flexible, accessible, and engaging digital materials, echoing findings from Alpiani et al. (2022); Ardiansyah and Indrakusuma (2024) regarding the limited availability of learner-centered and technology-integrated resources in vocational education. To address these gaps, the design phase implemented multimedia-rich content aligned with the Merdeka Curriculum, consistent with contemporary pedagogical frameworks emphasizing autonomy, interactivity, and contextual relevance (Juliana & Sulistyowati, 2023). During the development phase, the SAC-based prototype incorporated expert validation and student testing, confirming both feasibility and usability, which supports theoretical claims that interactive digital learning media enhance engagement, comprehension, and skill acquisition (Wulandari & Sulistyowati, 2022).

The validation results confirmed the product's high feasibility: material expert (95%), media expert (98%), and language expert (96%). A score of 95% indicates that the digital handout is 'highly feasible', meaning it is pedagogically stable and ready for classroom deployment without major structural changes. Qualitatively, the experts' feedback focused on two primary themes: (1) optimizing video contrast and brightness for better visibility on mobile screens, and (2) streamlining navigation icons to ensure the interface remains intuitive for independent learning. These refinements were integrated into the final prototype to ensure technical reliability. Student responses also reflected strong acceptance, with an overall feasibility score of 91.05%. This high percentage implies that the SAC-based handout is not only technically functional but also highly engaging for vocational students. The 'very good' response indicates that the integration of interactive quizzes and multimedia videos effectively reduces learning boredom, which is a common barrier in the CPE subject when using traditional static media. These findings support the initial hypothesis that SAC is a viable platform for developing interactive, learner-centered materials that align with the needs of digitally literate Generation Z learners, who prefer autonomy and multimedia-driven engagement (Sitanggang, 2023).

These results are consistent with previous research, such as Ardiansyah & Indrakusuma (2024), which demonstrated the validity and practicality of SAC-based learning media for Informatics subjects. Similarly, Juliana & Sulistyowati (2023) work with interactive e-modules using Book Creator also confirmed the effectiveness of multimedia tools in enhancing content delivery for vocational subjects. The present study extends these findings by applying SAC specifically to the PKK course and focusing on handouts rather than full modules, offering a more accessible and time-efficient digital learning alternative.

Unexpectedly, the graphical aspect received the highest student rating (98.8%), suggesting that design aesthetics played a more critical role in perceived effectiveness than initially anticipated. This highlights the importance of visual engagement in instructional design, particularly for vocational learners. Furthermore, the results align with Alpiani et al. (2022), who found that SAC-based e-modules were feasible, practical, and effective for high school implementation, reinforcing the platform's broader applicability across various subjects and levels. This study confirms the potential of SAC-based digital handouts to address gaps in current CPE instructional resources. It underscores the significance of integrating student-centered digital tools in vocational education to support curriculum goals and learner engagement in the era of Industry 4.0.

CONCLUSION

This study concludes that the Smart Apps Creator-based (SAC) digital handout is highly feasible for vocational education. The development process, following the ADDIE model, successfully produced a mobile-friendly instructional tool. Validation results from experts yielded excellent scores: 95% for material, 98% for media, and 96% for language. Furthermore, a limited trial with 36 students resulted in a 91.05% feasibility score, indicating strong student acceptance. These findings confirm that digital handouts developed through a systematic research and development process can effectively address the need for interactive, accessible, and learner-centered resources in Creative Projects and Entrepreneurship education (CPE).

This study has several limitations. First, the sample included only 36 students from a single vocational school, limiting generalizability. Second, the research concluded at the prototype stage, so long-term effects on learning outcomes and skill retention remain untested. Third, the SAC-based handout was examined as a standalone tool without integration with other digital platforms, such as learning management system or interactive quizzes, which could further enhance engagement and effectiveness. Future research should involve larger and more diverse samples, conduct longitudinal evaluations, and explore integration with complementary digital tools to optimize instructional design and maximize learning outcomes. Such investigations would provide stronger empirical support for the scalability and pedagogical effectiveness of SAC-based digital handouts in vocational education.

Authors Contribution

Z. R. L: Conceptualization, Methodology, Investigation, Formal analysis, Writing – original draft, and Visualization. R. S: Supervision, Validation, Writing – review & editing, and Project administration

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Not applicable

Competing interests
The author has declared that there are no conflicts of interest

Data availability
The data were provided upon request to corresponding author (zahidalaila68@gmail.com)

REFERENCES

Al-Ansi, A., Al-Ansi, A. M., & Al-Saman, A. S. (2021). Technology-enhanced Learning in high education: Evaluating the interactivity and usability of multimedia instructional tools. *International Journal of Emerging Technologies in Learning (iJET), 16*(12), 44–58. https://doi.org/10.3991/ijet.v16i12.21554

Alpiani, N., Pamungkas, A. S., & Jaenudin. (2022). Pengembangan e-modul matematika pada materi barisan dan deret berbantuan smart app creator untuk siswa SMA/SMK. *Jurnal Cendekia: Jurnal Pendidikan Matematika*, 6(2), 2110–2121. https://j-cup.org/index.php/cendekia/article/view/1452

Ardiansyah, A. R., & Indrakusuma, A. H. (2024). Pengembangan media pembelajaran berbasis smart apps creator pada mata pelajaran informatika kelas X SMK Negeri 2 Tulungagung. *BIOS: Jurnal Teknologi Informasi dan Rekayasa Komputer*, 6(1), 1–10. https://doi.org/10.37148/bios.v6i1.147

Asmawadi, A., Pattaufi, P., & Hakim, A. (2025). Development of android application-based learning media for English subjects. Inovasi Kurikulum, 22(3), 1257-1270.

Bahri, A., Hidayat, W., Putra, K. P., Ainun, N. A., & Arifin, N. (2024). The relationship between students' perception to the learning media, digital literacy skills, and self-regulated learning with students' learning outcomes in the rural area. *Journal of Technology and Science Education, 14*(2), 588-606.

Branch, R. M. (2009). *Instructional design: The ADDIE approach*. Springer.

Bruner, J. S. (1963). *The process of education.* Cambridge: Harvard University Press.

BSNP. (2016). *Instrumen penilaian buku teks pelajaran.* Jakarta: Badan Standar Nasional Pendidikan.

Diyana, T. N., & Artanti, F. H. (2025). Development of a smart apps creator-based e-book to enhance students' conceptual understanding and digital literacy. *Momentum: Physics Education Journal, 9(*2), 110–121. https://doi.org/10.21067/mpej.v9i2.11106.

Efendi, R., & Wulandari, R. A. (2025). Bridging the Industry 4.0 skills gap: An immersive augmented reality mobile learning approach for vocational education. *International Journal of Interactive Mobile Technologies, 19*(06), 60–74. https://doi.org/10.3991/ijim.v19i06.53825.

Gusteti, M. U., Wulandari, S., Rahmalina, W., Putri, M., & Putri, E. K. (2023). Development of electronic handouts using numerical literacy-based Mathemagics methods for learning in the digital era. *Jurnal Eksakta Pendidikan (JEP), 7*(1), 115-125.

Ilmi, R., I. M. Arnawa., Yerizon, dan N. N. Bakar. (2020). Development of an android based for math e-module by using adobe flash professional CS6 for grade X students of senior high school. *Journal of Physics: Conference Series*. 1-7

Irpan, M., & Lutfi, A. F. (2024). Development of learning media using genially to increase student learning interest at SMK Muhammadiyah 2 Kuningan in basic graphic design subjects. *Journal of Social Science, 5*(4), 2720-9938.

Juliana, I., & Sulistyowati, R. (2023). Pengembangan e-modul interaktif berbasis aplikasi book creator mata pelajaran produk kreatif dan kewirausahaan kelas XI BDP SMK PGRI 13 Surabaya. *Jurnal Pendidikan Ekonomi (JUPE)*, 11(3), 328–334. https://doi.org/10.26740/jupe.v11n3.p328-334

Kotsopoulos, K. I., Chourdaki, P., Tsolis, D., Antoniadis, R., Pavlidis, G., & Assimakopoulos, N. (2024). An authoring platform for developing smart apps which elevate cultural heritage experiences: A system dynamics approach in gamification. *Journal of Ambient Intelligence and Humanized Computing, 15*(2), 1679-1695.

Muzakkir, M. A., Pomalato, S. W. D., & Katili, M. R. (2022). Smartphone-based interactive multimedia development using smart apps creator for high school mathematics learning. *Journal of Pedagogical Inventions and Practices, 11*, 26-33.

Ningrum, A. O., & Sulistyowati, R. (2024). Developing wordwall-based learning media for online business subjects for eleventh grade students at SMKN 1 Sooko Mojokerto. *Jurnal Pendidikan Administrasi Perkantoran (JPAP)*, 12(1), 207–216. https://doi.org/10.26740/jpap.v12n1.p207-216

Piaget, J. (1952). *The origins of intelligence in children.* New York: International Universities Press.

Pratama, A. Y., & Mutadi, M. (2021). Development of Mathematics learning media based on android using smart apps creator (SAC). *Jurnal Math Educator Nusantara, 7*(2), 143–152.

Pratama, L. D., Lestari, W., & Anggraini, W. (2023). Developing android-based learning media using smart apps creator: Its impact on students' cognitive retention. International *Journal of Information and Education Technology, 13*(5), 844–851. https://doi.org/10.18178/ijiet.2023.13.5.1872

Puspitasari, J., Juhadi, J., Suyahmo, S., Wijayanto, P. A., & Saadah, N. (2022). Smartphone learning media prototype model based on SAC (Smart Apps Creator) for 4.0 learning. *International Journal of Social Learning (IJSL), 3*(1), 31-47.

Rahma, G., Nurfajriani, N., & Jahro, I. S. (2024). Developing an interactive multimedia innovation based on android using the smart apps creator 3.0 as teaching material for buffered solution course. *KnE Social Sciences*, 229-240.

Ramadhani, S., & Sugianto, A. (2023). Utilization of smart apps creator to improve cognitive learning outcomes in creative products and entrepreneurship subjects. *Jurnal Pendidikan Ekonomi & Bisnis, 11*(1), 32–41.

Riduwan, M. B. (2013). *Skala pengukuran variabel-variabel penelitian*. Alfabeta.

Rukoyah, S., & Bektiningsih, K. (2024). Development of interactive learning media based on smart apps creator to enhance elementary school students' science learning outcomes. *Jurnal Penelitian Pendidikan IPA, 10*(10), 8127-8135.

Sakdiah, H., Islami, F., Muliani, R., Riza, A., & Amam, T. H. (2023). Sosialisasi budaya kerja industri sebagai upaya penguatan kompetensi dasar siswa SMK Negeri 7 Lhokseumawe. *Jurnal Abdimas BSI*, 6(2), 208–217.

Sitanggang, W. Z. B. (2023). Pengembangan media pembelajaran Pendidikan Agama Katolik berbasis SAC (Smart Apps Creator) pada materi manusia makhluk pribadi untuk siswa kelas X SMA/SMK [Doctoral dissertation, STKIP Widya Yuwana Madiun].

Sugiyono. (2019). *Metode penelitian kuantitatif, kualitatif, dan R&D*. Alfabeta.

Tanju, N., Nenohai, J. M*., & Udil, P. A. (2024). Development of Android-based learning media on trigonometry for 10th graders.* Union: Jurnal Ilmiah Pendidikan Matematika, 12(1), 145-159.

El Koshiry, A., & Tony, M. A. A. (2025). Modern Learning Strategies in the Age of Digital Transformation: Future Insights and Practical Challenges. Educational Process: International Journal, 17, e2025313.

Widodo, A.W., Solikhatun I., Raharja, S., Salam, A.A., Wartini, F.S. (2020). A utilization of information technology on education in indonesia (2017-2020): A systematic literature review. Journal of Physycs: Conference Series. DOI: 10.1008/1742-6596/1779/1/012024.

Wiro'i, M., & Sulistyowati, R. (2021). Pengembangan mobile learning berbasis android pada mata pelajaran produk kreatif dan kewirausahaan sekolah menengah kejuruan. *Edukatif: Jurnal Ilmu Pendidikan*, 3(5), 2092–2104. https://doi.org/10.31004/edukatif.v3i5.730

Wu, S. (2024). Application of multimedia technology to innovative vocational education on learning satisfaction in China. *Plos one, 19*(2), e0298861.

Wulandari, C. Y., & Sulistyowati, R. (2022). Pengembangan e-modul interaktif berbasis flip pdf profesional mata pelajaran produk kreatif dan kewirausahaan di sekolah menengah kejuruan. *Edukatif: Jurnal Ilmu Pendidikan*, 4(3), 4882–4889. https://doi.org/10.31004/edukatif.v4i3.3027

Yusri, M., & Sulistyowati, R. (2020). Pengaruh teaching factory six steps pada mata pelajaran produk kreatif dan kewirausahaan terhadap kesiapan kerja siswa kelas XII Di SMKN 1 Surabaya. *Jurnal Pendidikan Tata Niaga (JPTN)*, 8(3), 1–9. https://ejournal.unesa.ac.id/index.php/jptn/article/view/39998