

Development of a Genially-Based Teaching Module Based on the Deep Learning Approach for Basic Vocational Subjects in the Mechatronics Engineering Program at SMKN 1 Cilegon

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ABSTRACT

Abstrak: Learning activities in the Basic Vocational Program subject at SMKN 1 Cilegon are still predominantly conducted through conventional instructional methods, accounting for 84.4% of classroom practices and limiting student's active engagement. This study developed an interactive learning module using the Genially platform integrated with a deep learning approach for the topic of Active and Passive Electronic Components and evaluated its feasibility, practicality, and effectiveness through a Research and Development (R&D) method based on the ADDIE model, consisting of analysis, design, development, implementation, and evaluation stages. The participants were 34 tenth-grade students of Mechatronics Engineering at SMKN 1 Cilegon, with data collected through expert validation instruments, student response questionnaires, and pretest–posttest assessments. The results showed that the module was highly feasible, with validation scores of 71 from media experts ($X \geq 54$) and 79 from material experts ($X \geq 60$), while student responses indicated very high practicality with an average score of 84.5 ($X \geq 72$). In terms of effectiveness, learning outcomes improved significantly, as shown by an increase in the average score from 51.6 on the pretest to 91.2 on the posttest, with an N-Gain value of 0.822 categorized as high, confirming that the developed module is feasible, practical, and effective in enhancing student learning outcomes and supporting student-centered learning in vocational education.

Keywords: Deep Learning, Genially, Digital Teaching Module, Mechatronics Engineering, Vocational Education

ABSTRAK

Abstrak: Pembelajaran Dasar Program Keahlian di SMKN 1 Cilegon masih didominasi oleh metode pembelajaran konvensional dengan persentase sebesar 84,4%, sehingga keterlibatan aktif peserta didik dalam proses pembelajaran belum optimal. Penelitian ini bertujuan untuk mengembangkan modul ajar interaktif berbasis platform Genially dengan pendekatan deep learning pada materi Komponen Elektronika Aktif dan Pasif, serta menganalisis tingkat kelayakan, kepraktisan, dan efektivitas modul yang dikembangkan. Penelitian menggunakan metode Research and Development (R&D) dengan model ADDIE yang meliputi tahap analysis, design, development, implementation, dan evaluation. Subjek

penelitian terdiri atas 34 peserta didik kelas X Teknik Mekatronika SMKN 1 Cilegon. Teknik pengumpulan data dilakukan melalui angket validasi ahli media dan ahli materi, angket respons peserta didik, serta tes hasil belajar berupa pretest dan posttest. Hasil penelitian menunjukkan bahwa modul ajar yang dikembangkan termasuk kategori sangat layak berdasarkan validasi ahli media dengan skor 71 pada rentang kategori ($X \geq 54$) dan validasi ahli materi dengan skor 79 pada rentang kategori ($X \geq 60$). Tingkat kepraktisan modul juga berada pada kategori sangat layak dengan skor respons peserta didik sebesar 84,5 pada rentang kategori ($X \geq 72$). Hasil uji efektivitas menunjukkan adanya peningkatan hasil belajar yang signifikan, ditandai dengan kenaikan nilai rata-rata dari 51,6 pada pretest menjadi 91,2 pada posttest serta perolehan nilai N-Gain sebesar 0,822 yang termasuk kategori tinggi. Dengan demikian, modul ajar interaktif berbasis Genially dengan pendekatan deep learning dinyatakan valid, praktis, dan efektif dalam meningkatkan hasil belajar serta mendukung pembelajaran yang berpusat pada peserta didik pada mata pelajaran Dasar Program Keahlian di SMK.

Kata Kunci: Deep Learning, Genially, Modul Ajar Digital, Pendidikan Vokasi, Teknik Mekatronika.

A. Introduction

Vocational education plays a strategic role in preparing graduates with technical competencies, professional attitudes, and knowledge that align with the continuously evolving demands of the labor market (Lailina & Zahrok, 2020). Vocational High Schools (SMKs) are required to align learning processes with industry needs through strengthening student competencies to ensure workforce readiness (Budiastuti et al., 2021). However, rapid technological development and changing job characteristics demand broader competencies, not only technical skills but also higher-order thinking

skills, creativity, communication, and collaboration abilities (Rama et al., 2023). Therefore, vocational learning must be directed toward supporting the development of 21st-century skills (Rahayu et al., 2025).

The integration of digital technology has significantly transformed educational practices by creating more flexible, interactive, and adaptive learning environments (Japrizal & Irfan, 2021). Learning technologies enable students to access materials anytime without limitations of space and time, thus promoting more independent learning (Mahalasari, 2022). This condition contributes to increased student engagement and

participation in a more effective learning process (Wu, 2024). In this context, digital learning media have become an essential component in improving instructional quality, particularly interactive media that integrate text, visuals, videos, animations, and interactive features to strengthen conceptual understanding (Afifah et al., 2022). In addition, digital media also support learning independence, efficiency, and the development of students' self-regulated learning skills (Utami Maulida, 2022). The use of digital media has also been proven to enhance the effectiveness of the learning process sustainably (Nengsih et al., 2024). Further strengthened by the integration of technology in modern education (Idayanti, 2024).

In vocational education, particularly in Mechatronics Engineering, the use of digital educational media holds high importance due to the interdisciplinary nature of the subject, which includes mechanics, electronics, control systems, and automation. These complex concepts require strong visualization to support student understanding (Liu et al., 2024). The

implementation of the Merdeka Curriculum also emphasizes deep learning approaches oriented toward meaningful understanding rather than memorization (Kemendikdasmen RI, 2025). The deep learning approach encourages students to connect concepts with real-world contexts, engage in reflection, and solve problems analytically (Alya Fitriani, 2025). This learning approach is further strengthened through technological integration that supports students' cognitive, social, and personal development (Mustaghfirin & Zaman, 2025). In addition, technology-based learning also contributes to increasing active student engagement in the learning process (Wu, 2024).

Genially is one of the digital learning platforms that enables the development of interactive media by integrating text, images, videos, animations, quizzes, and hyperlinks into a unified learning system (Putri et al., 2025). This interactive design enhances students' active participation in learning activities (Hermita et al., 2022). Previous studies have shown that Genially-integrated instructional media can enhance student motivation as well as

engagement due to its visually rich and interactive presentation. Nurjannah et al., 2025). Furthermore, it has been proven effective in improving conceptual understanding and classroom engagement (Sitorus & Karo-Karo, 2025).

The results of observation and needs analysis conducted at SMKN 1 Cilegon show that the learning process in the Basic Vocational Subjects continue to be implemented using conventional instructional methods. A total of 84.4% students stated that teachers mostly use lecture-based and one-way instructional methods. Meanwhile, 100% of students expressed interest in interactive learning media. These findings are supported by the availability of Android devices owned by all students and adequate internet infrastructure in the school to support digital-based learning.

Previous research indicates that Genially-based learning media can improve student motivation and learning outcomes (Amaliyah, 2025). However, studies integrating the development of Genially-based modules with a deep learning approach in Basic Vocational Subjects, particularly in Mechatronics, are still very limited. Research related to the

feasibility, practicality, and effectiveness of such learning media is also still insufficiently explored (Zulfah et al., 2023). This indicates a research gap that needs to be addressed through the development of more innovative learning media.

Building upon these issues, the present research is directed toward creating a Genially-supported instructional module aimed at facilitating a deep learning approach within Basic Vocational Subjects at SMKN 1 Cilegon. The study seeks to generate a digital educational product that is feasible, practical, and effective for instructional use in classroom settings. This development employs a Research and Development (R&D) approach utilizing the ADDIE framework, which encompasses five sequential phases: Analysis, Design, Development, Implementation, and Evaluation.

B. Methods

This research applies a Research and Development (R&D) approach to create an interactive Genially-based teaching module focusing on Active and Passive Electronic Components within the Basic Vocational Subjects at vocational high schools. This

approach was chosen because it extends beyond product creation by incorporating systematic testing of the product's quality, including expert validation and user trials, prior to its application in the classroom learning process (Sugiono, 2023). The developed product is designed to support deep learning by presenting interactive, visual, and easily accessible learning materials through digital devices, enabling students to understand concepts more effectively develop deeper understanding through more purposeful and autonomous learning experiences.

This study adopts the ADDIE development model, which is organized into five sequential phases: Analysis, Design, Development, Implementation, and Evaluation. The model was selected due to its clear structure, flexibility, and comprehensive framework, making it highly appropriate for developing technology-enhanced learning media in vocational education settings. In addition, it provides a systematic process that supports the identification of learning needs, the design of instructional materials, the production and implementation of the learning product, and the evaluation of its

effectiveness in achieving learning objectives and improving student outcomes in a structured and continuous manner (Azizah & Syarifah, 2021). Furthermore, the evaluation stage ensures continuous improvement of the learning media based on expert validation and student feedback, making the product more adaptive, relevant, and aligned with instructional objectives. This iterative process reinforces the overall quality of the developed learning media and guarantees its appropriateness for vocational learning environments, particularly in the context of Basic Vocational Subjects. Ongoing improvement throughout each phase of the ADDIE model supports instructional coherence and the long-term applicability of the learning product in classroom-based implementation. The research flow of the ADDIE model is presented in Figure 1.

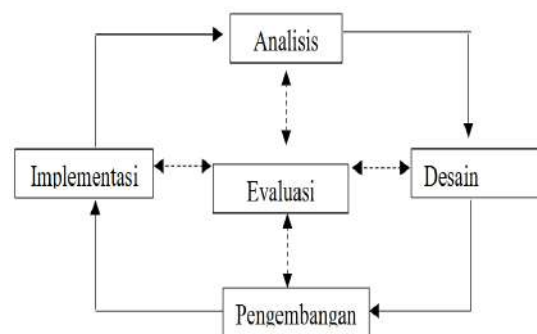


Figure 1. ADDIE Development Flow

The research was carried out at SMKN 1 Cilegon, with tenth-grade students of the Mechatronics Engineering program serving as the research subjects. This study developed an interactive instructional module created using Genially, which focused on the topic of active and passive electronic components. Data were gathered through several methods, namely observation, interviews, documentation, and questionnaires. Observation and interviews were applied to gain detailed information about learning conditions, students' needs, and the challenges encountered by teachers during the teaching and learning process. Documentation was utilized to collect supporting information related to the curriculum, teaching instruments, as well as the condition of learning facilities and infrastructure. Meanwhile, questionnaires were administered to obtain validation data from media experts and subject matter experts regarding the developed product, in order to assess its feasibility and suitability for use in classroom learning activities.

1. Analysis Stage

At the analysis stage, an initial investigation is carried out to identify

existing learning conditions and the requirements for developing a Genially-based e-module. This stage emphasizes the mapping of teachers' and students' learning resources, the utilization of digital media, and students' comprehension of the topic of Active and Passive Electronic Components. A needs analysis is conducted to determine the current state of instructional practices, the availability of learning media, and learners' needs for interactive instructional resources. It also includes the analysis of student characteristics to identify prior knowledge, learning interest, motivation, and digital literacy skills, as well as curriculum analysis to ensure alignment with the Merdeka Curriculum Phase E for the Mechatronics Engineering program. In addition, the analysis of learning materials and the learning environment is conducted to evaluate the availability of supporting resources and facilities for implementing digital-based learning (Pribadi, 2020).

2. Design Stage

The design stage aims to produce an initial blueprint of the developed product. At this stage, the module structure, learning flow, storyboard,

assessment instruments, and media interface design are developed. The learning materials are developed and arranged based on the expected learning outcomes and instructional objectives established in Phase E of the vocational education framework for the Mechatronics Engineering program. In addition, various learning activities, visual illustrations, instructional videos, and evaluation exercises are designed to encourage students to understand the concepts more deeply. The module design also incorporates readability considerations, navigation is facilitated for users, and user experience is prioritized to ensure optimal accessibility through smartphone devices.

3. Development Stage

During the development stage, the primary objective is to design and produce a creating Genially-based interactive e-module for Basic Vocational Subjects, specifically on Active and Passive Components, which includes the introduction, functions, characteristics, symbols, and simple application examples in electrical circuits. At this stage, the module is designed interactively by incorporating animations, illustrations,

and quizzes to enhance students' understanding and learning motivation, while also ensuring that all features, navigation, and display functions operate properly through a system check. Furthermore, the viability of the developed tool is systematically assessed via validation from both domain specialists and media professionals. This evaluation encompasses critical dimensions such as content validity, material comprehensiveness, visual design quality, and user interactivity. The resulting quantitative scores and qualitative feedback from these experts establish the primary framework for iterative adjustments, ensuring the module meets the necessary standards prior to its implementation with students.

4. Implementation Stage

The execution phase is conducted the instruction utilizing the Genially platform module has been declared feasible by both media experts and subject matter experts, and has been refined based on revision results. The module is subsequently applied in the teaching and learning process as the primary learning material covering the topic of Active and Passive Components within the Basic

Vocational Subjects course. Students access the learning materials via smartphones connected to the Genially website, then study the content and complete interactive quizzes as a form of practice and learning evaluation. The trial is conducted in one class, namely X Mechatronics 1 at SMKN 1 Cilegon, to determine the level of usefulness and effectiveness of the module within the teaching and learning activities.

5. Evaluation Stage

The evaluation phase is carried out to measure the quality of the product based on the outcomes of expert validation and feedback from students. This phase is intended to identify both the advantages and limitations of the developed module so that necessary improvements and revisions can be applied. The findings from the evaluation serve as a foundation for establishing the degree of suitability of the Genially-based instructional module for implementation in the teaching and learning process.

C. Results and Discussion

The findings of this research describe the creation of a teaching module for Basic Vocational Subjects

using Genially with a deep learning approach in the Mechatronics Engineering specialization at SMKN 1 Cilegon. The development process was carried out systematically by referring to the ADDIE model (Analyze, Design, Develop, Implement, and Evaluate) to produce a product that is feasible and aligned with learning needs.

1. Analysis

The analysis phase was carried out to determine the learning requirements in Basic Vocational Subjects under the Mechatronics Engineering specialization at SMKN 1 Cilegon. Information was gathered through classroom observation, interviews with teachers, and questionnaires distributed to students. The results of the analysis indicated that the teaching and learning process was still largely dependent on traditional instructional approaches, relatively less engaging, and had not adequately facilitated a thorough understanding of key concepts. The analysis revealed that the learning process was still dominated by conventional teaching methods, less interactive, and had not fully supported deep conceptual understanding. The findings showed

that 84.4% of students stated that learning was still conventional, 78.1% considered the learning materials less engaging and interactive, 71.9% felt that learning emphasized memorization rather than understanding, and 81.3% reported low active participation within the teaching and learning activities.

The examination of learner profiles reveals that all students (100%) prefer interactive learning media that can be operated directly, while 77.4% find it easier to understand the material through images, animations, and simulations. From the aspect of learning materials, students require more innovative digital learning media, with 68.8% stating the need for digital teaching modules to support their understanding of the subject matter.

The curriculum analysis was conducted by examining the Competency Outcomes (CP), Instructional Goals (TP), and Learning Progression (ATP) for the topic of active and passive electronic components. The results indicate that the developed material must support students' abilities to identify electronic components, understand basic electrical laws, and interpret

component values based on standard codes and symbols.

Based on the needs and curriculum analysis, this study develops a Genially-based teaching module for Basic Vocational Subjects with a deep learning approach in the Mechatronics Engineering program at SMKN 1 Cilegon. The development is driven by several key factors, including the dominance of conventional learning media such as textbooks, whiteboards, and PowerPoint that are not yet optimally used interactively. In addition, 68.8% of students expressed the need for digital teaching modules to better understand learning materials. Although all students (100%) already own Android devices, their use in learning activities remains limited and mostly non-academic. In addition, the module is designed in accordance with the Competency Outcomes (CP), Instructional Goals (TP), and Learning Progression (ATP) to guarantee its suitability with curriculum standards and the learning needs of students.

In addition, the learning environment analysis shows that the school has facilities that support digital learning, indicated by the availability of internet access (Wi-Fi) and Android

devices owned by all students (100%). Based on these analysis results, a Genially-based teaching module with a deep learning approach was developed as an alternative learning medium that is more interactive, aligned with students' characteristics, and in accordance with curriculum demands.

2. Design

The design phase is the process of constructing a preliminary framework of the product based on the outcomes of the needs assessment. The activities carried out during this phase encompass developing a storyboard, selecting appropriate learning content, preparing assessment instruments, and gathering supporting visual materials that will be incorporated in the development of the Genially-based instructional module.

The storyboard was developed as a guideline for the product development process to illustrate the flow of content delivery, navigation structure, and forms of interactivity to be applied in the teaching module. Furthermore, the learning materials were determined with a focus on active and passive electronic components, in line with the

competency outcomes of the Basic Vocational Subjects course. These materials were selected because they represent fundamental competencies that students must master as a foundation for studying more advanced electronic topics.

During this phase, assessment instruments were also constructed in the form of 20 multiple-choice questions accompanied by answer keys, which were utilized to evaluate the degree of students' comprehension of the learning content. The preparation of these instruments was grounded in the predetermined learning indicators and took into account aspects of validity and reliability in order to guarantee the quality of the assessment tools.

In addition, various supporting visual elements were collected, such as backgrounds, fonts, icons, images, and animations, which were tailored to the nature of the learning content and the requirements of the students. The selection of these visual elements was intended to produce an engaging and interactive module design that could efficiently support the teaching and learning process. The outcome of the design phase is a comprehensive instructional module framework that

functions as a guide for the subsequent product development stage.

3. Development

The development phase is executed by converting the design plan into a concrete product in the form of a Genially-based instructional module incorporating a deep learning approach for Basic Vocational Subjects in the Mechatronics Engineering specialization. This process adheres to the storyboard that was previously constructed, beginning with the establishment of the main page as the central navigation that links various menus within the instructional module, as illustrated in the figure below.

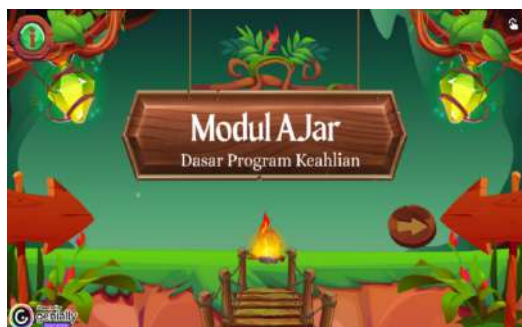


Figure 2. Main Page Display



Figure 3. Main Menu Display



Figure 4. Introduction Menu Display



Figure 5. Material List Menu Display



Figure 6. Teaching Module Menu



Figure 7. Profile Menu Display



Figure 8. LKPD Menu Display



Figure 9. Quiz Menu Display

In the developmental research of a Genially-based instructional module incorporating a deep learning approach within the Mechatronics Engineering specialization, a suitability evaluation covering both media and content aspects was performed. This suitability evaluation was intended to establish the degree of appropriateness of the developed instructional module so that it can be utilized effectively and correctly in classroom instruction. The assessment was undertaken by media specialists and subject matter experts who have adequate competencies and substantial experience in their respective domains.

As part of the research and development process of a Genially-based learning module that applies a deep learning approach in the Mechatronics Engineering specialization, a comprehensive feasibility assessment encompassing both the media and content dimensions was thoroughly conducted. The primary purpose of this feasibility assessment was to measure and establish the extent to which the developed learning module meets the required standards of appropriateness, so that it may be implemented in an effective, accurate, and meaningful manner during classroom-based instructional activities. The evaluation process was entrusted to a carefully selected panel of highly qualified media technology experts and subject matter specialists, all of whom are thoroughly equipped with relevant professional competencies and possess considerable depth of experience and extensive expertise within their respective fields of knowledge, thereby ensuring that the entire assessment process is conducted with the highest possible standards of objectivity, accuracy, credibility, and professional integrity.

Table 1. Media Feasibility

Aspects	Validators 1	Validators 2	Validators 3
1. Content/material			
2. Instructional function	72	72	69
3. Media display			
Description	Very Feasible	Very Feasible	Very Feasible
Maximum Score	72		

The outcomes of the evaluation conducted by media experts reveal that the Genially-based instructional module developed for Basic Vocational Subjects successfully achieved a total score of 71, which is positioned within the scoring range of $X \geq 54$ and is therefore classified under the category of 'Very Feasible.' These evaluation outcomes demonstrate that the developed module has satisfactorily fulfilled all the required criteria, particularly in terms of its visual presentation, user-friendliness, level of interactivity, consistency of design layout, as well as the effective integration of media features in alignment with the overall learning needs and objectives. The high score obtained reflects the quality and appropriateness of the module as an instructional medium that is not only visually appealing but also functionally supportive of an engaging and effective learning experience for students in the Mechatronics Engineering specialization. This

finding is in line with Afifah et al. (2022), which stated that Genially-based interactive learning media received a "very feasible" validation result from media experts. The utilization of Genially is regarded as highly effective in delivering learning materials in an appealing and interactive manner, thus facilitating a student-centered learning process.

Table 2. Content Feasibility

Aspects	Validators 1	Validators 2	Validators 3
1. Content feasibility			
2. Content accuracy	80	80	77
3. Presentation of content			
Description	Very Feasible	Very Feasible	Very Feasible
Maximum Score	80		

The outcomes of the subject matter expert validation conducted on the developed Genially-based instructional module yielded an average assessment score of 79. The score conversion indicates that it falls within the range of $X \geq 60$, which is categorized as Level 1, "Very Feasible." The study by Fadilah, (2022), also found that Genially-based learning media has a very high level of validity and is considered appropriate for use in the learning process. The findings derived from the subject matter expert validation carried out on the Genially-based instructional

module that was developed produced an overall average evaluation score of 79.

4. Implementation

The application of the Genially-based instructional module was executed after the product was officially determined to be suitable and appropriate based on the validation outcomes provided by both media and subject matter experts. The implementation was conducted in May 2026 with tenth-grade students of Mechatronics Engineering at SMKN 1 Cilegon by utilizing digital devices to access the module through provided links and QR codes. Before the learning process began, students were given guidance on how to use the module and its available features. Subsequently, students studied the materials, completed worksheets (LKPD), utilized learning simulations, and worked on integrated evaluation activities within the module. The outcomes of the implementation revealed that students were capable of utilizing the module autonomously and actively throughout the learning process. These findings demonstrate that the Genially-based instructional module possesses a satisfactory degree of practicality and is capable of

fostering student participation and engagement in learning activities in alignment with the fundamental principles of deep learning approach.

Upon the completion of the learning implementation, students were requested to complete a questionnaire aimed at evaluating the Genially-based interactive instructional module that had been utilized during the learning process. The data obtained from this evaluation were thoroughly analyzed to establish the degree of practicality as well as the level of acceptance among students toward the developed learning media. The findings of the students' assessment are comprehensively presented in Table 3.

Table 3. Students' Assessment

Total Respondents	34
Total Items	24
Maximum Total Score	96
Total Score	2.873
Average Score	84,5

As shown in Table 3, the evaluation of the Genially-based interactive instructional module in Basic Vocational Subjects by students produced an average score of 84.5, which is included in the range of $X \geq 72$ and is classified as 'Very Feasible.' These outcomes suggest that the learning media that has been

developed holds a remarkably high standard of practicality and is well received by students. The encouraging responses are evident in students' appraisals of the visually engaging media design, straightforward usability, well-structured content presentation, and dynamic features that stimulate student involvement throughout the instructional process. These results reveal that the Genially-based teaching module is able to cultivate a more vibrant and participative learning atmosphere. This study is consistent with previous research stating that Genially-based learning media received very positive student responses and is categorized as highly practical for classroom use Fadilah (2022), and is also able to increase students' interest, motivation, and engagement during the learning process (Nurjannah et al., 2025).

The effectiveness of the Genially-based instructional module was evaluated through the administration of both a pretest and a posttest to the students. The posttest was administered upon the completion of the learning process in which students utilized the instructional module and responded to 20 multiple-choice

questions that were embedded within the media. Subsequently, the pretest and posttest data were examined using the N-Gain index in order to measure the degree of improvement in students' learning outcomes following the utilization of the developed instructional module. The findings of the pretest and posttest evaluations are systematically presented in table 4.

Table 4. Pretest and Posttest Results

Number of Students	Maximum Score	Average Pretest Score	Average Posttest Score
34	100	51,6	91,2

The outcomes of the pretest and posttest reveal that the application of the Genially-based instructional module is capable of significantly enhancing students' learning achievements in Basic Vocational Subjects. This improvement is demonstrated by the average pretest score of 51.6, which subsequently rose to an average posttest score of 91.2 among 34 students. Based on the N-Gain analysis, a score of 0.822 was obtained, which falls under the category of very high, affirming that the Genially-based learning media proves to be highly effective in supporting the learning process. The notable improvement in learning outcomes is attributed to the

interactive delivery of instructional materials, visually appealing design elements, and a range of learning features that considerably boost student engagement and motivation throughout the learning activities. This finding is consistent with previous studies by (Nurjannah et al., 2025) and (Zulaichah, 2025), which state that Genially-based learning media is effective in improving students' learning outcomes, motivation, and understanding by creating more interactive, engaging, meaningful learning and encouraging active student participation during the learning process.

5. Evaluation

During this phase, a thorough evaluation was carried out on the developed Genially-based interactive instructional module to assess its level of suitability and effectiveness within the learning process. The suitability of the module was determined through a validation process involving media experts and subject matter experts by means of structured questionnaires, yielding a score of 71 for media validation and 79 for content validation, both of which were classified under the category of 'very feasible,' signifying that the module

has successfully fulfilled all the necessary criteria for implementation in the learning process. In addition, the effectiveness of the module was measured through the analysis of pretest and posttest scores obtained after students engaged with the module, whereby the average pretest score of 51.6 showed a substantial increase to 91.2 in the posttest. The N-Gain analysis generated a score of 0.822, which is categorized as high, demonstrating that the module is genuinely effective in elevating student learning outcomes. Drawing from these comprehensive findings, the Genially-based interactive instructional module is firmly regarded as both highly suitable and effective for utilization in Basic Vocational Subjects learning activities.

E. Conclusion

This research has successfully produced an interactive instructional module based on the Genially platform that incorporates a deep learning approach, focusing on the topic of Active and Passive Electronic Components at SMKN 1 Cilegon. The outcomes of the validation process confirmed that the developed module demonstrates a very high degree of suitability with regard to both its media presentation and content quality. The classroom implementation

demonstrated that the module is highly practical, enabling students to engage actively and independently through mobile devices, while also significantly improving learning outcomes, as shown by a high N-Gain value. Overall, the integration of the Genially platform and the deep learning approach has proven to be an effective instructional innovation in shifting conventional teaching methods toward student-centered vocational learning, while simultaneously fostering the attainment of 21st-century skills and competencies within the Mechatronics Engineering specialization.

REFERENCES

- Amaliyah, N., Joko, J., Rijanto, T., & Fransisca, Y. (2025). Pengaruh problem based learning berbantuan Genially terhadap hasil belajar peserta didik SMK. *Jurnal Pendidikan Teknik Elektro*, 14(1), 45–53.
- Azizah, N., & Syarifah. (2021). Desain Pembelajaran ADDIE (Analysis, Design, Development, Implementation, and Evaluation) E-Learning Pada Materi Sejarah Kebudayaan Islam. *Jurnal Pendidikan Islam*, 12(2), 109–120.
<https://doi.org/10.22236/jpi.v12i2.7934>
- Budiastuti, P., Soenarto, S., Muchlas, M., & Ramndani, H. W. (2021). Analisis tujuan pembelajaran dengan kompetensi dasar pada rencana pelaksanaan pembelajaran dasar listrik dan elektronika di sekolah menengah kejuruan. *Jurnal Edukasi Elektro*, 5(1), 39–48.
<https://journal.uny.ac.id/index.php/jee>
- Fadilah, A. N. (2022). Pengembangan media pembelajaran berbantuan genially pada mata pelajaran korespondensi untuk meningkatkan hasil belajar peserta didik. Universitas Negeri Malang.
- Hermita, N., Putra, Z. H., Alim, J. A., Wijaya, T. T., Anggoro, S., & Diniya, D. (2022). Elementary Teachers' Perceptions on Genially Learning Media Using Item Response Theory (IRT). *Indonesian Journal on Learning and Advanced Education (IJOLAE)*, 1–20.
- Atifah, N., Kurniawan, O., & Noviana, E. (2022). Pengembangan Media Pembelajaran Interaktif Pada Pembelajaran Bahasa Indonesia Kelas Iii Sekolah Dasar. *Jurnal Kiprah Pendidikan*, 1(1), 33–42.
<https://doi.org/10.33578/kpd.v1i1.24>
- Alya Fitriani, S. (2025). Analisis Literatur: Pendekatan Pembelajaran Deep Learning Dalam Pendidikan. *Jurnal Ilmiah Nusantara (JINU)*, 2(1), 51–57.
<https://doi.org/10.61722/jinu.v2i3.4357>

- <https://doi.org/10.23917/ijolae.v4i2.14757>
- Japrizal, J., & Irfan, D. (2021). Pengaruh Penggunaan Media Pembelajaran Berbasis Google Sites Terhadap Hasil Belajar Siswa Pada Masa Covid-19 di SMK Negeri 6 Bungo. JAVIT: Jurnal Vokasi Informatika. <https://doi.org/10.24036/javit.v1i3.33>
- Kemendikdasmen RI. (2025). Pembelajaran Mendalam Menuju Pendidikan Bermutu Untuk Semua.
- Lailina, A., & Zahrok, N. (2020). Implementasi Sistem Penjaminan Mutu Internal (SPMI) di Sekolah Menengah Kejuruan (SMK). Jurnal Akuntabilitas Manajemen Pendidikan, 8(2), 196–204. <https://doi.org/10.21831/jamp.v8i1.32867>
- Liu, Y., Zhan, Q., & Zhao, W. (2024). A systematic review of VR/AR applications in vocational education: models, affects, and performances. Interactive Learning Environments, 32(10), 6375–6392. <https://doi.org/10.1080/10494820.2023.2263043>
- Mahalasari. (2022). Pemanfaatan Google Site dalam Pembelajaran untuk Meningkatkan. In SALIMIYA: Jurnal Studi Ilmu Keagamaan Islam (Vol. 3, Number 3). <https://ejournal.iaifa.ac.id/index.php/salimiya>
- Mustaghfirin, U. A., & Zaman, B. (2025). Tinjauan Pendekatan Pembelajaran Mendalam Kemdikdasmen Perspektif Pendidikan Islam. Journal of Instructional and Development Researches, 5(1), 75–85. <https://doi.org/10.53621/jider.v5i1.476>
- Nengsih, D., Febrina, W., Maifalinda, M., Junaidi, J., Darmansyah, D., & Demina, D. (2024). PENGEMBANGAN MODUL AJAR KURIKULUM MERDEKA. Diklat Review: Jurnal Manajemen Pendidikan Dan Pelatihan, 8(1), 150–158. <https://doi.org/10.35446/diklatreview.v8i1.1738>
- Nurjannah, N., Ndari, N., Awaludin, A., & Fizen, F. (2025). Pengembangan Media Pembelajaran Berbasis Genially untuk Meningkatkan Minat Belajar Sejarah Siswa di SMAN 2 Woja. Jurnal Pendidikan Dan Pembelajaran Indonesia (JPPI), 5(1), 290–298. <https://doi.org/10.53299/jppi.v5i1.1071>
- Pribadi, B. A. (2020). Desain dan Pengembangan Program Pelatihan Berbasis Kompetensi: Implementasi Model ADDIE. (Jakarta: Kencana).
- Putri, I. M., Mulyawati, Y., & Zen, D. S. (2025). Pengembangan Media Pembelajaran Interaktif Menggunakan Genially Pada Mata Pelajaran Ilmu

- Pengetahuan Alam Dan Sosial. Jurnal Ilmiah Pendidikan Dasar, 10, 231–248.
<https://doi.org/10.23969/jp.v10i01.23383>
- Rahayu, C., Setiani, W. R., Yulindra, D., & Azzahra, L. (2025). Pendidikan Matematika Realistik Indonesia dalam Pembelajaran Mendalam (Deep Learning): Tinjauan Literatur. Jurnal Pendidikan Matematika Universitas Lampung, 13(1), 9–25.
<https://doi.org/10.23960/mtk/v13i1.pp9-25>
- Rama, A., Ambiyar, A., Rizal, F., Jalinus, N., Waskito, W., & Wulansari, R. E. (2023). Konsep model evaluasi context, input, process dan product (CIPP) di sekolah menengah kejuruan. JRTI (Jurnal Riset Tindakan Indonesia), 8(1), 82–86.
<https://doi.org/10.29210/30032976000>
- Sitorus, S. F., & Karo-Karo S, I. R. (2025). The Effect of Genially-Based Interactive Media on Students' Understanding of Mathematical Concepts. Journal of General Education and Humanities, 4(4), 1853–1865.
<https://doi.org/10.58421/gehu.v4i4.757>
- Sugiono. (2023). Metode Penelitian Kuantitatif, Kualitatif, Dan R&D.
www.cvalfabeta.com
- Utami Maulida. (2022). Pengembangan Modul Ajar Berbasis Kurikulum Merdeka. In Agustus (Vol. 5, Number 2).
<https://stai-binamadani.e-journal.id/Tarbawi>.
DOI:10.51476/tarbawi.v5i2.392
- Wu, X.-Y. (2024). Exploring the effects of digital technology on deep learning: a meta-analysis. Education and Information Technologies, 29(1), 425–458.
<https://doi.org/10.1007/s10639-023-12307-1>
- Zulaichah, L., Pristiani, R., & Suciptaningsih, O. A. (2025). Inovasi bahan ajar berbasis Genially untuk meningkatkan motivasi dan pemahaman siswa SD dalam pembelajaran ekosistem: Studi pengembangan bahan ajar IPAS Kelas III SDN Percobaan 2 Kota Malang. Jurnal Ilmiah Pendidikan Dasar, 10(02).
<https://doi.org/10.23969/jp.v10i02.24989>
- Zulfah, N. L., Rusimamto, P. W., Suprianto, B., & Fransisca, Y. (2023). Pengembangan Media Pembelajaran Interaktif Berbantuan Genially Pada Mata Pelajaran Dasar-Dasar Teknik Ketenagalistrikan Kelas X Titl Di Smk Negeri 7 Surabaya. Jurnal Pendidikan Teknik Elektro, 12(03), 205–212.
<https://doi.org/10.26740/jpte.v12n03.p205-212>
- Zulfi Idayanti, Muh. A. S. (2024). E-Modul sebagai Bahan Ajar Mandiri untuk Meningkatkan Hasil Belajar Peserta Didik. Jurnal

Penelitian Dan Pengembangan
Pendidikan, 8(1), 127–133.

<https://doi.org/10.23887/jppp.v8i1.61283>