Journal of Research in Instructional
e-ISSN: 2776-222X
Vol. 5(1) 2025, pp. 75 – 89
https://doi.org/10.30862/jri.v5i1.567

Development of a smart articulate storyline using teaching at the right level based learning tools to improve teaching skills

Aldina Eka Andriani*, Sri Sulistyorini, Dewi Nilam Tyas

Universitas Negeri Semarang, Indonesia

Submitted: 28-11-2024

Accepted: 08-01-2025

Published: 10-01-2025

Abstract: Developing high-quality lesson plan requires a meticulous and systematic process, considering several key aspects. This study aims to describe the development design, assess the feasibility, and evaluate the effectiveness of smart class articulate storyline through the development of lesson plan based on teaching at the right level (TaRL) to improve the teaching skills of pre-service teacher professional education (PPG Prajabatan) students in the elementary school teacher education study program within the context of differentiated learning. This research used a research and development (R&D) approach, using the ADDIE model. The strength of this research lies in developing materials focusing on basic teaching skills through the TaRL approach, complemented by instructional practice videos and lesson plan that could be accessed anytime. The study results indicate that the smart class articulate storyline is categorized as highly feasible, with evaluations from media and content experts each scoring 95% in the "highly feasible" category. Additionally, the smart class articulate storyline, developed through TaRL-based lesson plan, is found to be effective based on pretest and posttest results, indicating a significant improvement in the ability to understand basic teaching skills.

Keywords: Artificial intelligence, lesson plan, smart class, teaching skill

Abstrak: Penyusunan modul ajar berkualitas memerlukan proses yang cermat dan sistematis, dengan memperhatikan beberapa aspek penting. Tujuan penelitian ini yakni untuk mendeskripsikan desain pengembangan, menguji kelayakan dan menguji keefektifan *smart class articulate storyline* melalui penyusunan modul ajar berbasis *teaching at the right level* (TaRL) untuk meningkatkan *teaching skill* mahasiswa pendidikan profesi guru prajabatan bidang studi pendidikan guru sekolah dasar pada pembelajaran berdiferensiasi. Jenis penelitian ini adalah Research and Development (R&D) dengan menggunakan model ADDIE. Keunggulan penelitian ini adalah pengembangan materi tentang keterampilan dasar mengajar dengan pendekatan TaRL yang dilengkapi dengan video praktik pembelajaran serta modul ajar yang dapat diakses setiap waktu. Hasil penelitian menunjukkan kelayakan smart class articulate storyline dari ahli media dan ahli materi masing-masing dengan skor 95% dalam kategori sangat layak. Smart class articulate storyline melalui modul ajar berbasis TaRL dinyatakan efektif berdasarkan hasil pretest dan posttest dengan mengukur kemampuan memahami keterampilan dasar mengajar yaitu mengalami perubahan secara signifikan dalam peningkatannya.

Kata kunci: Kecerdasan buatan, rencana pembelajaran, kelas pintar, keterampilan mengajar

*Corresponding author: aldinaekaandriani@mail.unnes.ac.id

INTRODUCTION

The transformation of education is done through the use of innovative, student-centered learning models, differentiated instruction, the implementation of the Pancasila student profile, TPACK, and the 4Cs (communication, collaboration, critical thinking, and creative thinking) in the development of lesson plan for the *Merdeka* curriculum. These modules are designed based on the backward design model, where the learning process begins with defining the targeted competencies in the form of learning outcomes and objectives (Mctighe & Wiggins, 2014). Students are regarded as unique individuals with

diverse learning needs (Tomlinson, 2014). Therefore, teachers need to prepare by developing lesson plan. Teachers are allowed to modify lesson plan but are encouraged to adapt them to the learning needs and characteristics of the students (Hama & Amin, 2025; Kemendikbud, 2022)

The development of high-quality lesson plan requires a careful and systematic process, considering several essential aspects. According to the instructional guidelines, three main components must be included in a teaching module: learning objectives, learning activities, and learning assessments (Mctighe & Wiggins, 2014). Lesson plan in the *Merdeka* curriculum feature several distinctive elements, including phases, learning outcomes, character integration through the dimensions of the Pancasila student profile, diagnostic assessments conducted before the learning, differentiated learning, as well as test and non-test assessments, in addition to the general components of standard lesson plan (Fausta et al., 2024; Maarif, 2022; Prihantini & Khoirunnisa, 2023). When preparing lesson plan, teachers must begin by analyzing the learning outcomes and formulating them into specific learning objectives. In the *Merdeka* curriculum, learning outcomes consist of two main elements, which are competencies and learning materials (Maulida, 2022). Subsequently, teachers divide the desired learning outcomes into a set of specific learning objetives. These objectives are then organized into a logical and sequential order (Akilla et al., 2024).

It was identified that 40% of Pre-service Teacher Professional Education (PPG Prajabatan) students have not demonstrated adequate understanding in developing and presenting the conceptual content of lesson plan. Furthermore, they have not been able to effectively modify lesson plan in alignment with learning objectives, students' needs, and characteristics, as illustrated in Figure 1. This is concerning, as lesson plan are essential instructional tools that can intervene in the learning process to achieve better outcomes (Larawan, 2013). The elements of a lesson plan include of the author's identity, initial competencies, Pancasila student profile, facilities and infrastructure, target learners, the applied learning model, learning objectives, meaningful understanding, guiding questions, learning activities (introduction, main activities, and closing), assessments (diagnostic, formative, and summative), learning reflections for students and educators, student worksheets, textbooks, glossaries, and references.

Fig. 1. The process of developing lesson plan by students of *PPG Prajabatan*

The development of lesson plan, as shown in Figure 1, indicates that students have not yet applied the syntax of innovative learning models. Group formations are not based on the learners' levels of knowledge and understanding, and there has been no monitoring provided by the teacher for each group. This has resulted in low-quality classroom learning, particularly concerning the implementation of teaching practices in assigned field schools. Students of *PPG Prajabatan* have not yet optimally implemented the eight basic teaching skills, which include opening and closing skills, explaining skills, questioning skills, varying teaching techniques, reinforcement skills, classroom management skills, guiding small group discussions, and teaching skills for small groups and individuals. This is evident when *PPG Prajabatan* students begin their lessons. They have not yet implemented variations in teaching stimuli, teaching styles, learning media, or interaction patterns. Students tend to position themselves continuously at the front of the class, as shown in Figure 2. However, to create an enjoyable learning environment, it is essential to have teachers who are competent, professional, and creative, ensuring that learning is engaging, remains conducive, and effectively facilitates student learning (Christian-Ike et al., 2024; Jaya, 2017).

Fig. 2. The condition of elementary school students and *PPG Prajabatan* students as teachers during the learning process

PPG Prajabatan students have also not yet implemented variation skills in teaching, such as alternating between concrete and digital learning media, varying interaction patterns and student activities, and paying attention to students' seating positions (which is related to the development of their spinal structure). Therefore, it remains essential for PPG students to develop their ability to create lesson plan to improve the quality of learning and improve basic teaching skills. One approach is through the implementation of the Teaching at the Right Level (TaRL) approach to improve the teaching skills of *PPG Prajabatan* students in the Elementary School Teacher Education Study Program, presented in the form of a smart class using articulate storyline. The TaRL concept is utilized to address differences in learning abilities and provide instruction that meets the needs of learners (Janah, 2023).

The TaRL approach is a personalized learning strategy that tailors instruction to meet the unique academic needs, abilities, and goals of each student. This approach also offers flexibility in teaching according to the learners' capacities. It is designed by aligning learning outcomes with the ability levels and needs of students (Akker et al., 2013). Lesson plan

must be developed to facilitate student learning and personalized to the learning characteristics of three levels of knowledge and understanding, which are the highly proficient group, the proficient group, and the needs guidance group, determined through cognitive and non-cognitive diagnostic assessments. Diagnostic assessments are used to identify the characteristics, needs, and abilities of learners, allowing teachers to understand students' initial abilities and developmental progress (Suharyani et al., 2023).

Smart class articulate storyline is a digital platform that utilizes artificial intelligence (AI), such as articulate storyline-3, which is then converted using website 2 APK builder to create an application. This application is designed to assist *PPG Prajabatan* students in developing lesson plan to improve and support their skills and roles as educators. It aids in analyzing the alignment of lesson plan with learning objectives, students' needs, and their characteristics. In addition, smart class articulate storyline-3 is designed to support the improvement of teaching skills among *PPG Prajabatan* students through the provision of materials on the TaRL approach. It includes explanations and video examples of teaching practices related to the eight basic teaching skills, which consist of opening and closing lessons, explaining, questioning, varying learning activities, teaching small groups or individuals, classroom management, guiding small group discussions, and providing reinforcement. These resources allow *PPG Prajabatan* students to gain insights into the development of lesson plan and the selection of appropriate and innovative media, methods, and learning models. Furthermore, articulate storyline-3 is equipped with features such as animations, text, images, videos, and more (Pratiwi et al., 2022).

With the help of articulate storyline-3 technology, teachers can integrate technology by introducing innovations in the educational domain, transforming it into an alternative and engaging method of presenting modern teaching materials using AI (Akker et al., 2013). This positively impacts the teaching skills of teacher professional education students. According to Fitriati et al. (2021), AI is an artificial intelligence designed to think like humans, enabling it to perform various analyses. This capability is leveraged by students, as their tendency to struggle with lengthy analytical processes becomes an opportunity to utilize AI, which is highly appealing. One example is the use of ChatGPT to analyze content mapping and interactive quiz applications as interactive edugames.

Utilizing ChatGPT as a resource for creating lesson plans has the potential to enhance efficiency, innovation, and precision. ChatGPT, through its capacity to create text automatically and interactively, can act as a virtual companion for students in investigating concepts, developing arguments, and writing paragraphs more efficiently (Wahyudi, 2023). Additionally, the use of ChatGPT can result in high-quality lesson plan, thereby positively affecting the improvement of teaching skills in their respective field schools. This is further supported by the use of interactive quizzes designed as engaging edugames, such as quizizz, quizizz paper mode, and wordwall.net, which function as automatic assessment tools for creating cognitive and non-cognitive diagnostic assessments, as well as formative and summative assessments. Additionally, the use of applications like nearpod and canva for designing interactive learning media enhances the development of basic teaching skills for educators.

Fundamental teaching skills are highly specific instructional techniques that educators must master to deliver instruction effectively, efficiently, and professionally (Wahida et al., 2022). According to Sugihartini et al. (2020), there are eight basic teaching

skills that a teacher must master: (1) questioning, (2) providing reinforcement, (3) varying instruction, (4) explaining, (5) opening and closing lessons, (6) guiding small group discussions, (7) classroom management, and (8) teaching small groups and individuals.

Based on the context of these issues and the identified learning needs in this technological era, the purpose of this study is to describe the development design, evaluate the feasibility, and assess the effectiveness of smart class articulate storyline using TaRL-based learning tools to improve the teaching skills of *PPG Prajabatan* students in the Elementary School Teacher Education study program within the context of differentiated learning.

METHOD

This study used a Research and Development (R&D) approach using the ADDIE development model, developed by Dick and Carey (1996) to design instructional systems (Cahyadi, 2019). Analysis, design, development, implementation, and evaluation are the five phases of development that make up the ADDIE paradigm. The stages of the ADDIE development model applied in this study are illustrated in Figure 3.

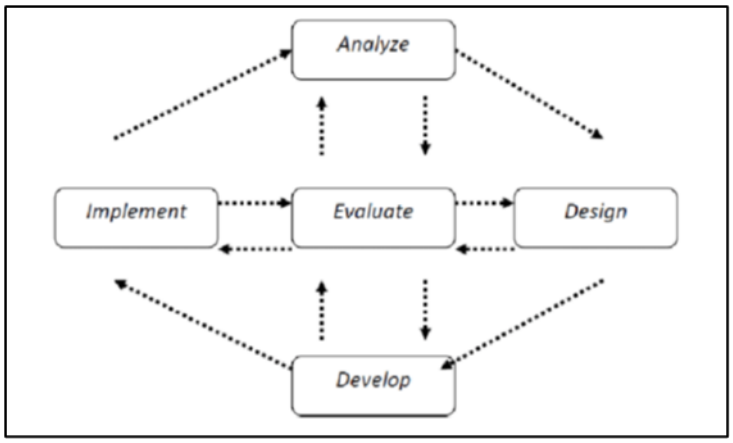

Fig. 3. Stages of the ADDIE development model (Sari, 2018)

The development of the smart class articulate storyline using teaching at the right level-based lesson plan as a learning resource to enhance teaching skills in differentiated learning for students of *PPG Prajabatan* began with the initial stage, which was the analysis stage. The analysis stage involved gathering information that served as a basis for creating the product, such as the need for the smart class articulate storyline application, which was driven by fundamental issues in the learning process. The design stage was the subsequent phase in the product development process following the analysis stage. The design stage involved planning the smart class articulate storyline application using TaRL-based lesson plan for students of *PPG Prajabatan*. The development stage involved realizing the product development in the form of the smart class articulate storyline using TaRL-based lesson plan, designed as a learning resource to enhance the teaching skills of *PPG Prajabatan* students. This phase involved validation testing conducted by media and content specialists, followed by a pilot study with six participants. The implementation stage was conducted after the smart class articulate storyline application using TaRL-based lesson plan underwent revisions and was subsequently tested in a larger group consisting of 23

participants. The evaluation stage involved assessing the smart class articulate storyline using TaRL-based lesson plan for students of *PPG Prajabatan* at Universitas Negeri Semarang. The product's feasibility and effectiveness were tested using normality tests, t-tests, and N-Gain analysis (Anafi et al., 2021).

The subjects of this study were 23 second-semester students of the *PPG Prajabatan* program during the 2023/2024 academic year. The research was conducted at the graduate school of Universitas Negeri Semarang, within the teacher professional program for elementary school teacher education study program, over a period of 8 months. Data collection techniques included both tests and non-tests. Tests were used to measure students' understanding of the components involved in developing TaRL-based lesson plan and basic teaching skills. The instrument consisted of objective questions administered during pretests and posttests. Non-test methods involved observations (observer sheets), interviews (interview guidelines), questionnaires, and document analysis.

The data analysis techniques used were adjusted based on the data groups, which included analyzing product feasibility and product effectiveness. The product feasibility analysis was conducted by media and content experts to obtain validation, supported by a student response questionnaire after using the smart class articulate storyline application with TaRL-based lesson plan. Responses were rated on a scale from very good (score of 4) to poor (score of 1). The effectiveness of the product was evaluated using the N-Gain formula, as presented below:

$$N - Gan = \frac{Skor_{posttest} - Skor_{pretest}}{Skor_{max} - Skor_{pretest}} \quad (1)$$

The criteria for normalized N-Gain can be seen in Table 1 (Hake, 2002):

Table 1. N-gain index criteria

N-Gain	Improvement Criteria
G < 0.3	Low improvement
0.3 ≤ G ≤ 0.7	Medium improvement
G > 0.7	High improvement

The analysis of product effectiveness was conducted by examining all data obtained from the pretest and posttest, starting with a normality test, followed by data analysis using t-tests and N-Gain tests to determine the final results. The data analysis was assisted by SPSS software version 26.

RESULTS AND DISCUSSION

Analysis

The researchers conducted a potential and need analysis through observations and questionnaire distribution, which revealed that 40% of students of the *PPG Prajabatan* field had not shown sufficient understanding of developing lesson plan using TaRL approach. Furthermore, the students were not yet fully capable of modifying lesson plan to align with learning objectives, learner characteristics, and needs. This issue affected the quality of classroom learning, particularly regarding the implementation of practical field experience

in assigned schools. Students of the *PPG Prajabatan* program had not yet optimally applied the eight fundamental teaching skills, which include introducing variety, explaining, asking questions, opening and closing lessons, managing the classroom, facilitating small group discussions, and instructing both individuals and small groups—to their full potential.. When starting lessons, the students had not introduced variations in teaching styles, learning media, or interaction patterns. They tended to position themselves in front of the learners continuously without employing more dynamic or engaging teaching approaches.

The potential analysis, conducted through observations, showed that 100% of the *PPG Prajabatan* students already owned devices such as laptops and smartphones, which support their self-development in creating lesson plan with attachments as well as practicing classroom teaching during PPL I and PPL II. This is because smartphones come in various forms and qualities, making it very easy to access information within seconds. Smartphones also have the potential to be used as one of the learning media (Sulisworo, 2012). Furthermore, smartphones allow access to the smart class articulate storyline application using TaRL-based lesson plan, making it one of the best tools needed for learning. The application, in HTML5 format, can be accessed online (Sari & Qohar, 2023).

Design

In the design stage, the smart class was designed using articulate storyline 3 as the primary authoring tool and then converted into an application using website 2 APK builder. The design process for the smart class articulate storyline utilized various features provided by the software to support the learning process. These features included content presentation, video delivery, and evaluation. Additionally, flowcharts and storyboards were created as visual representations to facilitate the development of instructional media, making the process easier for the researcher. This approach is backed by inquire about discoveries, which demonstrate that beginning the plan prepare with a storyboard streamlines item improvement (Husna & Fajar, 2022).

Additionally, a storyboard was created, consisting of design illustrations and explanations for various components, including the opening, main page, menu, introduction menu, material menu, video, practice questions, evaluation menu, and profile menu, as shown in Figure 4. This type of design and analysis process is supported by research findings, which suggest that media specifications resulting from in-depth and comprehensive analysis and design are expected to produce development products that effectively address factual learning problems, such as the effectiveness of learning within limited time constraints (Cikarge & Utami, 2018).

In the design stage, specific learning objectives were formulated for TaRL-based teaching module. The TaRL is an approach that involves grouping students to conduct learning activities customized to their levels of competence or the grade level they are currently in (Ahyar et al., 2022). The learning objectives focus on improving the teaching skills of students in the *PPG Prajabatan* within the context of differentiated learning. The TaRL-based teaching module design considers various aspects, including the characteristics of the students and the needs of learners in the classroom. By utilizing an approach centered on separated learning, this educating module is planned to supply pertinent and relevant learning encounters for the understudies.

Fig. 4. Smart class AI interface, consisting of: (a) Smart class main page; (b) Main menu; (c) General information page; (d) User guide page; (e) Objectives page; and (f) Content presentation page

Development

In the development stage, the smart class articulate storyline application using TaRL-based learning tools was successfully created and produced. The module content includes foundational theories on TaRL, differentiated learning strategies, and practical examples that can be applied in the classroom. Additionally, the development involved selecting a background color, choosing animated characters or appropriate images, and selecting available background music. The researcher also added external images and sounds to present engaging content. the smart class components include the main page, the main menu page comprising objectives, materials, and evaluation, and the material page, which consists of four topics, including basic teaching skills, TaRL approach, lesson plan with attachments using the TaRL approach, and tutorial videos on teaching practices. The product underwent validation testing by media and content experts.

This stage was conducted by two validators: a media expert and a content expert. The assessment of the media was conducted by Muhammad Imaduddin, S.Pd., M.Pd., a lecturer in the elementary school teacher education study program at Universitas Negeri Surabaya,

who gave a score of 95, categorizing it as highly feasible for use without revisions. The evaluation criteria included material and content feasibility, presentation, language, and graphic quality. Similarly, the content evaluation was conducted by Dr. Dra. Panca Dewi Purwati, M.Pd., who also gave a score of 95, categorizing it as highly feasible for use without revisions. The evaluation criteria covered content relevance, presentation, and language feasibility based on ISBN standards. The feasibility assessments from the content and media validators are presented in Table 2.

Table 2. Average value of final assessment from validators

Indicator	Average (%)	Category
Media Feasibility	95%	Highly Suitable
Material Feasibility	95%	Highly Suitable

According to the media and content experts' validation data in Table 2, it can be identified that each percentage score is 95%, and this score falls within the "highly feasible" category. Therefore, the cumulative average percentage score from both the content expert and media expert is 95%, indicating that the smart class AI developed using TaRL-based lesson plan is categorized as "highly feasible." Thus, the smart class articulate storyline using TaRL-based learning tools, complemented by a tutorial video on teaching practices, can be implemented in the classes of group 8 students of the *PPG Prajabatan* program batch 2, during semester 2 in 2024. A small group test was conducted with six students possessing varying levels of knowledge: high, medium, and low. The pretest and posttest improvements in the small group are presented in Table 3.

Table 3. Small group pretest and posttest results

Aspects	Pretest Score	Posttest Score
Highest Score	75	90
Lowest Score	47.5	70
Average	62.9	83.1

Table 3 shows that the small group's average knowledge of basic teaching skills in the small group increased from a pretest score of 62.9 to a posttest score of 83.1, reflecting an improvement of 32.11%.

Implementation

The implementation stage involved testing the smart class articulate storyline application using TaRL-based learning tools with a large group consisting of 23 students from the *PPG Prajabatan* program. The improvement in pretest and posttest results for the large group is presented in Table 4.

Table 4. Large group pretest and posttest results

Aspects	Pre-test Score	Post-test Score
Highest Score	75	95.5
Lowest Score	42.5	79
Average	57.8	88.2

Based on Table 4, it is evident that the average knowledge of basic teaching skills increased from a pretest score of 57.8 to a posttest score of 88.2, reflecting an improvement of 30.4%. This improvement appeared due to the interaction between *PPG Prajabatan* students and the learning materials. Innovations were applied in the learning process by utilizing the smart class articulate storyline with TaRL-based learning tools, which improved the cognitive learning outcomes of the students. This is supported by research findings indicating that incorporating visuals and audio in technology-based learning media applications can assist students in understanding the meaning and information being conveyed (Novita et al., 2019).

Evaluation

The evaluation stage was carried out to assess whether the product development was effective in improving the teaching skills of *PPG Prajabatan* students. Subsequently, the researchers distributed a response questionnaire to the students as a follow-up to the product development. The results of the student response questionnaire for the smart class articulate storyline using TaRL-based learning tools showed a 90% rating in the highly practical category. This concludes that the smart class articulate storyline using TaRL-based learning tools were well-received by the students. This is supported by experimental research results on the impact of using interactive multimedia based on articulate storyline, which showed improved learning outcomes from the first meeting in the good category to the second meeting in the excellent category (Septiana et al., 2022).

The effectiveness of the smart class articulate storyline application using TaRL-based learning tools was determined based on the evaluation of knowledge regarding basic teaching skills by analyzing pretest and posttest scores, which showed an improvement of 30.4%. The effectiveness test was conducted by administering pretest and posttest questions. The improvement in pretest and posttest results is presented in Figure 5.

Fig. 5. Improvement in pretest and posttest results for basic teaching skills analysis

Subsequently, the data analysis began with a normality test, followed by data analysis using t-tests and N-Gain tests to determine the final results. This study utilized SPSS version 26 to analyze the initial and final data. To determine whether the data were normally distributed, a normality test was conducted. The normality test in this study was performed using SPSS version 26 with the Shapiro-Wilk method. The results of the normality test are presented in Table 5.

Table 5. Normality test resuls

Shapiro-Wilk	Sig. value	Information
Pretest	0.089	Normal
Posttest	0.091	Normal

Based on Table 5, the normality test results indicate that the data is considered normally distributed if the Sig. value is > 0.05 and not normally distributed if the Sig. value is < 0.05. Referring to Table 5, the Sig. value for the pretest data using Shapiro-Wilk is 0.089, and for the posttest data, it is 0.093. The Sig. values for both the pretest and posttest normality tests are greater than 0.05, leading to the conclusion that the pretest and posttest data are normally distributed. After confirming the normal distribution of the data, a Paired T-test was conducted using SPSS version 26 to determine the effectiveness of the smart class articulate storyline application using TaRL-based learning tools. The results of the Paired T-test are presented in Table 6.

Table 6. Paired sample t-test results

Paired Samples test	Mean	Sig. (2-tailed)
Pretest – posttest	-30.34	0.000

The paired sample t-test was used to evaluate the effect of a specific treatment on the same sample at two different periods. In the Paired T-test, it is stated that a significant difference exists between the pretest and posttest results if the Sig. (2-tailed) value is <0.05. Based on Table 6, the Sig. (2-tailed) value is <0.05, specifically 0.000, indicating a significant improvement between the pretest and posttest results, with an increase of 30.34%. This demonstrates a significant difference. It can be concluded that the smart class AI application using TaRL-based lesson plan is effective in improving teaching skills in differentiated learning for *PPG Prajabatan* students.

The average pretest and posttest results were determined using the N-Gain test. This study utilized SPSS version 26 to conduct the N-Gain test. The results of the N-Gain test are presented in Table 7.

Table 7. N-gain test results

Aspect	Average	Criterion
N-Gain score	0.719	High

The results of the N-Gain test show that the teaching skills of *PPG Prajabatan* students at Universitas Negeri Semarang improved through the use of the smart class AI application with TaRL-based lesson plan, achieving an average N-Gain score of 0.719, categorized as high. This high average improvement aligns with the product, which was also rated as highly feasible by content and media experts. An external factor affecting this outcome is the student's readiness to learn. This finding is consistent with previous research Nihaya and Yuniarsih (2020), which explained that both learning readiness and learning styles significantly impact the average improvement in student learning outcomes. This aligns with Marlina (2023), who stated that the ability of teachers to independently develop lesson plan ensures that the modules are better suited to the characteristics of the students,

teacher readiness, the school ecosystem, the learning environment, and the characteristics of the surrounding community. Furthermore, to ensure that students achieve meaningful understanding (Nurhayati et al., 2022), which encompasses knowledge, skills, and attitudes relevant to the students (Mukhlishina et al., 2023).

The design of TaRL-based lesson plan considers various aspects, including the characteristics of the students and the needs of learners in the classroom. By utilizing a differentiated learning approach, these lesson plan are designed to provide relevant and contextual learning experiences for students. In the design process, collaboration with content and teaching experts is crucial to ensure that the content in the smart class articulate storyline using TaRL-based lesson plan is structured in alignment with the curriculum and can be implemented in real teaching practices. Additionally, selecting appropriate media and teaching methods is a primary focus to enhance student engagement in the learning process. This shows that the improvement in students' understanding resulted from their initial abilities combined with absorbing information through technology-based learning media applications (Dita et al., 2024; Nugraheni et al., 2023).

The development process of the smart class articulate storyline using TaRL-based lesson plan highlights the importance of student feedback in refining the created materials. Trials conducted with small and large groups provided insights into areas requiring improvement, such as improving explanations of the TaRL approach, basic teaching skills, and teaching practice videos. Revisions were made based on this feedback to improve the quality of the smart class articulate storyline application using TaRL-based lesson plan. In addition, this development also includes the presentation of relevant evaluations to assess the teaching skills of students. Thus, the outcomes of this development stage are expected to contribute positively to the improvement of teaching skills among *PPG Prajabatan* students in the elementary school teacher education study program.

CONCLUSION

The development of the smart class articulate storyline application using TaRL-based learning tools to enhance the teaching skills of *PPG Prajabatan* students in elementary school teacher education study program was successfully done using R&D approach with the ADDIE model. The results demonstrated that the application was highly feasible and effective. The "highly feasible" category was achieved based on validation tests conducted by media and content experts, each scoring 95%. The smart class articulate storyline application using TaRL-based learning tools was found to be effective based on pretest and posttest results, showing a significant improvement in students' understanding of basic teaching skills

REFERENCES

Ahyar, A., Nurhidayah, N., & Saputra, A. (2022). Implementasi Model Pembelajaran TaRL dalam Meningkatan Kemampuan Literasi Dasar Membaca Peserta Didik di Sekolah Dasar Kelas Awal. *JIIP - Jurnal Ilmiah Ilmu Pendidikan*, *5*(11), 5241–5246. https://doi.org/10.54371/jiip.v5i11.1242

Akilla, N., Nurhasanah, Saputri, R., & Mustafiyanti. (2024). Alur Tujuan Pembelajaran dan Asasmen. *Al-Tarbiyah: Jurnal Ilmu Pendidikan Islam*, *2*(1), 231–238. https://doi.org/https://doi.org/10.59059/al-tarbiyah.v2i1.793

Akker, J. van den, Bannan, B., Kelly, A. E., Nieveen, N., & Plomp, T. (2013). *Educational Design Research* (T. Plomp & N. Nieveen (eds.)). Netherlands Institute for Curriculum Development (SLO). http://international.slo.nl/publications/edr/

Anafi, K., Wiryokusumo, I., & Leksono, I. P. (2021). Pengembangan Media Pembelajaran Model Addie Menggunakan Software Unity 3D. *Jurnal Education and Development*, *9*(4), 433–438. https://journal.ipts.ac.id/index.php/ED/article/view/3206/2123

Cahyadi, R. A. H. (2019). Pengembangan Bahan Ajar Berbasis Addie Model. *Halaqa: Islamic Education Journal*, *3*(1), 35–42. https://doi.org/10.21070/halaqa.v3i1.2124

Christian-Ike, N. O., Nnalue, O. H., & Nwuba, I. S. (2024). The teachers' awareness and utilisation of innovative strategies for teaching and learning in Awka South. *Inornatus: Biology Education Journal*, *4*(1), 36–45. https://doi.org/10.30862/inornatus.v4i1.587

Cikarge, G. P., & Utami, P. (2018). Analisis Dan Desain Media Pembelajaran Praktik Teknik Digital Sesuai Rps. *Elinvo (Electronics, Informatics, and Vocational Education)*, *3*(1), 92–105. https://doi.org/10.21831/elinvo.v3i1.20509

Dita, K. I., Nunaki, J. H., Nasir, N. I. R. F., Winarno, N., Damopolii, I., & Latjompoh, M. (2024). Flipbook digital sistem peredaran darah manusia: Dampaknya terhadap hasil belajar siswa. *Biogenesis*, *20*(2), 55–70. http://dx.doi.org/10.31258/biogenesis.20.2.55-70

Fausta, T. E., Muslihati, M., & Indreswari, H. (2024). Percentage of Pancasila student profile dimensions in the Merdeka curriculum and the implications for high school guidance and counseling programs. *Journal of Research in Instructional*, *4*(2), 314–323. https://doi.org/10.30862/jri.v4i2.416

Fitriati, I., Hardiningsih, S., & Sani, K. (2021). Workshop Implementasi Gamifikasi Menggunakan Educandy Dan Quizizz Pada Pembelajaran Masa Covid-19 Bagi Guru Smk Bima. *JMM (Jurnal Masyarakat Mandiri*, *5*(6), 5–12. https://doi.org/10.31764/jmm.v5i6.4857

Hake, R. R. (2002). Relationship of individual student normalized learning gains in mechanics with gender, high-school physics, and pretest scores on Mathematics and Spatial Visualization. *The Physics Education Research Conference*, *August*, 1–14. https://doi.org/10.16920/jeet/2024/v37is2/24119

Hama, N. H., & Amin, A. M. (2025). Using integrated project-based and 4C-scaffolding (PJ4CS) to improve students' critical thinking skills. *Inornatus: Biology Education Journal*, *5*(1), 25–36. https://doi.org/10.30862/inornatus.v5i1.738

Husna, A., & Fajar, D. M. (2022). Development of Interactive Learning Media Based on Articulate Storyline 3 on Newton's Law Material with a Contextual Approach at the Junior High School Level. *IJIS Edu : Indonesian Journal of Integrated Science Education*, *4*(1), 17–26. https://doi.org/10.29300/ijisedu.v4i1.5857

Janah, I. M. (2023). *Implementasi Teaching at The Right Level Kurikulum Merdeka*. Kejarcita. https://blog.kejarcita.id/implementasi-teaching-at-the-right-level-dalam-kurikulum-merdeka/

Jaya, H. N. (2017). Keterampilan Dasar Guru untuk Menciptakan Suasana Belajar yang Menyenangkan. *Didaktis: Pendidikan Dan Ilmu Pengetahuan*, *17*(1), 23–35. https://doi.org/https://doi.org/10.30651/didaktis.v17i1.1555

Kemendikbud. (2022). *Panduan Pembelajaran dan Asesmen Pendidikan Anak Usia Dini,*

Pendidikan Dasar, dan Menengah.

Larawan, L. (2013). Acceptability of Teacher-Made Modules in Production Management. *International Journal of Managerial Studies and Research (IJMSR)*, *1*(2), 10–22. https://hdl.handle.net/20.500.12852/1290

Maarif, N. S. (2022). Peningkatan Ketrampilan Guru Dalam Penyusun Modul Ajar Untuk Pembelajaran Kelas 1 SD Melalui Supervisi Akademik. *Jurnal Pendidikan Taman Widya Humaniora (JPTWH)*, *1*(1), 208–220. https://jurnal.widyahumaniora.org/

Marlina, E. (2023). Pembinaan Penyusunan Modul Ajar Kurikulum Merdeka Belajar Pada Guru Sekolah Menengah Pertama (SMP). *Journal of Community Dedication*, *3*(1), 88–97. https://adisampublisher.org/index.php/pkm/article/view/266

Maulida, U. (2022). Pengembangan Modul Ajar Berbasis Kurikulum Merdeka. *Tarbawi*, *5*(2). https://doi.org/10.51476/tarbawi.v5i2.392

Mctighe, J., & Wiggins, G. (2014). *Improve Curriculum, Assessment, and Instruction Using the Understanding by Design ® Framework*. www.ascd.orgwww.ascd.org

Mukhlishina, I., Danawati, M. G., & Wijayaningputri, A. R. (2023). Penerapan Modul Ajar Sebagai Implementasi Kurikulum Merdeka Pada Siswa Kelas IV Di Sekolah Indonesia Kuala Lumpur. *Jurnal Pengabdian Kepada Masyarakat Nusantara (JPkMN)*, *4*(1), 126–133. https://ejournal.sisfokomtek.org/index.php/jpkm/article/view/675

Nihaya, S. S., & Yuniarsih, T. (2020). Pengaruh Kesiapan Dan Gaya Belajar Terhadap Prestasi Belajar Siswa. *Jurnal Pendidikan Manajemen Perkantoran*, *5*(2), 267–280. https://doi.org/10.17509/jpm.v4i2.18008

Novita, L., Sukmanasa, E., & Pratama, M. Y. (2019). Penggunaan Media Pembelajaran Video terhadap Hasil Belajar Siswa SD. *Indonesian Journal of Primary Education*, *3*(2), 64–72. https://doi.org/10.17509/ijpe.v3i2.22103

Nugraheni, N., Sukestiyarno, Y., Wardono, & Masrukan. (2023). Mathematical Ability Profiles in Solving Numeracy Problems. *International Journal of Education and Research*, *11*(11), 1–12. https://ijern.com/journal/2023/November-2023/01.pdf

Nurhayati, P., Emilzoli, M., & Fu'adiah, D. (2022). Peningkatan Keterampilan Penyusunan Modul Ajar Dan Modul Proyek Penguatan Profil Pelajar Pancasila Kurikulum Merdeka Pada Guru Madrasah Ibtidaiyah. *JMM (Jurnal Masyarakat Mandiri)*, *6*(5), 3602–3612. https://doi.org/10.31764/jmm.v6i5.10047

Pratiwi, S. A., Sudyana, I. N., & Fatah, A. H. (2022). Pengembangan media pembelajaran digital berbasis articulate-storyline-3 pada pokok bahasan struktur atom. *Journal of Environment and Management*, *3*(2), 153–160. https://doi.org/10.37304/jem.v3i2.5507

Prihantini, P., & Khoirunnisa, Q. (2023). Project module for strengthening the profile of Pancasila students in the perspective of 21st-century learning design microsoft. *Journal of Research in Instructional*, *3*(2), 231–241. https://doi.org/10.30862/jri.v3i2.277

Sari, I. P. (2018). Implementasi Model Addie Dan Kompetensi Kewirausahaan Dosen Terhadap Motivasi Wirausaha Mahasiswa. *Jurnal Ekonomi Pendidikan Dan Kewirausahaan*, *6*(1), 83–94. https://doi.org/10.26740/jepk.v6n1.p83-94

Sari, M. R., & Qohar, A. (2023). Development of mathematics learning media based on articulate storyline 3 on cube materials. In *AIP Conference Proceedings*.

https://doi.org/10.1063/5.0125871

Septiana, I. G. Y., Wibawa, I. M. C., & Trisna, G. A. P. S. (2022). Interactive Multimedia Based on Articulate Storylines in the Topic of Plant Anatomy and Physiology. *International Journal of Elementary Education*, *6*(2), 182–194. https://doi.org/10.23887/ijee.v6i2.46837

Sugihartini, N., Sindu, G. P., Dewi, K. S., Zakariah, M., & Sudira, P. (2020). Improving Teaching Ability with Eight Teaching Skills. *3rd International Conference on Innovative Research Across Disciplines (ICIRAD 2019)*, 306–310. https://doi.org/10.2991/assehr.k.200115.050

Suharyani, S., Suarti, N. K. A., & Astuti, F. H. (2023). Implementasi Pendekatan Teaching At The Right Level (Tarl) Dalam Meningkatkan Kemampuan Literasi Numerasi Anak. *Jurnal Teknologi Pendidikan : Jurnal Penelitian Dan Pengembangan Pembelajaran*, *8*(2), 470–479. https://doi.org/10.33394/jtp.v8i2.7590

Sulisworo, D. (2012). Enabling ICT and Knowledge Management to Enhance Competitiveness of Higher Education Institutions. *International Journal of Education*, *4*(1), 112–121. https://doi.org/10.5296/ije.v4i1.1207

Tomlinson, C. A. (2014). *The Differentiated Classroom: Responding to the Needs of All Learners* (Second edition). ASCD. www.ascd.org/deskcopy.

Wahida, S., Tobing, M., Ampera, D., Sitompul, A., & Anggraini, Y. (2022). Development of Better Teaching and Learning Models in the Competence of Basic Teaching Skills of Students. *International Journal of Islamic Educational Psychology*, *3*(2), 159–171. https://doi.org/10.18196/ijiep.v3i2.16051

Wahyudi, T. (2023). Studi Kasus Pengembangan dan Penggunaan Artificial Intelligence (AI) Sebagai Penunjang Kegiatan Masyarakat Indonesia. *Indonesian Journal on Software Engineering (IJSE)*, *9*(1), 28–32. https://doi.org/https://doi.org/10.31294/ijse.v9i1.15631