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Development of Scratch Learning Media to Improve Scientific Literacy and Computational Thinking in Primary Education in The Society 5.0 Era

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ABSTRACT
Learning media are one of the most important components in the implementation of learning both inside and outside the classroom. In this era, learning media must be technology-based and have a good pedagogic approach, as well as complete and in-depth material content. From an analysis of conditions in the field and a review of several articles, researchers wanted to develop a learning medium in the form of a Scratch-Based E-Module. Methodology-This study is an R&D using the ADDIE model seen from the practical aspects, involving 100 (41%) teachers, 100 (42%) university students, and 40 (17%) students. Data were collected via a google form with an assessment component consisting of several aspects, namely (1) ease of use, (2) presentation, (3) readability, and (4) the role of the media. From the data obtained, as a whole, the product provides information and technology-based teaching material facilities with a combination of videos, text, images, coding, games, and QR-Code. Findings- This product meets the validity criteria of 77% with the "Valid" criteria, the practicality criteria of 88.10% in the " Very Practical " category for teachers, 88.18% in the " Very Practical" category for university students, and 85.53% in the " Very Practical " category for students. Each teacher's computational thinking skills are in the "GOOD" category with an average percentage of 19% (Strongly Agree), 67% (Agree,) and 11% (Disagree). Significance Each teacher's scientific literacy skills are in the "GOOD" category with an average percentage of 15% (Strongly Agree), 64% (Agree), and 20% (Disagree). Therefore, the Scratch-Based E-Module can be implemented in the learning process.

Keywords: *development, era society 5.0, expert , scracth, validity*

INTRODUCTION

The emergence of Society 5.0 was initiated by Japan as the vision of a new human-centered society in its fifth stage (Fukuda, 2020) (Iqbal & Olariu, 2021). Industry 5.0 changes the paradigm and brings resolution because it will reduce the emphasis on technology and assume that the potential for progress is based on collaboration between humans and machines (Adel, 2022). This development in the Society 5.0 Era is considered as an anticipation of the disruptive turmoil caused by the industrial revolution 4.0 which has the potential to reduce the role of humans in maintaining their identity (Gladden, 2019) (Acioli et al., 2021), and also because of seeing the rapid development of technology, digitization to artificial intelligence (Shiroishi et al., 2018).

Society 5.0 is a concept of human life that uses technology-based education and social interaction (AI, Robot, Scratch)(Syarif, 2020). This can be seen during the pandemic, in which the concept of education no longer has to be done face to face (Katz & Nandi, 2021; Sá & Serpa, 2020). Technology is developing rapidly and significantly (Daniel, 2020), even now, the internet has become part of our lives starting from digital access and in all areas of human activity, which are based on the "Internet of Everything" (Dutta, 2020; Gurjanov et al., 2020).

The importance of using the Internet and Internet technology has a significant impact on sustainable development and the emergence of Society 5.0 (Roblek et al., 2020). This is because Society 5.0 aims to place humans at the center of innovation, leveraging the impact of technology and the results of industrial revolution 4.0 with the integration of technology to improve quality of life, social responsibility, and sustainability (Carayannis & Morawska-Jancelewicz, 2022) (Aghnaita, 2021). The conceptions of technology and the future seem to be intertwined, as technology has been predicted by experts to take us anywhere between utopia and extinction in just a century (Rasa & Laherto, 2022). Thus, various aspects of human life also experience rapid changes, including the educational aspect. This is a challenge in the adjustment of the educational aspect with technological developments that is often carried out in line with the ease of accessing current technology and information (Hew et al., 2019). Technology in the context of teaching and learning has become an interesting trend today (Granić & Marangunić, 2019). The magnitude of its influences plays an important role in the progress of education, as various media or learning tools are easier to be used with the help of educational technology (Sweller, 2020) (Martin Sagayam et al., 2018).

Technology and information can improve the quality of education that should undergo changes so that it is not monotonous (Bernacki et al., 2020; Huynh et al., 2020; Nazari et al., 2021), besides they can also increase student involvement in learning (Bond et al., 2020). The conventional learning process is considered boring and somewhat monotonous. This is because learning that is only centered on teachers and books will make students bored with learning (Prieto et al., 2021). Changes can be seen in the learning and teaching process which used to be teacher-centered (Kusnandi, 2017). Not only that, there are also changes in curriculum to prepare superior human resources who can compete globally (Mawardi, 2013). Indonesia is dominated by generations X, Y (Millenial), Z who are technology literate.

Based on this, it can be said that technology and information media can be utilized to explain messages, overcome limitations of space, time, energy, and five senses, as well as to encourage motivation to learn (Alajmi et al., 2020; Pito, 2018) thus enabling students to learn independently according to their abilities—seen from their visual, auditory, and kinesthetic skills (Ekayani, 2017; Wanelly & Fauzan, 2020). The learning process using technology can be applied anywhere and anytime by students in their daily lives (Berlian et al., 2021). Then, qualified mastery of technology is obtained through various processes that must be tested and evaluated on an ongoing basis to realize an education system that is more oriented towards mastery of technology at both the primary, secondary, and tertiary levels (Huynh et al., 2020) (Bond et al., 2020).

The role of media or technology also influences scientific literacy (Latip & Permanasari, 2015). This is also stated by (Juleha et al., 2019) that using technology can improve the assessment of scientific literacy tests. Scientific literacy is defined as the skilled use of scientific knowledge to identify questions and draw conclusions based on evidence—and make decisions related to nature and changes to nature through activities carried out by humans (Savitri et al., 2021)

Facts in the field show that SD/MI students in Pekanbaru have difficulties in learning science lessons, especially on the topic of the water cycle. This was shown during the initial data collection to identify problems in the field, involving 25 SD/MI students in Pekanbaru. The difficulties experienced by students, include 1) the materials are a lot and must be memorized, 2) the teacher only uses textbooks, 3) the teacher's teaching method is boring, and 4) students are not interested in learning science lessons, and 5) learning science lessons has not used the concept of scientific literacy. According to Awang (2015), there are internal and external factors that cause difficulties for students to learn science lesson. Internal factors consist of aspects of interest, self-confidence, study habits, and student motivation, whereas external factors consist of aspects of foreign terms and learning materials that are a lot, as well as limited learning media and monotonous teacher's teaching method.

Students give suggestions on what makes learning science lessons better and more interesting, including 1) the use of learning resources such as mobile phones and laptops, 2) the materials being studied are observable, and 3) the teacher teaches in a cool (interesting) method, 4) learning must be more contextual and applicable. Difficulties in science lessons are not only experienced by students when learning but also by teachers when teaching them (science lessons). These difficulties can be seen in the problem identification instrument that has been filled out, including 1) limitations in providing the right media, 2) too many foreign terms that are difficult and not familiar for students, 3) difficulties in providing materials through smartphones in the form of pictures and then explain in detail as it requires time in making the concept, 4) when learning takes place online—students are more lacking in concentration, 5) the teacher lacks mastery of the material, and 6) internal and external difficulties that exist in students.

There is a relation between education and the process of delivering knowledge that should receive more proportional attention—in terms of teaching materials, so education does not only contribute to mastery of technology but also prepares a generation that is technology literate (Mulyani & Haliza, 2021). The 21st-century society that is massively computerized and networked will require individuals to have computational knowledge and skills, thus there is also a need for educators/teachers who are technology literate. According to (Fakhriyah et al., 2022; Rusydiyah et al., 2020), Most pre-service teachers still do not understand the use of digital media in the learning process. Therefore, a more comprehensive TPACK (Technology Pedagogy Content Knowledge) competency profile is needed by pre-service teachers to become true teachers in the future by integrating.

In recent years, with the rapid development of Scratch all over the world, teachers consider it as the carrier of natural artificial intelligence teaching to develop abundant teaching cases according to the characteristics of students of different ages (Li & Song, 2020) (Chang et al., 2020) and degrees. It should be noted that children who are not yet literate, by 3 or 4 years old, have a fairly easy time using and manipulating computational devices, such as tablets and smartphones (Marcelino et al., 2018). Scratch is a visual language, namely making projects using media in the form of images (Jannah et al., 2021). It is designed to introduce computer programming concepts in a simple way so that anyone from various backgrounds can understand it—and can be used to create applications, animations, and games (Fagerlund et al., 2021). Scratch (a programming language designed for youth, developed by the MIT Media Lab) (De Kereki, 2008) involves assembling icon-based blocks of commands—this programming language allows students to program easily by dragging and dropping blocks of their code (Park & Shin, 2019) (Salahli et al., 2019). A study by (Çiftci & Bildiren, 2020) revealed that computer programming supports high-level abilities such as creative thinking, questioning, problem-solving, and critical thinking that are included in the scope of 21st-century skills, as well as efficacy and achievement among students (Fitriyana et al., 2020; Husna et al., 2019)

The superiority of Scratch can be seen in cultivating students' creative thinking and finally concluding how to encourage students' creative thinking with the Scratch application (Li & Song, 2020; Thompson & Childers, 2021). By providing educational games to students, they will expend all their abilities to complete the challenges that exist in the game (Muharram & Fajrin, 2021; Pratama et al., 2019). The focus of this research is on the use of digital media by students in the learning process so that students can compete in the current global era. Scratch builds a digital world where kids can design, develop, and create courses that help them be creative (Su et al., 2022).

METHODOLOGY

This study is an R&D (Research and Development) using the ADDIE model (Analysis, Design, Develop, Implementation, Evaluation) by Dick Walter and Lou Carey (2005) in (Safitri & Aziz, 2022) because it is a widely recognized and considered as an efficient model for educational studies—and has a strong - active association with high-quality design, clear learning objects (Dewi et al., 2021). Some of the stages of development carried out are presented in the following:

Analysis stage, efforts made include analyzing the needs to know the conditions and needs of primary education in the Society 5.0 era as well as the abilities and needs of students in developing scientific literacy and computational thinking. Scientific literacy and CT are considered necessary skills for everyone. Scientific literacy is skills that students must have to analyze and apply scientific concepts in solving everyday life problems (Jufrida et al., 2019)—and a large number of studies focused on CT that have been published in recent years reveal that CT is an ideal medium for developing 21st-century skills (Tikva & Tambouris, 2021). The process in this stage includes literature studies, observations, interviews, and the distribution of questionnaires to obtain the required data. Expected results are in the form of follow-ups on the development of scratch learning media to improve scientific literacy and computational thinking in primary education in the Society 5.0 era. Design stage, efforts made include planning and designing Scratch learning media to improve scientific literacy and computational thinking in primary education in the Society 5.0 era, and preparation of instruments in the form of validity and practicality sheets, as well as scientific literacy and computational thinking skill tests. The process in this stage includes designing learning media that can be done by considering learning objectives, learning materials, student learning styles, and the characteristics of Scratch learning media. Expected results are in the form of neatly arranged Scratch learning media and early drafts of developing Scratch learning media. Development stage, efforts made include producing or making products and validation to assess the material and design of Scratch learning media. The process in this stage includes the preparation of a validation sheet for experts in education, educational technology, and language. Expected results are in the form of material validity and scratch learning media design. Implementation stage, efforts made include involving students and teachers in conducting learning using Scratch learning media (practicality test). Expected results are in the form of teacher and student responses stating the material and design of Scratch learning media. Evaluation stage, efforts made include comparing student learning outcomes before and after using Scratch learning media, as well as analyzing input and suggestions from students and teachers regarding the use of Scratch learning media. The process in this stage includes conducting trials (try-outs) in two classes, namely the experimental class and the control class. Expected results are in the form of differences in the skills of computational thinking and scientific literacy in primary education students who use Scratch learning media developed and those who do not use scratch learning media.

The research instruments used include a validation sheet (validity aspect) for 5 lecturers and 4 teachers, student and a teacher assessment sheet (practicality aspect) for 100 teachers and 40 students, and a questionnaire sheet (effectiveness aspect) for 40 students. The questionnaire for testing students' scientific literacy and computational thinking skills in primary education was analyzed using quantitative descriptive tests and inferential statistics with the t-test using IBM SPSS Statistics 23.

RESULT AND DISCUSSION

The results of this study refer to the ADDIE model.

Analysis

Analysis of Development Experience. Researchers researched the development experience of teachers, based on aspects of training experience, developing blended learning experience, and making computational thinking and scientific literacy assessment e-modules experience. The results are presented in the following Table 1.

Table 1. Results of Research Questionnaire with Teachers

No.	Aspect analyzed	Teacher response
1	Gain experience or take part in training on making Scratch learning media	68% of teachers have no experience in taking part in training on making Scratch learning media
2	Develop Scratch learning media	20% of teachers have developed Scratch learning media
3	Difficulties in developing learning media on their own	67% of teachers experience difficulties in developing learning media on their own
4	Conduct a computational thinking assessment	78% of teachers have never conducted a computational thinking assessment
5	Conduct a scientific literacy assessment	53% of teachers have never conducted a scientific literacy assessment

Based on Table 1, it is known that teachers, on average, have never had experience in training on making Scratch learning media (Scratch-Based E-Module), in which it hinders them from developing Scratch learning media on their own and lead them to experience difficulties in developing Scratch learning media. Based on this, it is necessary to provide training on the product development process, in this case, Scratch learning media so that teachers will no longer experience difficulties in developing Scratch learning media in the future. This is in accordance with the demands of the industrial revolution 4.0 in the learning process, where teachers and students must collaboratively innovate including in the use of information technology-based learning media (Rahim et al., 2019).

Analysis of Knowledge of Scratch

Researchers also researched the teacher's knowledge of Scratch. The results are presented in the following Table 2.

Table 2. Knowledge of Scratch

No.	Aspect analyzed	Teacher response
1	The use of IT with Scratch learning media in learning	97% of teachers agree with the use of IT with Scratch learning media in learning
2	The need for Scratch learning media as an alternative learning to iimprove computational thinking and scientific literacy	95% of teachers agree with the need Scratch learning media as an alternative learning to improve computational thinking and scientific literacy

Based on Table 2, it is known that most teachers agree with the use of IT with Scratch learning media in learning, as learning can be designed online and offline (Lestari & Sudihartinih, 2022) (Syaliman et al., 2023). In addition, it is also known that teachers agree with the need of Scratch learning media as an alternative learning to improve computational thinking and scientific literacy (Syahroni et al., 2020). According to studies by (Oluk & Korkmaz, 2016; Rodríguez-Martínez et al., 2020), the scores students obtained using either measurement tool did not differ significantly by gender or period of computer use—however, a high level of significant relation was observed between students' programming skills using Scratch learning media and their computational thinking skills.

Learning Conditions

Researchers also researched the learning conditions, as presented in the following Table 3.

Table 3. Learning Conditions

No.	Aspect analyzed	Teacher response
1	Students' reading interest in the media available in studying learning materials	77% of teachers consider students to have an enthusiastic interest in reading the media available in studying learning materials
2	Whether the criteria of currently available media are in accordance with the character of students	60% of teachers consider that the criteria of currently available media are not in accordance with the character of students

Based on Table 3, it is known that the conditions of students' reading interest in the media available in studying learning materials are in the “Enthusiastic” category with a percentage of 77%. Based on teachers’ responses, students' lack of interest in reading can be influenced by several factors, including students being influenced by games, students always use printed books, and students tending to listen more than read. In the criteria of currently available media, 60% of teachers consider that they are not in accordance with the character of students. This can be seen from teachers' responses who answered that the criteria of currently available media do not match the character of students because they still use learning media that have been used too frequently such as a PowerPoint presentation, learning media are still needed to be developed and improved, and there are teachers who have not been able to use and design learning media on their own.

Scratch learning media can be used as an upgrade of media that teachers often use in learning such as a PowerPoint presentation (Gunawan & Al Irsyadi, 2016) because Scratch learning media consists of a dynamic, attractive, colorful, and simple graphical interface that allows performing animations, games, dialogues, simulations, various activities, and interactive comics (Durak & Guyer, 2019) or other programs that often emerge from students' own creativity—that can be shared with other students or Scratch users. The environment uses a menu, control—that is called a palette of differentiated color blocks that allow students to design programs. This control is assembled as a puzzle in an orderly and logical manner so that the program works properly and is useful/beneficial, so as to encourage active learning (Cárdenas-Cobo et al., 2021; Gans, 2010).

Computational thinking skills

Computational thinking is one of the skills that must be possessed by students in welcoming the Society 5.0 Era (Grover & Pea, 2013). Learning science lessons (biology, chemistry, and physics) using various images as conceptual visualization requires 21st-century literacy skills including computer literacy and media literacy (Wusqo et al., 2021). As a manifestation of researchers' attention to these skills, the results of initial digital literacy skills among teachers are presented in the following Table 4 and Table 5.

Table 4. Teacher's Computational Thinking Skills

No.	Statement	Alternative Assessment				
		ST	S	KS	TS	STS
1	I can provide problem-solving using a computer or other device	17%	73%	10%	-	-
2	I can organize and analyze data	22%	67%	8%	3%	-
3	I can represent data through abstraction with a model or simulation	20%	65%	10%	2%	3%
4	I can automate solutions through algorithmic thinking	15%	60%	20%	2%	3%
5	I can identify, analyze, and implement solutions with various combinations of steps/means and resources that are efficient and effective	20%	70%	10%	-	-
6	I can generalize solutions to many different problems	17%	67%	13%	3%	-
7	I can identify known information from the given problems	23%	70%	7%	-	-
8	I can recognize patterns or characteristics that are similar/different in solving the given problems to build solutions	17%	75%	8%	-	-

No.	Statement	Alternative Assessment				
		ST	S	KS	TS	STS
9	I can mention the logical steps used to compile solutions to the given problems	22%	65%	13%	-	-
10	I can state the general patterns of similarities/differences found in the given problems	20%	62%	15%	3%	-
Average		**19%**	**67%**	**11%**	**3%**	**3%**

Table 5. Teacher's Scientific Literacy Skills

No	Statement	Alternative Assessment				
		ST	S	KS	TS	STS
1	I can provide problem-solving using scientific perceptions	10%	70%	17%	3%	-
2	I can organize scientific data	17%	63%	20%	-	-
3	I can analyze scientific data	15%	62%	23%	-	-
4	I can get the latest issues about data science	20%	65%	15%	-	-
5	I can recognize patterns or characteristics in learning science lessons	15%	62%	23%	-	-
Average		**15%**	**64%**	**20%**	**3%**	**-**

Based on Table 4, it is known that the teacher's computational thinking skills is assessed from 10 items. Computational thinking skills are one of the basic skills needed by every individual, such as reading and writing. For the development of CT, programming education is seen as the key (Yildiz Durak et al., 2021). In general, each teacher's computational thinking skills are in the "GOOD" category with an average percentage of 19% (Strongly Agree), 67% (Agree,) and 11% (Disagree). Thus, the respondents agree with each of the question items about computational thinking. Based on Table 5, it is known that the teacher's scientific literacy skills is assessed from 5 items. In general, each teacher's scientific literacy skills are in the "GOOD" category with an average percentage of 15% (Strongly Agree), 64% (Agree), and 20% (Disagree). To support teachers' computational thinking and scientific literacy skills, the development of Scratch learning media (Scratch-Based E-Module) is one of the best solutions.

Design and Development

The following describes the characteristics of Scratch learning media *(*Scratch-Based E-Module*)* designed by researchers. Design validation was given by expert lecturers (5) and expert teachers (4), to ensure the quality of the design and product produced before being tested and distributed. *Homepage* contains the title of the Scratch-Based E-Module materials. There is a simulation video that provides an overview of the e-module contents. *List of contents* contain the scope of e-module materials presented to teachers and students. *Materials presented in the E-Module* contain teaching materials that are equipped with a QR-Code which will then be linked to the learning video. Study findings reveal that QR-code can facilitate use and help obtain information thus it has been widely used for certain purposes including learning (Musyaffi et al., 2021; Sharara & Radia, 2022). The description of the Scratch-based E-module is as follows:

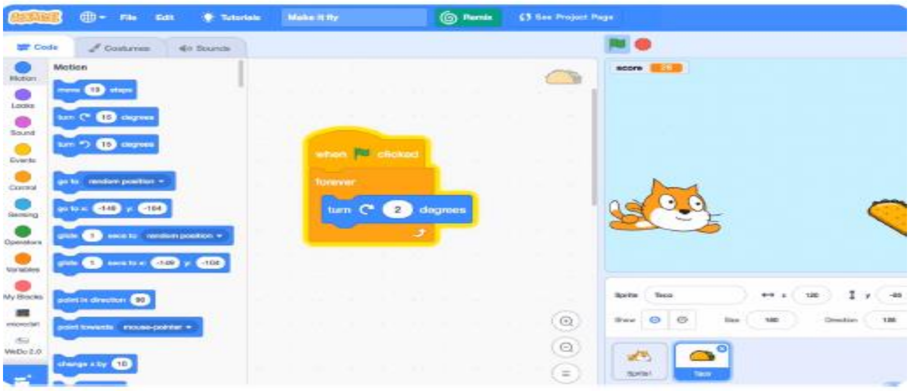

Figure 1. An attractive and interactive Scrach-based E-module display in real time

Figure 2. Scrach-based E-module equipped with a QR Code

The results of the development of the Scrach-based E-module are submitted to experts for assessment. The e-module was validated by 9 validators, including 4 teachers and 5 lecturers as shown in Figure 2.

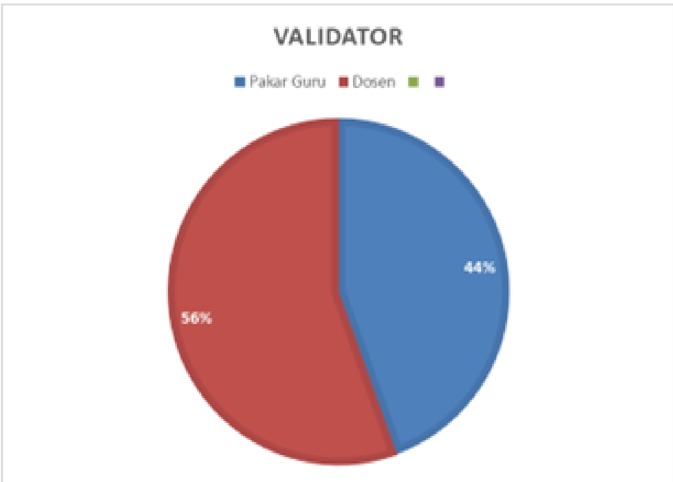

Figure 3. Validator Team Diagram

Product validation was carried out by involving several experienced experts to assess the product (Sugiyono, 2013) in(Ernica & Hardeli, 2019). Experts who become validators in this study come from 3 different areas of expertise, namely education, educational technology, and languages. The aspects observed in the e-module are aspects of content component, language, presentation, graphics, and program/the role of the media (Azkiya et al., 2022). The results are presented in Table 6.

Table 6. Overall E-Module Validation Results by Experts

No	Aspect	Average	Category
1	Content	76%	Valid
2	Language	77%	Valid
3	Presentation	78%	Valid
4	Graphics	76%	Valid
5	Program	75%	Valid
	Average	**77%**	**Valid**

Based on Table 6, it is known that the average score of e-module validation as a whole is 77% with the "Valid" criteria. This shows that according to experts, the Scratch-Based E-Module is valid and can be used in the learning process. This is also stated by (Yulando et al., 2019) that a multimedia-based learning process follows the flow of innovation to increase learning creativity in the 21st-century which requires active learning designs, one of which is an interactive electronic module. Thus, this Scratch-Based E-Module is appropriate and feasible to use.

Implementation and Evaluation.

After product validation was carried out by the validators then a small group trial was carried out, namely by involving 100 (41%) teachers, 100 (42%) university students, and 40 (17%) students as presented in Figure 3.

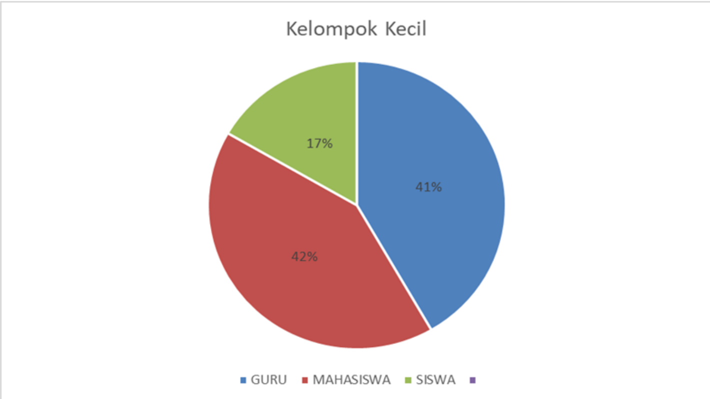

Figure 4. Respondents of Practicality and Effectiveness Tests

The teacher and student response questionnaires contain several aspects, namely (1) Ease of Use Of Module (2) Presentation, (3) Readability and (4) Role Of Media. The results of the questionnaire from teachers, university student and students to response are presented in the following Table 7.

Table 7. Data Results of Practicality Questionnaire by Teachers, University Students, and Students in General in Field Tests

No	Rated aspect	Teacher		University Student		Student	
		Practicaliy score (%)	Category	Practicality score (%)	Category	Practicality score (%)	Category
1	Ease of Use of Module	87.47	Very Practical	87.5	Very Practical	85.87	Very Practical
2	Presentation	87.71	Very Practical	88.53	Very Practical	85.83	Very Practical
3	Readability	88.65	Very Practical	88.36	Very Practical	85.93	Very

No	Rated aspect	Teacher		University Student		Student	
		Practicaliy score (%)	Category	Practicality score (%)	Category	Practicality score (%)	Category
4	Role of Media	88.58	Very Practical	88.35	Very Practical	84.5	Practical Very Practical
	Average	**88.10**	**Very Practical**	**88.18**	**Very Practical**	**85.53**	**Very Practical**

Based on Table 7, it is known that the average score of practicality from teachers, university students, and students is 88.10%, 88.18%, and 85.53% respectively in the "Very Practical" category. This means, based on the practicality questionnaire filled out by teachers, university students, and students after the field trials (try-outs), the Scratch-based e-module is declared practical. In addition, this study also analyzed the computational thinking skills of teachers, university students, and students obtained from the affective domain in the form of questionnaires given after using the Scratch-Based E-Module. The questionnaire contains 15 objective questions. As a manifestation of researchers' attention to computational thinking and scientific literacy skills, the results of digital literacy skills after the study among teachers are presented in the following Table 8 and Table 9:

Table 8. Teacher's Computational Thinking Skills

No.	Statement	Alternative Assessment				
		ST	S	KS	TS	STS
1	I can provide problem-solving using a computer or other device	17%	73%	10%	-	-
2	I can organize and analyze data	22%	67%	8%	3%	-
3	I can represent data through abstraction with a model or simulation	20%	65%	10%	2%	3%
4	I can automate solutions through algorithmic thinking	15%	60%	20%	2%	3%
5	I can identify, analyze, and implement solutions with various combinations of steps/means and resources that are efficient and effective	20%	70%	10%	-	-
6	I can generalize solutions to many different problems	17%	67%	13%	3%	-
7	I can identify known information from the given problems	23%	70%	7%	-	-
8	I can recognize patterns or characteristics that are similar/different in solving the given problems to build solutions	17%	75%	8%	-	-
9	I can mention the logical steps used to compile solutions to the given problems	22%	65%	13%	-	-
10	I can state the general patterns of similarities/differences found in the given problems	20%	62%	15%	3%	-
Average		**19%**	**7%**	**11%**	**3%**	**3%**

Table 9. Teacher's Scientific Literacy Skills

No	Statement	Alternative Assessment				
		ST	**S**	**KS**	**TS**	STS
1	I can provide problem-solving using scientific perceptions	10%	70%	17%	3%	-
2	I can organize scientific data	17%	63%	20%	-	-
3	I can analyze scientific data	15%	62%	23%	-	-
4	I can get the latest issues about data science	20%	65%	15%	-	-
5	I can recognize patterns or characteristics in learning science lessons	15%	62%	23%	-	-
Average		15%	64%	20%	3%	-

Based on Tables 8, it is known that the teacher's computational thinking skills is assessed from 10 items. In general, each teacher's computational thinking skills are in the "GOOD" category with an average percentage of 19% (Strongly Agree), 67% (Agree,) and 11% (Disagree). Thus, the respondents agree with each of the question items about computational thinking. Based on Table 9, it is known that the teacher's scientific literacy skills is assessed from 5 items. In general, each teacher's scientific literacy skills are in the "GOOD" category with an average percentage of 15% (Strongly Agree), 64% (Agree), and 20% (Disagree). This suggests that teachers' abilities for computational thinking and scientific literacy improve when they direct digital learning. This is because scracth is a simple and easy to understand medium for both teachers and students. Previous studies show that teachers should use TPACK (Technology Pedagogy Content Knowledge). This research will support these findings by using scracth as an open media that connects technology with learning content.

Based on the results obtained from computational thinking and data science literacy, in the research entitled Development of Scratch Learning Media to Improve Scientific Literacy and Computational Thinking in Basic Education in the Era of Society 5.0, it can be concluded that the E-Module developed is effective and suitable for use. Based on the research results, it can be concluded that learning using the Scratch-based E-Module that was developed can improve students' computational thinking skills and scientific literacy.

CONCLUSION

The results of the development research that has been carried out provide the following conclusions. This product provides information and technology-based teaching material facilities with a combination of videos, text, images, coding, games, and QR-Code. The development product in the form of a Scratch-based e-module has met the validity criteria of 77% with the "Valid" criteria. Development products in the form of Scratch-based e-modules have met the practicality criteria of 88.10% in the "Practical" category for teachers, 88.18% in the "Practical" category for students and 85.53% in the "Practical" category for students. Each teacher's computational thinking skills are in the "good" category with an average percentage of 19% (Strongly Agree), 67% (Agree) and 11% (Disagree).

The scientific literacy skills of each teacher are in the "good" category with an average percentage of 15% (Strongly Agree), 64% (Agree) and 20% (Disagree). Scratch-based e-module development is one of the best solutions.

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