

## Research Article

# Optimizing Young Learners' Role Using Scratch as a Media in a Participative Learning Method

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The 21<sup>st</sup>-century learning paradigm emphasizes the use of information and communication technology (ICT) that supports the students ability to think critically in order to solve the problem. In other words, ICT bridges science with the real world. Scratch, as one of the project's web-based multimedia products, allows students to develop their creativity in an interactive and fun way. Scratch is used not only to create games but also to make projects such as story animations. Hence, the researchers intend to conduct a research and development with ADDIE approach to answer the challenges of the technological disruption era for young learners. Based on the research results, scratch is declared valid and suitable for use in learning to optimize young learners to increase their creativity.

**Keywords:** scratch, ICT, development, young learners, optimize

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**Published** 16 May 2023

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Selection and Peer-review under the responsibility of the ICLIRBE Conference Committee.

## 1. INTRODUCTION

21st century education is marked by the use of information and communication technology (ICT) which is integrated between skills and attitudes. Efforts to fulfill educational needs in 21st century education are known as the era of knowledge of computer science and technology [1]. The 21st century learning paradigm emphasizes the ability of students to think critically with problem solving so that they are able to connect science with the real world, master of information and communication technology, and collaborate.

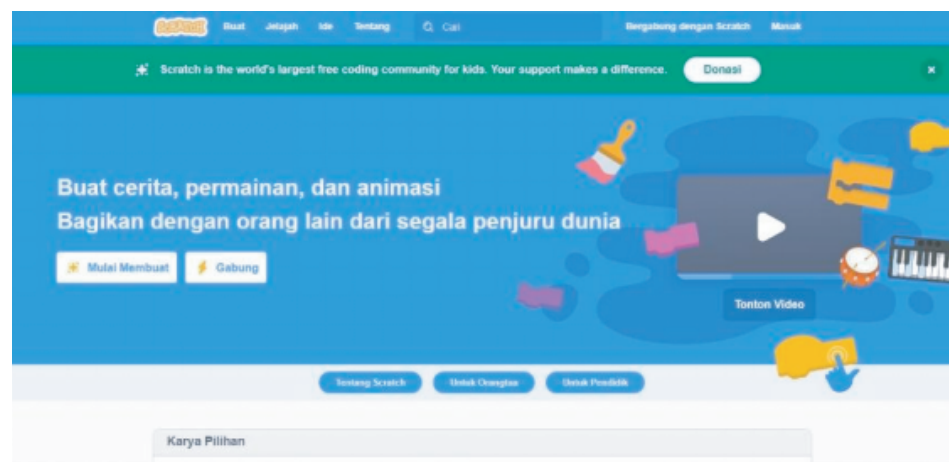
The ability to think critically is very important because it allows students to effectively deal with matters relating to social, scientific, and practical problems [2]. Thus, knowledge or information alone is not enough but students must be able to solve problems effectively. Students' critical thinking skills can be built using various learning methods, one of which is using participatory learning methods. The learning method can be varied

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programmatically using a computer. There are various supporting applications that can be used, which one is that students can use Scratch-based programming. Basically, Scratch is a multimedia product in the form of programming by a project website that allows to develop children's creativity in an interactive and fun way [3]. Scratch can be used at the age of 8-16 years to learn computer programming while working on learning projects such as story animations and games [4]. So, the Scratch program is very suitable for learning coding for children. It aims to support independent learning through tinkering and collaborating.

Scratch teaches students to be able to arrange command blocks to an object so that it can run according to orders. The existence of Scratch teaches children to think logically and think creatively. Researchers conducted a preliminary study to determine the use of the Scratch program in optimizing the role of students as participation in exploring themselves to improve hard skills and soft skills in elementary schools. See Figure 1.

Besides that, [5] the programming knowledge and experience of students who have studied Scratch can understand learning materials more effectively and efficiently. It was found that students achieved a higher level of cognitive understanding from some regular learning.



**Figure 1:** Scratch (<https://scratch.mit.edu/>).

Based on previous research, the Scratch program did not cause significant differences in students' problem solving skills which may not have an impact on their problem solving abilities [3]. Otherwi, [5] the knowledge and experience that has been learned in the Scratch program greatly facilitates the learning of more definite material so that it is found that students achieve a higher level of cognitive understanding than some regular learning.

## 1.1. The Role of Teachers and Students in Participatory Learning Methods

Participatory learning (Participative Teaching and Learning) is a learning method that involves students actively in planning, implementing, and evaluating learning. In terms of interaction between teachers and students, there are six characteristics of participatory learning [6]

1. Teacher puts themselves in the position of not knowing all the learning materials.
2. Teachers have a role to help students in carrying out learning activities.
3. Teachers motivate students to participate in setting study goals.
4. Teachers at the same time place themselves as a student during learning activities by providing encouragement and guidance.
5. Teachers encourage and help students to develop problem solving skills from the student environment.
6. Teachers and students carry out mutual learning activities by exchanging ideas about the content, process, and results of learning activities.

From the six characteristics of the participatory learning method, it can be concluded that the teacher acts as a motivator, facilitator, and partner during the learning process. Thus, students are empowered to be more independent and gain a deeper understanding of the meaning of responsibility in preparing themselves in society [7].

## 1.2. Scratch and Effectiveness

Scratch is a visual programming environment that allows users to create interactive and fun media projects. With Scratch, users can create animations, games, and interesting creations to create projects that contain media and scripts [4]. Scratch makes it easy for users to create programs without worry about writing syntax because there is no need to write codes. Scratch also makes it easy for users to simply drag and drop the available color command blocks to control 2D graphic objects called sprites moving in the background. To form a complete program, users need to compose and form a logic that can be executed so that it becomes a program. Initial projects can be saved to a file system or shared on the Scratch website.

The learning application program using Scratch is able to provide a learning experience in developing problem solving skills on the material provided based on the material

facilitated by the teacher. researchers are interested in conducting similar research. The difference between this study and previous research is that students are able to optimize themselves to develop hard skills in the form of programming skills and soft skills in the form of critical thinking skills and problem solving assisted by Scratch-based supporting applications.

## 2. METHOD

The method used in this research is Research and Development (R&D) with ADDIE approach. [8] In this method there are 5 stages, including: 1) analysis; 2) design; 3) development; 4) implementation; and 5) evaluation. The following is a Figure 2 of the stages of R&D research using the ADDIE approach method.

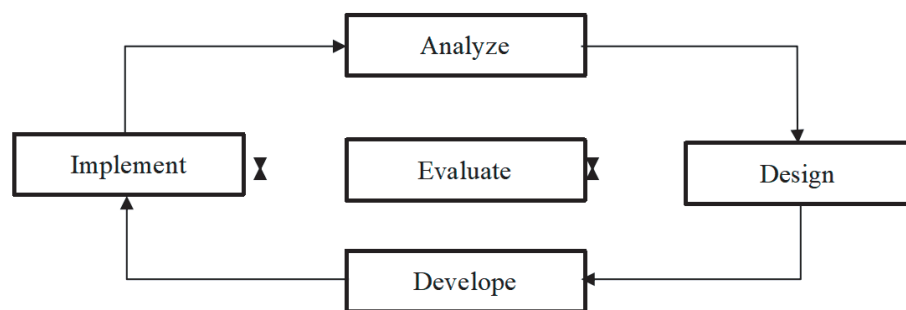


Figure 2: ADDIE.

In this research, data collection was carried out using observation and questionnaire methods. Observations were made to determine the practical learning process carried out by students, learning methods, and the use of learning media. Meanwhile, the questionnaire aims to determine the level of feasibility of the Scratch program for optimizing the role of students. Assessment using this questionnaire is carried out by media experts, material experts, and students. The content of the questionnaire consists of an assessment based on the suitability of the material and the appropriateness of the media.

Based on the selected research and development method, it will be carried out in five stages.

### Analyze

Researchers determine potential problems in conducting development research using relevant theories. To determine potentials and problems, it is necessary to collect information obtained from informants. Based on the information obtained, the

multimedia facilities have not been utilized optimally by teachers to develop learning media in schools so that learning is still monotonous and boring.

Design

Researchers make a design that will be developed in the form of a Scratch project. Before entering the manufacturing stage, a design process is needed which includes flowcharts, storyboards, and user interfaces.

Development

1. (a) Flowchart, Scratch has steps in the form of coding to carry out the process of the program.
- (b) Storyboard, After designing the flowchart, it will be processed into a storyboard to convey ideas or ideas and provide directions such as audio, location, or information that facilitates the work process.
- (c) User Interface (UI), the user interface refers to the storyboard that has been created as a visual display of the Scratch product to the user. The UI's display can be in the form of shapes, colors, and writing that are designed to be attractive.

Implementation

Researchers conducted a trial of criticism and suggestions from media experts and material experts. Product trials will be carried out in learning to determine the optimization of young learners.

Evaluation

The final result of the Scratch product which is developed based on the results of the revision, validation and product testing will be stored in Scratch.

### 3. RESULTS AND DISCUSSION

Based on the results of validation by media experts and material experts regarding the feasibility of optimizing young learners in the developed participatory learning method. The developer obtains the following data. See table 1.

TABLE 1: Expert Validation Results.

No.	Validator	Presentase
1.	Media expert	96,63%
2.	Material expert	95,29%

Based on the data processing of media experts in the table, overall results can be obtained 96.63%. Based on the results of data processing and predetermined criteria, it is known that the optimization of young learners in the participatory learning method developed is included in the valid or feasible criteria and can be used in learning with some suggestions from media experts, that is improving the visual arrangement of projects on Scratch.

Based on the material expert data processing in the table, overall results can be obtained 95.29%. Based on the results of data processing and predetermined criteria, it is known that the optimization of young learners in the participatory learning method developed is included in the valid or appropriate criteria and can be used in learning with some suggestions from material experts, that is shortening the material on Scratch and optimizing the use of sentences.

TABLE 2: Individual, Small Group, Field, and Learning Outcome Test Results.

No.	Trials	Presentase
1.	Individual	88,2%
2.	Small Group	89,5%
3.	Field	91,9%
4.	Learning Outcome Test Results	81,1%

Based on the results of data processing on individual trials, overall results can be obtained 88.2%. Based on the results of data processing and predetermined criteria, it is known that the optimization of young learners in the participatory learning method using Scratch is included in the valid or feasible category with several suggestions, that is more diverse animation variations.

Based on the results of the data processing in the small group trial, the overall result was 89.5%. Based on the results of data processing and predetermined criteria, it is known that the optimization of young learners in the participatory learning method using Scratch is included in the valid or feasible category with several suggestions, namely more diverse animation variations.

Based on the results of data processing in field trials, overall results can be obtained 91.9%. Based on the results of data processing and predetermined criteria, it is known that the optimization of young learners in the participatory learning method using Scratch is included in the valid or feasible category with several suggestions, that is more diverse animation variations.

Based on the results of the data processing on the learning outcomes test, the overall result was 81.1%. Based on the interpretation data, which is included in category A with

a presentation of 76% - 100%, it is concluded that the optimization of young learners in the participatory learning method using Scratch is effective.

The product revision is a conclusion that comes from the results of data analysis by media experts, material experts, and trials with the audience about optimizing young learners' roles using scratch as a media in a participative learning method, so that the product is more perfect and more effective for learning activities. The product revision includes:

1. Media expert response

Based on the instrument that comes from media experts, there are criticisms and suggestions. The media is declared valid and can be continued to the next stage, as well as improvements to the visual arrangement of the project on Scratch.

2. Material expert response

Based on the instrument that comes from material experts, there are criticisms and suggestions. The media is declared valid with a note to shorten the material on Scratch and optimize the use of sentences.

3. Audience response

Based on the instruments that came from students during field trials, there were criticisms and suggestions from the audience. The media is quite interesting, but needs to add more variety of animations

## 4. CONCLUSION

Scratch's original design was motivated by the needs and interests of learners in the 8-16 year age range. The Scratch program encourages students (in the context of this study, young learners) to learn through exploration and sharing with friends. Even so, Scratch can be used from all ages for learning media. Scratch's programming language is easy to understand and can be the choice of "new programmers" to practice computational thinking.

Scratch includes a complete program that is used to code games, control games, and program behavior into robots. Getting acquainted with the Scratch development environment, this web project can create creative programs using programming logic without worrying about syntax errors because it is relatively easy to use. The develop built by Scratch is very versatile.

Scratch has categories that produce learning activities, including creative development, problem solving, and trying out programs as projects. In this case, Scratch as a means of delivering learning material which is also used as a game can attract students to more easily understand the description of a material optimally.

## References

- [1] Wijaya EY, Sudjimat DA, Nyoto A, Malang U. "Transformasi Pendidikan Abad 21 Sebagai Tuntutan Pengembangan Sumber Daya Manusia di Era Global." Prosiding Seminar Nasional Pendidikan Matematika. 2016.
- [2] Shakirova DM. "Technology for the shaping of college students' and upper-grade students' critical thinking." *Russ Educ Soc.* 2014;49(9):42-52.
- [3] Pratama A. "Pengaruh Pengajaran Pemrograman Animasi melalui Aplikasi Scratch pada Kemampuan Pemecahan Masalah." *J Inform Educ.* 2018;1(1):24-31.
- [4] Maloney J, Resnick M, Rusk N. "The scratch programming language." *ACM Trans Comput Educ.* 2010;10(4):1-15.
- [5] Armoni M, Meerbaum-Salant O, Ben-Ari M. "From scratch to "real" programming." *ACM Trans Comput Educ.* 2015;14(4):1-15.
- [6] Sudjana, *Dasar-dasar Proses Belajar Mengajar*, Bandung: PT. Sinar Baru Algensindo; 2015.
- [7] Tsien TBK, Tsui M. "A participative learning and teaching model: The partnership of students and teachers in practice teaching." *Social Work Educ.* 2007;26(4):348-358.
- [8] Branch RM. *Instructional design: The ADDIE approach*. London: Springer; 2009.