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Correlation between Critical Thinking Skills and Students' Learning Interests in the Development of Website-Based Learning Media Using the SQ3R Method

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A B S T R A C T

The problem of low scores in Informatics subjects, student literacy, and critical thinking skills are the main background of this research. To answer these challenges, this study aims to develop website-based learning media using the SQ3R (Survey, Question, Read, Recite, Review) method in learning programming algorithms, and to measure the influence and correlation between students' learning interests and critical thinking skills. The subjects in this study were grade X students of the Software and Game Development Expertise Program (PPLG) at SMKN 1 Cisarua, with the object of research being students' critical thinking skills and learning interests. The research method used is Research and Development (R&D) with the ADDIE development model, which consists of five stages, namely Analysis, Design, Development, Implementation, and Evaluation. Learning media are designed to provide an interactive and enjoyable learning experience that supports the development of critical thinking skills and increases students' interest in learning programming algorithm material. The research instruments consisted of a learning interest questionnaire, a critical thinking test, and a validation sheet from material and media experts. The validation results showed that the developed media was feasible to use. Data analysis showed that there was a low positive correlation between students' learning interests and critical thinking skills, with a correlation coefficient value of 0.27. The conclusion of this study is that there is a relationship between students' learning interest and critical thinking skills, although the relationship is included in the low category. The developed learning media has the potential as an effective tool in improving the quality of the programming algorithm learning process.

Keywords: *Learning Media, SQ3R, Website, Programming Algorithm, Learning Interest, Critical Thinking*

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INTRODUCTION

Algorithm and programming learning is one of the essential aspects of the informatics curriculum applied at the secondary education level, both high school and vocational school. At the vocational level, especially in majors that focus on information technology such as Software and Game Development (PPLG), algorithm material is the foundation for shaping students' computational thinking skills, logical thinking, and problem-solving skills (Sari et al., 2023). According to Maharani et al. (2020), algorithms are not just a series of logical instructions, but also serve as the basis of computer programming, so understanding these concepts is key for students to progress to mastery of more complex digital skills.

Unfortunately, the algorithm learning process in vocational schools still faces many challenges. The use of conventional learning methods, lack of interactivity, and lack of interesting learning media are factors that cause low student learning outcomes. At SMKN 1 Cisarua, for example, it was found that the results of the second semester of the 2023/2024 school year showed scores that had not reached the Minimum Completeness Criteria (KKM), which was 70, and there was considerable variation between one class and another (Lutfi et al., 2020). This shows that there is an inequality in the learning process that must be immediately overcome through media innovations and learning strategies.

On the other hand, the low critical thinking skills and science literacy of Indonesian students also exacerbate this problem. Based on the PISA report from 2000 to 2018, Indonesian students tend

to be weak in applying scientific concepts in their daily lives, making data-driven decisions, and solving complex problems (Amanda et al., 2024; Safrizal et al., 2023). Science literacy, which also includes critical thinking skills, has long been recognized as a key competency in 21st-century education. Building these skills is not only essential for students' academic success, but also to prepare them for global challenges.

Critical thinking itself is part of higher order thinking skills which include the ability to analyze, evaluate, draw conclusions, explain, and organize thoughts independently (Facione, 2015; Handayani et al., 2023). Fadilasari et al. (2020) added that critical thinking allows students to formulate logical arguments, solve problems independently, and handle complex information effectively. Unfortunately, research shows that only a small percentage of Indonesian students are able to solve mathematical modeling or complex logic problems, with only 0.1% of students successfully solving them (Fadilasari et al., 2020).

The ability to think critically is very influential in learning programming algorithms. Algorithmic learning requires a logical, systematic, and analytical thought process to solve problems and devise the right programming steps. In this context, critical thinking is the basis for students to understand concepts, analyze problems, and evaluate and draw rational conclusions. The study underscores that critical thinking is "one of the essential skills that students should have when studying informatics" because it allows students to "identify, disseminate, and build arguments" in solving problems. Unfortunately, the level of critical thinking skills of students in Indonesia is still relatively low, as data shows that only 33.1% of students can solve problems with complete information, and only 0.1% are able to solve modeling problems that require a high level of critical thinking.

On the other hand, interest in learning also plays a crucial role in the success of algorithmic learning. The abstract and technical nature of algorithms requires high attention and motivation from students so that they do not just memorize but actually understand concepts. In this study, it is stated that "interest in learning is very important because it is the main trigger of student involvement in learning," and that students who have high interest will be more "focused, have clear learning goals, and persistent in overcoming learning difficulties" (p. 25). In addition, the research findings showed a positive correlation although low between learning interest and critical thinking skills, with a coefficient value of 0.27, which indicates that increased learning interest has the potential to contribute to the development of students' critical thinking skills. Therefore, the integration of learning approaches that encourage these two aspects, such as the website-based SQ3R method, is relevant to support a more in-depth and meaningful learning process in programming algorithm learning.

To answer these challenges, a learning approach is needed that not only conveys information, but is also able to build active student involvement in understanding concepts. One approach that can be applied is the SQ3R (Survey, Question, Read, Recite, Review) method. This method comes from the reading infusion strategy, which according to Suhendi et al. (2018) emphasizes reading comprehension as a means to build knowledge and critical thinking skills. SQ3R invites students to survey topics, ask questions, read actively, repeat in their own words, and revisit information, all of which are designed to strengthen engagement and in-depth information processing.

Furthermore, web-based media allows the integration of these methods into learning that is more flexible, interactive, and in line with the learning styles of the digital generation. The use of web-based learning media not only answers the need for broad and fast access to information, but also opens up opportunities to insert visual content, animations, interactive quizzes, and self-paced exercises that support active student engagement. This innovation is very relevant for vocational school students studying informatics because it brings them closer to the real-world context of the technology industry.

With this background, this study aims to develop a website-based learning media using the SQ3R method in algorithm subjects, as well as measure its effect on improving students' critical thinking skills and learning interests. This research also seeks to answer the gap that exists in

current algorithmic learning practices and offers a real contribution to the development of digital-based learning strategies in the vocational school environment.

RESEARCH METHODS

This research uses a Research and Development (R&D) **approach with** the ADDIE (Analysis, Design, Development, Implementation, Evaluation) model, which was chosen for its flexibility and systematics in producing empirically tested learning products (Walid, 2017). This model allows researchers to develop effective website-based learning media using the SQ3R (Survey, Question, Read, Recite, Review) approach**,** as well as evaluate its impact on improving students' critical thinking skills and learning interests.

The research design used is a pre-experimental design, specifically the One-Group Pretest-Posttest Design type**,** which allows researchers to evaluate changes in student learning outcomes before and after treatment (Sugiyono, 2019). In this design, one group of students is given a pretest, then given treatment in the form of the use of web-based learning media with the SQ3R method, and then measured again with a posttest. This model is suitable for measuring the effectiveness of interventions in a realistic educational environment but limited in external controls.

The population in this study is SMK students majoring in Software and Game Development (PPLG) in the city of Bandung. The sample consisted of 30–35 students in class X of SMKN 1 Cisarua, selected purposively based on the school's readiness to implement technology-based learning. This location was chosen because of adequate supporting facilities and the school's openness to digital learning innovations. The research was conducted for four months, from January to April 2025. Media development is carried out based on the ADDIE model which includes:

Analysis

Analysis of student needs and learning gaps. It was found that the learning outcomes of algorithm material were still low (38.15% of algorithmic aspects were answered correctly). Students have a weak programming foundation and are less interested in abstract material.

Design

Designing web-based media with the integration of the SQ3R method. The learning flow includes a login feature, SQ3R stage navigation, digital flipbooks, learning videos, interactive LKPDs, and evaluative quizzes.

Development

Media creation using the WordPress platform equipped with educational plugins. Research instruments such as learning interest questionnaires, critical thinking tests, and validation sheets are developed and validated by experts.

Implementation

A trial was conducted on 34 students. Learning is carried out in four sessions, each representing one stage of the SQ3R method. Activities include independent learning through media, filling out LKPD, as well as pretest and posttest.

Evaluation

Evaluation is carried out through the analysis of data on the results of the pretest and posttest of critical thinking as well as a learning interest questionnaire. Formative evaluation is carried out at each stage, while summative evaluation is carried out after implementation. The research instruments used in this study include critical thinking tests administered as pretests and posttests, which have been validated through both validity and reliability testing, ensuring their effectiveness in measuring students' critical thinking skills. Additionally, a learning interest questionnaire was employed, developed based on indicators of student interest such as attention, feelings of pleasure, and involvement, as outlined by Safari (2003).

Data collection techniques in this study include questionnaires, observations, interviews, and documentation to assess student responses and the effectiveness of the learning media. The collected data were analyzed using several statistical methods: the Shapiro-Wilk Normality Test to ensure the data were normally distributed; the Paired Sample t-Test to determine the significance of differences between pretest and posttest scores; the Normalized Gain (g) to evaluate

the effectiveness of learning in enhancing critical thinking skills; and the Pearson Correlation Test to examine the relationship between learning interest and critical thinking skills, following the guidelines proposed by Sugiyono (2014).

The interpretation of the correlation results is based on the classification of relationship levels: very low, low, medium, strong, and very strong. The hypotheses tested in this study are: (1) H_0**:** There is no relationship between students' learning interest and students' critical thinking skills through website-based learning media using the SQ3R method, and (2) H_1**:** There is a relationship between students' learning interests and students' critical thinking skills through website-based learning media using the SQ3R method.

RESULTS AND DISCUSSION

This research aims to develop and test the effectiveness of website-based learning media with the SQ3R (Survey, Question, Read, Recite, Review) method in improving students' critical thinking skills and learning interests in programming algorithm subjects. The subjects of the study were 27 students of class X PPLG at SMKN 1 Cisarua.

Media Development and Validation

Learning media is developed with the ADDIE model, consisting of five main stages: Analysis, Design, Development, Implementation, and Evaluation. The WordPress-based media prototype is designed with the features of the SQ3R stages, such as a flipbook for Read**,** an online LKPD for Recite, and an evaluative quiz for Review**.**

The validation process is carried out by media and material experts using the LORI (Learning Object Review Instrument) instrument. The results of the media validation showed an average score of 85%, while the material validation obtained a score of 82.45%, both of which were categorized as "very good". The presentation design and media interactivity aspects scored 80% each, while the accessibility and reusability aspects received the highest score of 90%.

Table 1 Media Validation Table Results

Yes	Aspects	Number of Testers	Question Item	Ideal score	Total Score	Percent
1	Presentation *Design*	1	3	15	12	80%
2	Interaction *Usability*	1	3	15	12	80%
3	Accessibility	1	2	10	9	90%
4	Reusability	1	2	10	9	90%
	Average					85%

Table 2 Material Validation Table Results

No	Aspects	Number of Testers	Question Item	Ideal score	Total Score	Percent
1	Content *Quality*	1	4	20	17	85%
2	Learning Goal *Alignment*	1	11	55	48	87%
3	Feedback and Adaptation	1	1	5	4	80%
4	Motivation	1	1	5	4	80%
5	Presentation Design	1	3	15	12	80%
	Average					82,45 %

Implementation of SQ3R Model Design in Website-Based Learning Media

The Survey, Question, Read, Recite, Review *(SQ3R) learning model* was developed by Robinson (1946) as an active reading strategy that aims to improve comprehension and retention of information. This model is then adapted into the context of web-based digital learning to support the improvement of students' critical thinking skills and learning interests, especially in programming algorithm materials. The development of this learning media follows the ADDIE

(Analysis, Design, Development, Implementation, Evaluation) framework which is one of the instructional development models commonly used in learning design (Branch, 2009). The focus in the development of this media lies in the design and development stages, with an emphasis on the systematic integration of the five stages of SQ3R into a digital structure tailored to the characteristics of Vocational High School (SMK) students.

In the *Survey stage*, the media presents initial elements in the form of titles, subtitles, visual illustrations, and keywords that are displayed explicitly. This presentation aims to build *an advance organizer* that can help students form an initial conceptual framework for the material to be studied (Ausubel, 1968). This activity is designed to facilitate information *skimming* and improve the ability to interpret the structure of the text.

The *Question* stage encourages students to formulate questions based on initial observations. Interactive facilities with a 5W+1H approach provided in the media are intended to develop students' analytical and inferential thinking skills, two important components in critical thinking according to Ennis (2011). This process also supports deeper cognitive engagement with learning content.

Furthermore, the *Read* stage allows students to read material in the form of a digital *flipbook module* equipped with annotation and note-taking features. Reading activities are directed at trying to find answers to questions that have been formulated beforehand. This activity stimulates critical reading skills as well as the ability to relate between concepts, which is important in the process of internalizing knowledge (Paul & Elder, 2014).

In the *Recite* stage, students are asked to re-express their understanding through activities in the digital Student Worksheet (LKPD). The LKPD includes making summaries, solving description problems, and preparing concept maps. This stage develops *explanation* and *self-regulation* skills which are important dimensions in metacognitive learning (Zimmerman, 2002).

The *Review stage* includes learning evaluation through a posttest in the form of multiple-choice quizzes designed based on critical thinking indicators, as well as filling out reflection sheets as a learning introspection tool. This evaluation is in line with the principle *of assessment for learning* which places reflection as an integral part of the learning process (Black & Wiliam, 2009).

Media effectiveness testing is carried out through *a One-Group Pretest-Posttest Design* which is part of the *Research and Development approach* (Gall, Gall, & Borg, 2003). The test subjects were 34 students in class X of the Software and Game Development Expertise Program (PPLG) at SMKN 1 Cisarua, who were selected purposively based on the suitability of the curriculum and the availability of learning facilities.

The steps to implement the trial began with media socialization by teachers, followed by the implementation of online learning for four sessions, each representing stages in the SQ3R model. Data collection was carried out through pretest and posttest instruments to measure critical thinking skills, learning interest questionnaires filled out before and after learning, and digital LKPD as indicators of student involvement.

The data were analyzed using statistical techniques, namely *the gain test* to measure the improvement of student learning outcomes (Hake, 1998), *the paired-sample t-test* test to test the significance of the difference in pretest and posttest scores, and the Pearson correlation test to analyze the relationship between learning interest and critical thinking skills. The results of the correlation test showed a low positive association ($r = 0.27$), which indicated that increased interest in learning contributed to the improvement of critical thinking skills, although not very strongly.

The learning media developed has gone through a validation process by material experts and media experts. The validation results show that this media meets the feasibility criteria in terms of content, design, and ease of navigation, and is declared suitable for use in learning. This indicates that the media has met the appropriate pedagogical and technical standards for use in learning programming algorithms digitally.

Thus, the integration of the SQ3R model into website-based learning media has been proven to make a positive contribution to improving the quality of learning, especially in terms of students' critical thinking skills and learning interests. This innovation is in line with the needs of 21st century learning that emphasizes mastery of digital literacy and high-level thinking skills.

Test of Effectiveness on Critical Thinking Skills

The evaluation was carried out by comparing the results of the pretest and posttest consisting of 40 critical thinking questions based on six indicators according to Facione (2015): interpretation, analysis, evaluation, inference, explanation, and self-regulation.

The average student pretest score is 46.76, while the posttest increased to 87.5. This indicates a significant increase. The Paired Sample t-Test showed a significance value of p = 0.001, which means that there was a statistically significant difference between the pretest and posttest results.

Furthermore, the average N-Gain score obtained in the study is 0.76, which falls into the high category, indicating a significant improvement in students' critical thinking skills. When analyzed by ability groups, the upper group achieved an N-Gain of 0.85 (high), the middle group recorded an N-Gain of 0.76 (high), and the lower group attained an N-Gain of 0.67, which is categorized as moderate.

The increase in values is also reflected in each critical thinking indicator, as follows:

Table 3 N Gain Pretest and Posttest

Indicator	Pretest	Posttest	N-Gain
Interpretation	46,6	83,59	0,69
Analysis	29,6	88,9	0,84
Evaluation	43,4	79,4	0,64
Inference	55,6	92,6	0,83
Explanation	60,5	92,6	0,81
Self-regulation	51,2	89,5	0,78

These values show that all indicators have increased, with the Analysis and Inference indicators experiencing the highest increases. This shows that the SQ3R method successfully encourages a more analytical and logical thinking process in understanding the concept of algorithms.

Test Students' Learning Interest

To measure changes in learning interests, questionnaires were filled out before and after learning. The results showed an increase from 65.55% to 71.57%, with the largest increase in the indicator of learning engagement (up 7.16%), followed by aspects of feeling happy (6.48.%) and attention (6.23%)

Table 4 Increased Interest in Learning

Aspects of Learning Interest	Before Score	After Score	Change (%)
Ketertarikan	64,25%	68,70%	+4,45%
Attention	64,88%	71,11%	+6,23%
Feeling Happy	66,85%	73,33%	+6,48%
Involvement	66,66%	73,82%	+7,16%

Correlation Test Between Learning Interest and Critical Thinking

Pearson's correlation analysis yielded a value of r = 0.271, which indicated a low positive relationship between students' interest in learning and critical thinking skills. The value of the determination coefficient (r^2 = 7.34%) showed that learning interest contributed 7.34% to the improvement of critical thinking. With r-table at n = 27 of 0.323, then r-count (0.271) > r-table, so that the correlation indicates a low positive relationship.

CONCLUSION

This study aims to develop a website-based algorithmic learning media using the SQ3R (Survey, Question, Read, Recite, Review) method and test its effectiveness in improving students' critical thinking skills and learning interests. The development process is carried out through the ADDIE model approach, including the stage of needs analysis, interactive media design, digital content development, implementation in grade X PPLG SMKN 1 Cisarua students, as well as evaluation based on student responses and learning outcomes. The results of the study showed that the learning media developed had excellent quality based on expert validation (media: 85%, material: 82.45%). The application of the website-based SQ3R method significantly improved students' critical thinking skills, with an average pretest score of 46.76 increasing to 87.5 in the

posttest. The calculation of an N-Gain score of 0.76 indicates high effectiveness. All groups of students—bottom (0.67), middle (0.76), and upper (0.85)—experienced improvements, proving that this method is inclusive and adaptive to students' differences in early abilities. In addition, there was a positive increase in the aspect of student learning interest, from a score of 1416 (65.55%) before learning to 1546 (71.57%) after learning. The largest increase was recorded in the aspect of learning engagement, which was 7.16%, followed by the aspects of feeling happy (6.48%), attention to learning (6.23%), and interest (4.45%). The correlation test showed a low positive relationship (r = 0.271) between learning interest and critical thinking skills. Overall, this study concludes that the integration of the SQ3R method into website-based media has proven to be effective in improving the critical thinking skills and learning interests of vocational school students, and is relevant to be applied in conceptual and theoretical learning algorithms.

REFERENCES

Amanda, R.R., Syahidin, S., Nazhan, F.A., & Muzakki, R.F. (2024). Analysis of the Jurisprudence Learning Model with Debate Strategies in Building Students' Argumentative Skills. Journal of Educational Management, 8(2), 316-327.

Ausubel, D. P. (1968). *Educational Psychology: A Cognitive View*. New York: Holt, Rinehart and Winston.

Black, P., & Wiliam, D. (2009). Developing the theory of formative assessment. *Educational Assessment, Evaluation and Accountability, 21*(1), 5–31.

Branch, R. M. (2009). *Instructional Design: The ADDIE Approach*. New York: Springer.

Ennis, R. H. (2011). The Nature of Critical Thinking: An Outline of Critical Thinking Dispositions and Abilities. University of Illinois.

Facione, P.A. critical thinking: what it is and Why it Count. http://www.insightassessment.com/content/download/1176/7580/file/what/26why 2010.pdf.2015.

Fadilasari, E., Pramudita, O., Aeni, K., & Azizah, W.A. (2024). Application of Project-Based Learning Model in Pancasila Education Subjects to Improve Learning Outcomes and Practice the Meaning of Pancasila Values. INNOVATIVE: Journal of Social Science Research, 4(1), 6887-6901.

Gall, M. D., Gall, J. P., & Borg, W. R. (2003). *Educational Research: An Introduction* (7th ed.). Boston: Allyn & Bacon.

Hake, R. R. (1998). Interactive-engagement vs traditional methods: A six-thousand-student survey of mechanics test data for introductory physics courses. *American Journal of Physics, 66*(1), 64–74.

Luthfia, Izza (2022). *The Effectiveness of the Application of Interactive Media in Face-to-Face Learning is Limited to Student Learning Outcomes* (Doctoral Dissertation, Dehasen University Bengkulu)

Maharani, S., Nusantara, T., As'ari, A.R., & Qohar, A. (2020). *COMPUTATIONAL THINKING Problem Solving in the 2nd Century*. CreateBook. Com

Paul, R., & Elder, L. (2014). *The Miniature Guide to Critical Thinking Concepts and Tools*. Foundation for Critical Thinking.

Purnamasari, I., Handayani, D., & Formen, A. (2020). Stimulation of hots skills in early childhood through steam learning. In the Proceedings of the National Postgraduate Seminar (Vol. 3, No. 1, pp. 506-516).

Robinson, F. P. (1946). *Effective Study*. New York: Harper & Brothers.

Safari. 2003. Learning Interest Indicators. Jakarta:Rineka Cipta

ʾari, E.I., Nursanti, Ed.R., Fadholi, M., Aprinastuti, C., & Rismiyati, Y. (2023). The application of a computational approach to thinking about the foundational ability of energy materials and its changes in grade 3 of SD Negeri Bhaktikarya. *Education: Journal of Research and Educational Articles*, *15*(1), 1-12.

Sugiono, Quantitative, Qualitative, and R&D Research Methods, 2010. Bandung: Alphabet.

Sugiyono. (2018). Educational Research Methods. Bandung: Alfabeta.

Suhendi, H.H., Utari, S., & Hasanah, L. (2018). Profile of critical thinking skills and improvement of learning achievement of high school students through the application of problem-solving strategies by reading infusions. Gravity: Scientific Journal of Physics Research and Learning, 4(1).

Syafrizal, T. (2023). Analysis of the Implementation of the Independent Curriculum in the Perspective of Humanistic Learning Theory in MTsN 3 and MTsN 19 Jakarta (S2 Thesis, Jakarta: FITK UIN Syarif Hidayatullah Jakarta).

Walid, MI (2017). Development of Geogebra-based interactive learning media with ADDIE development model (analysis, design, development, implementation, evaluation) in geometry materials for class XI MIA SMA Negeri 3 Takalar. *Retrieved from the repository. uin-alauddin. ac. identifier*.

Zimmerman, B. J. (2002). Becoming a self-regulated learner: An overview. *Theory into Practice, 41*(2), 64–70.