



The influence of the RQA model on the digital literacy ability of high school students

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ABSTRACT

The digital literacy skills of high school students are still relatively low, especially in critically searching for, evaluating, and managing digital information. This study aims to analyze the effect of the Reading, Questioning, and Answering (RQA) learning model on students' digital literacy skills in Informatics. This study used a quantitative approach with a nonequivalent control group quasi-experimental design involving two classes: an experimental class and a control class, with a sample of 70 grade XI students at SMA Negeri 2 Padang in the 2024/2025 academic year. The research instrument was a digital literacy test covering aspects of online information searching, hypertext navigation, content evaluation, and knowledge compilation. Data analysis was performed using an independent-samples t-test and an N-Gain calculation. The results showed a significant difference in learning outcomes between the experimental and control classes. Students who used the RQA model for learning showed greater improvement across all aspects of digital literacy than those in conventional learning. The RQA model is considered effective because it encourages active engagement, critical thinking, and independent learning among students.

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ABSTRAK

Kemampuan literasi digital murid SMA masih tergolong rendah, terutama dalam mencari, mengevaluasi, dan mengelola informasi digital secara kritis. Penelitian ini bertujuan untuk menganalisis pengaruh model pembelajaran Reading, Questioning, and Answering (RQA) terhadap kemampuan literasi digital murid pada mata pelajaran Informatika. Penelitian ini menggunakan pendekatan kuantitatif dengan desain quasi eksperimen nonequivalent control group design yang melibatkan dua kelas, yaitu kelas eksperimen dan kelas kontrol dengan jumlah sampel 70 murid kelas XI SMA Negeri 2 Padang tahun ajaran 2024/2025. Instrumen penelitian berupa tes literasi digital yang mencakup aspek pencarian informasi melalui internet, navigasi hypertext, evaluasi konten, dan penyusunan pengetahuan. Analisis data dilakukan menggunakan uji independent sample t-test dan perhitungan N-Gain. Hasil penelitian menunjukkan adanya perbedaan signifikan antara hasil belajar murid pada kelas eksperimen dan kelas kontrol. Murid yang mengikuti pembelajaran dengan model RQA menunjukkan peningkatan lebih tinggi pada seluruh aspek literasi digital dibandingkan dengan pembelajaran konvensional. Model RQA dinilai efektif karena mampu mendorong keterlibatan aktif, kemampuan berpikir kritis, dan kemandirian belajar murid.

Kata Kunci: literasi digital; model pembelajaran; Reading, Questioning, and Answering; RQA

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INTRODUCTION

The digital era has significantly transformed many aspects of human life, with education among the most affected sectors. With the advancement of information and communication technology, the learning process has shifted from conventional models to more dynamic, interactive, and technology-integrated approaches. This transformation is not limited to the use of learning tools but also includes changes in methods, strategies, and more innovative learning models. As explained by Kasali in a book titled “*Self Disruption*”, the era of disruption is a period in which fundamental innovations occur, forcing individuals, especially students, to have skills that are relevant to the demands of the times. The skills needed in the 21st century include critical thinking, creativity, language competence, cultural competence, and digital literacy (Hadiapurwa et al., 2023).

Data from the Ministry of Communication and Information Technology shows that Indonesia's digital literacy index stands at 3.49 on a scale of 1–5, which is classified as “moderate.” This classification groups the national digital literacy index into four categories: low (1.00–2.00), moderate (2.01–3.50), good (3.51–4.50), and very good (4.51–5.00). The score of 3.49, which is at the upper limit of the moderate category, indicates that the level of digital literacy among Indonesians still needs improvement, particularly in digital ethics, digital security, digital culture, and digital skills (see: <https://literasidigital.id/survey>). This finding indicates the need for learning innovations that develop digital literacy skills from the secondary education level onward. This shows that the community's digital literacy skills, especially among students, still need improvement. Low digital literacy skills can result in the spread of misinformation, such as hoaxes and online fraud, which are increasingly prevalent in this digital age.

Based on observations at a high school in Padang, the implementation of digital literacy in schools remains suboptimal. Many students have difficulty finding valid information on the internet, understanding hyperlink structures, critically evaluating content, and compiling information into new knowledge. This makes it difficult for students to understand the subject matter delivered through technology. The same is true in learning. Based on observations at a high school in Padang, the application of digital literacy in the school environment remains suboptimal. This can be seen from the fact that many students still have difficulty finding valid information on the internet, understanding hyperlink structures or hypertext directions, critically evaluating the content they find, and compiling information into new knowledge. As a result, students have difficulty understanding the subject matter delivered through technology. A lack of digital literacy skills can lead to misconceptions of information in the learning process (Aida, 2023). This shows that students' digital literacy skills still need improvement, especially in technology-based learning.

As a result, students receive information passively, without being trained to search for, evaluate, and manage it independently. This condition reflects a deficit in higher-order cognitive skills, such as analysis, synthesis, and evaluation of information, which are important components in critical thinking and meaningful learning. This deficit not only hinders students' development of digital literacy but also directly affects their ability to solve problems and relate knowledge to real-world contexts. Inadequate digital literacy skills often prevent the achievement of learning outcomes and objectives (Aida, 2023). The world of education must keep pace with technological developments and leverage technology to facilitate learning. However, the learning carried out in each school still leaves gaps in continuity, such as declines in student and teacher literacy activities, especially when students' digital literacy is inadequate (Davis et al., 2025; Kerkhoff & Makubuya, 2022; Manca & Delfino, 2021).

The use of media and learning models is also necessary to clarify problems and solutions in teaching themes, motivate learning, foster critical thinking, and further improve students' digital literacy (Rosyiddin et al., 2023). Today, the dominant learning models are often conventional, teacher-centered, and passive (Khaira et al., 2023). This approach does not provide students with opportunities to actively engage in the

learning process, so they cannot construct their own knowledge. In this context, the application of the Reading, Questioning, and Answering (RQA) learning model is important. The Reading, Questioning, and Answering (RQA) model developed by Corebima in the book titled "*Model Reading, Questioning, and Answering (RQA) dalam Pembelajaran Genetika*" focuses on active student engagement through three main stages, namely reading, questioning, and answering. Each component in this model is directly relevant to the four dimensions of digital literacy proposed by Gilster in a book titled "*Digital Literacy*". The reading stage relates to the ability to search for information on the internet (internet searching) and understand the digital context.

The questioning stage trains students' hypertext navigation and content-evaluation skills, while the answering stage encourages them to assemble new knowledge through their own analysis. Thus, the RQA model not only supports deep cognitive activities but also strengthens students' digital literacy across all significant aspects in an integrated manner. Research shows that applying the RQA model yields higher learning outcomes than conventional models, demonstrating its effectiveness in supporting digital literacy learning (Maulida & Mayasari, 2019). Based on the above issues, this study aims to analyze the effect of the RQA model on the digital literacy skills of high school students in Informatics. Focusing on internet searching, hypertext navigation, information content evaluation, and knowledge organization, this study is expected to make a significant contribution to improving the quality of learning in the digital age.

By applying the RQA model, students are expected to become independent, critical, and adaptive learners in response to ever-changing technological developments. This research was conducted to improve students' digital literacy skills and to apply more interactive learning models to maximize the use of technology in education, especially in Informatics. The objectives of this study are: 1) to determine which group has a significantly higher influence on students' digital literacy skills in Informatics between the group using the RQA model and the group using the conventional model; 2) To determine the effect of the RQA model on the digital literacy skills of high school students in Informatics, and to compare the results between the group that learned using the RQA model and the group that learned through conventional methods in terms of internet search, hypertext navigation, content evaluation, and knowledge compilation.

LITERATURE REVIEW

Reading, Questioning, and Answering (RQA) Learning Model

The Reading, Questioning, and Answering (RQA) learning model is a student-centered strategy that emphasizes three main stages: reading, questioning, and answering. This model aims to improve critical thinking skills, conceptual understanding, and active student engagement in the learning process. According to Sanjaya in the book titled "*Strategi Pembelajaran Berorientasi Standar Proses Pendidikan*", RQA can help students understand the material in depth because they are required to process information from reading, formulate meaningful questions, and answer based on their own understanding. In line with this, Corebima, in a book titled "*Model Reading, Questioning, and Answering (RQA) dalam Pembelajaran Genetika*" emphasizes that RQA is effective in developing higher-order thinking skills because it involves a process of reflection and self-evaluation in understanding the material. Recent research also shows this model's effectiveness in improving 21st-century skills.

Research found that applying the RQA model can significantly improve students' critical thinking skills and learning outcomes across various subjects (Putri et al., 2022). In addition, RQA fosters active engagement and a sense of responsibility for learning among students by providing opportunities to construct knowledge (Lisa et al., 2021). In the context of Informatics learning, the RQA model helps students develop analytical and logical thinking skills in understanding digital concepts, while also fostering an independent attitude in searching for and managing information from various digital sources (Hidayahtika et al., 2020). Similar findings reported that the RQA model improves students' information literacy and scientific

communication skills because it requires active engagement in a digital, text-based question-and-answer process (Tendrita & Sari, 2020). Meanwhile, previous research found that applying RQA in an online learning environment significantly increases students' motivation to learn and collaboration (Fitrianingsih et al., 2022). Thus, RQA has proven to be relevant for application in modern learning that emphasizes digital literacy, collaboration, and higher-order thinking skills.

Digital Literacy in 21st Century Learning

Digital literacy is the ability to search for, evaluate, and convey information clearly through various digital platforms (Komara & Hadiapurwa, 2023). Digital literacy encompasses not only the technical ability to operate digital devices but also a deep understanding of how information is presented and accessed. According to Gilster in a book titled "*Digital Literacy*", digital literacy is the skill of understanding and using information from various digital sources effectively and efficiently. This includes the ability to search for information, understand hypertext structures, evaluate the validity of information, and compile new knowledge. Digital literacy can be divided into several aspects, including searching for information on the internet, navigating hypertext, evaluating information content, and synthesizing knowledge. Each of these aspects plays an important role in helping students adapt to an increasingly complex digital environment. Digital literacy is an individual's ability to use digital technology to find, evaluate, create, and communicate information effectively.

According to Gilster in a book titled "*Digital literacy*", digital literacy encompasses four main aspects, namely internet searching, hypertextual navigation, content evaluation, and knowledge assembly. In the context of 21st-century learning, digital literacy is one of the key competencies students must possess to actively participate in an information- and technology-based society (Anyaoobi & Echedom, 2025). Digital literacy skills are not only about the technical aspects of using devices but also include critical and evaluative thinking when processing digital information (Komara et al., 2025). Research shows that students with high digital literacy tend to exhibit greater learning independence and academic achievement (Sari, 2022). Therefore, the application of learning models oriented toward higher-order thinking activities and independent exploration, such as RQA, has excellent potential to develop students' digital literacy skills comprehensively (Tarigan & Tarigan, 2022).

The Relationship between the RQA Model and Digital Literacy

The RQA model is highly relevant to the development of digital literacy because the processes of reading, questioning, and answering require critical thinking skills and the ability to manage information from various sources. The reading stage encourages students to search for and understand digital information in depth, while the questioning stage develops their ability to analyze and evaluate the information obtained. The answering stage helps students reorganize new knowledge into a more meaningful and reflective understanding. According to Keller in the book titled "Motivational design for learning and performance: The ARCS model approach," the ARCS model (Attention, Relevance, Confidence, and Satisfaction), learning activities that involve active cognitive activities, such as RQA, can increase learning motivation and learning outcomes.

The Self-Determination Theory, which emphasizes that active involvement in the learning process can fulfill students' basic psychological needs for autonomy, competence, and relatedness, thereby encouraging intrinsic motivation (Deci & Ryan, 2000). Research also shows that the RQA model is efficacious in improving critical thinking skills and learning independence because it places students at the center of learning activities (Hikamah & Maghfiroh, 2024). Furthermore, applying the RQA strategy in a digital learning context can strengthen students' digital literacy competencies, particularly their ability to

evaluate and integrate information from various online sources (Pratiwi et al., 2024). Thus, applying the RQA model in Informatics learning not only improves conceptual understanding but also strengthens students' digital literacy competencies in addressing the challenges of the technological era.

Previous Relevant Research

Several studies support the effectiveness of the RQA model in improving learning outcomes and 21st-century skills. Previous research found that applying RQA in biology learning improved students' conceptual understanding and critical thinking skills (Nur et al., 2023). Similar results were reported in previous research, which showed that the RQA model can increase students' active participation and information literacy in project-based learning (Rumahlatu et al., 2021; Zubaidah et al., 2023). In addition, another study emphasized that question-based learning strategies, such as RQA, can optimize students' metacognitive abilities in managing their own thinking processes (Leasa et al., 2023).

Recent research also shows that integrating the RQA model into digital learning can improve student collaboration, communication, and higher-order thinking skills, which are key components of 21st-century competencies (Palenti et al., 2023; Putri et al., 2022). These findings are in line with Ng in a book titled *"Integrating Digital Literacy into Education: Frameworks and practices"*, who states that strengthening digital literacy and critical thinking skills through active learning approaches is essential for students to adapt to the challenges of technology and information. Thus, applying the RQA model in the context of Informatics learning not only helps students understand academic content but also develops higher-order thinking skills and digital literacy relevant to 21st-century education.

METHODS

This research employed a quantitative, quasi-experimental design to examine the causal relationship between variable X (the Reading, Questioning, and Answering learning model) and variable Y (students' digital literacy skills). Two class groups were involved: the experimental group and the control group. The experimental group received instruction through the RQA learning model, while the control group followed conventional teaching without any special treatment. The study was carried out at SMA Negeri 2 Padang, located on Jl. Musi No. 2 Purus Atas, Padang City, West Sumatra. The population consisted of 11th-grade students in the 2024/2025 academic year, with a total sample of 70 learners. The sample was divided into two groups: ICT 1, the experimental class with 35 students, and ICT 2, the control class with 35 students. Sampling in this study was conducted using a nonequivalent control group design, in which the experimental and control groups were determined based on existing classes without randomization (non-randomized).

Therefore, to ensure that both groups had comparable initial conditions, a pre-test was conducted before treatment. This pre-test served to control for initial differences between the experimental and control groups, particularly in terms of students' digital literacy skills prior to the implementation of the RQA model. Thus, any changes in learning outcomes observed after the treatment (post-test) could be more reliably attributed to the implementation of the RQA learning model rather than to differences in initial abilities between the groups. This study used pre- and post-test data collection techniques. The tests in this study were administered to measure students' mastery of the scope to be assessed, namely digital literacy skills, before learning (pre-test) and after learning or after treatment (post-test), in the subject of Informatics, in the form of multiple-choice objective tests.

Table 1. Results of the Instrument trials

Question No.	R Value	R Table	Description	Significance Level
1.	0.5160	0.2973	Valid	Medium
2.	0.8640	0.2973	Valid	Very High
3.	0.6200	0.2973	Valid	High
4.	0.6837	0.2973	Valid	High
5.	0.4508	0.2973	Valid	Medium
6.	0.5680	0.2973	Valid	Medium
7.	0.8818	0.2973	Valid	Very High
8.	0.5990	0.2973	Valid	Medium
9.	0.8038	0.2973	Valid	Very High
10.	0.5086	0.2973	Valid	Medium
11.	0.7655	0.2973	Valid	High
12.	0.6392	0.2973	Valid	High
13.	0.5502	0.2973	Valid	Medium
14.	0.8526	0.2973	Valid	Very High
15.	0.4373	0.2973	Valid	Medium
16.	0.5663	0.2973	Valid	Medium
17.	0.6131	0.2973	Valid	High
18.	0.5848	0.2973	Valid	Medium
19.	0.6969	0.2973	Valid	High
20.	0.6617	0.2973	Valid	High
21.	0.6962	0.2973	Valid	High
22.	0.5830	0.2973	Valid	Medium
23.	0.7355	0.2973	Valid	High
24.	0.5565	0.2973	Valid	Medium
25.	0.6029	0.2973	Valid	High

Source: Research 2025

The test instrument used in this study was an objective multiple-choice test consisting of 25 questions, designed to measure students' digital literacy skills before and after learning in Informatics subjects (see **Table 1**). The questions were compiled based on four aspects of digital literacy according to Gilster in a book titled "*Digital Literacy*", namely, internet searching, hypertextual navigation, content evaluation, and knowledge assembly. Each aspect was represented by a proportional number of questions, based on the skill indicators being measured. Before administering the test to the sample, the test instrument was first piloted with students who were not part of the research sample. The results of the reliability test data analysis in Microsoft Excel 2019 are shown in **Table 2**.

Table 2. Reliability Statistics

Reference value	Total N	Cronbach's Alpha	Reliable Criteria
0.700	35	0.909	Very High

Source: Research 2025

Based on the reliability statistics in **Table 2**, the Cronbach's alpha value is 0.909 with 25 questions. The reliability criteria table shows that the Cronbach's alpha value of 0.909 (> 0.700) falls into the "Very High" category, indicating that the test is reliable.

RESULTS AND DISCUSSION

Data Description

The RQA model study was conducted at SMA Negeri 2 Padang, involving 70 grade XI students in the Informatics subject. The sample was divided into two groups: the experimental and the control. The research process began by administering a pretest to both groups, a multiple-choice test of digital literacy skills. The pretest results were intended to assess students' initial abilities before treatment. Based on the pretest results from both groups, processed in Microsoft Excel 2019, the following were obtained (**Table 3**).

Table 3. Results of the Pre-test on Students' Digital Literacy Skills

Acquisition	Control class	Experimental class
Sample size	35	35
Minimum value	36	28
Maximum value	88	88
Mean	56,34	53,37
Modus	56	52
Median	56	52
Standard deviation	14,50	16,46
Varians	210,23	271,01

Source: Research 2025

According to the data presented in **Table 3**, each class shows significant differences: the average in the control class is 56.34, while in the experimental class it is 53.37. The average of the experimental class is lower than that of the control class. After treatment was administered to the experimental class using the RQA learning model and to the control class using conventional learning, the next step was to give a posttest to both classes. The posttest aimed to determine students' digital literacy skills and their understanding of the material delivered through the RQA model in the experimental group and the conventional method in the control group. The results of the students' posttest scores in both classes are as follows in **Table 4**.

Table 4. Posttest Results of Students' Digital Literacy Skills

Acquisition	Control class	Experimental class
Sample size	35	35
Minimum value	48	48
Maximum value	100	100
Mean	69,49	82,51
Modus	60	84
Median	68	84

Acquisition	Control class	Experimental class
Standard deviation	14,39	12,54
Varians	207,14	157,26

Source: Research 2025

According to the data presented in **Table 4** above, both the experimental and control groups showed increases from pretest scores before treatment. The lowest and highest scores in both sample classes were the same: 48 and 100. The average scores obtained by both classes differed significantly: 13.02 for the experimental class, and 82.51 and 69.49 for the control class. The median in the experimental class was also higher, at 84, than in the control class, at 68. The mode in the experimental class was 84, while in the control class it was 60. The experimental class had a standard deviation of 12.54, whereas the control class had a standard deviation of 14.39.

Table 5. Pre-Posttest Percentage of Students' Digital Literacy Skills

Aspect	Pre-test score		Posttest Score	
	Control	Experiment	Control	Experiment
Internet search	11%	11%	14%	16%
Hypertext navigation guide	55%	54%	67%	82%
Evaluation of information content	57%	52%	69%	84%
Knowledge compilation	61%	51%	64%	83%

Source: Research 2025

The digital literacy framework employed in this study is adapted from Gilster in a book titled “*Digital Literacy*”, who categorizes digital literacy into four aspects: Internet searching, Hypertextual navigation, Content evaluation, and Knowledge assembly. The students’ digital literacy performance in each aspect, both before and after treatment in the two sample classes (as reflected in pretest scores), is presented in **Table 5**. According to the table above, scores increased in both the experimental and control groups across all aspects of digital literacy assessed. However, there was a significant increase in the experimental group from pretest to posttest. This shows that applying the RQA model affected the assessed aspects of digital literacy.

Results of Variable Analysis Research

In this study, hypothesis testing was conducted using prerequisite procedures that included normality and homogeneity assessments, paired and independent-samples t-tests, and N-gain tests. The first stage was the normality test; a p-value above 0.05 indicates that the data are typically distributed.

Table 6. Results of the Normality Test of Students' Digital Literacy Skills

Class	Post-test			
	Sample size	Sig	Desc.	Criteria
Experiment	35	0,054	> 0,05	Normally Distributed
Control	35	0,106	> 0,05	Normally Distributed

Source: Research 2025

Based on **Table 6**, the results of the normality test for the digital literacy ability scores of the experimental and control classes using the Liliefors test indicate that the experimental class ($0.054 > 0.05$) and the control class ($0.106 > 0.05$) are not normally distributed. Accordingly, it is concluded that the students' digital literacy scores post-learning in both classes exhibited a normal distribution. Next, a homogeneity test was conducted to determine whether the data were homogeneous (i.e., whether the sample data came from a population with the same variance).

Table 7. Results of the Homogeneity Test for Experimental and Control Groups

	Mean		Variants		F hit.	F table	Desc.	Criteria
	Pre	Post	Pre	Post				
Control Class	56,34	69,49	210,23	207,14	1,01	1,77	0,05	homogeneous
Experimental class	53,37	82,51	271,01	157,26	1,72	1,77	0,05	homogeneous

Source: Research 2025

In this test, the researcher used the Levene test in Microsoft Excel 2019. This test uses the largest-variance method, with the decision criteria that if the calculated $F <$ the F table value, it is homogeneous, and if the calculated $F >$ the F table value, it is not homogeneous. This is shown in **Table 7**. The homogeneity test results of the digital literacy scores for the experimental and control classes prior to learning are presented in the table above. This test applied a significance level of $\alpha = 0.05$ with an F -table value of 1.77. From the data above, it can be seen that the homogeneity test for the pretest-posttest data for both classes yielded a calculated F value $<$ the F table value. The calculation of homogeneity in both sample classes yielded a calculated F value for the control class ($1.01 <$ the F table value (1.77)). The experimental class obtained a calculated F value ($1.72 <$ F table (1.77)). Based on the data from the homogeneity test calculation in both sample classes, it can be stated that they are homogeneous because the calculated $F <$ F table.

Hypothesis Testing

For hypothesis testing, the study used paired-samples t -tests, independent-samples t -tests, and N -gain tests. The paired sample t -test assessed differences in mean scores between two dependent samples, comparing students' performance before and after treatment in both the control and experimental groups.

Table 8. Results of the Paired Sample t -test for the experimental and control groups

	t-test: paired two-sample for means (Control)	t-test: paired two-sample for means (Experiment)
Pearson correlation	0,979	0,915
df	34	34
T stat.	35,91	24,28
P(T<=t) one tail	2,8e-24	2,32e-23
T critical one-tail	1,6909	1,6909
P(T<=t) two tail	5,7e24	4,6e-23
T critical two-tail	2,032	2,032

Source: Research 2025

The results of this analysis are presented in **Table 8**. The decision in this test is based on comparing the calculated T value with the table T value. If the calculated $T \leq$ table T, then H_0 is accepted; otherwise, H_0 is rejected. In addition, if the p-value is smaller than the significance level ($\alpha = 0.05$), then H_0 is rejected, and if it is larger, then H_0 is accepted. Interpretation of the Paired Sample t-test.

1. The data analysis produced a Sig. (2-tailed) value of $0.000 < 0.05$, indicating $p < 0.05$. Thus, it can be concluded that a significant difference exists between the average learning outcomes of students in the experimental class before and after treatment using the Reading, Questioning, and Answering (RQA) model.
2. The Sig. (2-tailed) analysis yielded a value of 0.000, which is below the 0.05 significance level, indicating that there is a significant difference in the mean learning outcomes of students between the pre-test and post-test in the control class taught with the conventional method.

Based on the above explanation, this shows that students' digital literacy skills have increased, as evidenced by a significant difference in the average learning outcomes before and after the treatment (learning model) was applied in the classroom. The following procedure involved applying an independent-samples t-test to assess potential differences in the mean scores of two groups with different participants. The outcomes of this test are in **Table 9** below. The decision in this test is that if the calculated T is less than or equal to the table T (calculated $T <$ table T), then H_0 is accepted, and vice versa. Alternatively, if the p-value is less than the significance level ($\alpha = 0.05$), then the decision is that H_0 is rejected, and vice versa.

Table 9. Results of the Independent sample t-test

	t-test: two-sample assuming equal variances	t-test: two-sample assuming unequal variances
Pooled variance	182,198	0
Df	68	67
t-stat	4,038	4,038
P(T<=t) one-tail	0,00007	0,00007
T critical one-tail	1,668	1,668
P(T<=t) two-tail	0,0001	0,0001
T critical two-tail	1,995	1,996

Source: Research 2025

Based on Table 9, it can be seen that the results obtained are the calculated T value (4.038) $>$ T table (1.99) and p value $<$ significance level (0.05), namely $0.0001 < (\alpha) = 0.05$, so H_a is accepted, and H_0 is rejected. Thus, based on the results of the above study, there is a difference in the average learning outcomes of students after applying the Reading, Questioning, Answering (RQA) learning model in chapter 3, namely critical thinking and the social impact of informatics, when compared to conventional methods. This shows an increase in students' digital literacy skills, as evidenced by a significant difference in average learning outcomes after implementing this model in the classroom. Therefore, the findings of this research align with the proposed hypothesis, indicating that the Reading, Questioning, and Answering (RQA) learning model influences the digital literacy skills of high school students.

After conducting the hypothesis test, an N Gain test was also conducted on the pretest and posttest results, as well as on each aspect of the students' digital literacy skills. The N-Gain test was conducted to determine the level of understanding or mastery of concepts in both sample classes after the learning intervention was implemented. The results of the N-gain test for both groups are presented below.

Table 10. N Gain Test Results

No	Class	N-Gain	Description	Indeks Gain
1	Control	0,35	Currently	$0,70 > g > 0,30$
2	Experiment	0,67	Currently	$g > 70$

Source: Research 2025

As shown in **Table 10**, the control group achieved an average N-gain score of 0.35, which falls within the moderate category, indicating that their conceptual understanding improved moderately. On the other hand, the experimental group achieved an average N-gain of 0.67, placing it in the high category and indicating greater improvement in students' conceptual understanding. Despite both groups being generally classified as moderate, the difference in scores (0.32) was substantial. This confirms that the Reading, Questioning, and Answering (RQA) model produced a significantly greater improvement in student learning outcomes in Critical Thinking and the Social Impact of Informatics than the traditional method.

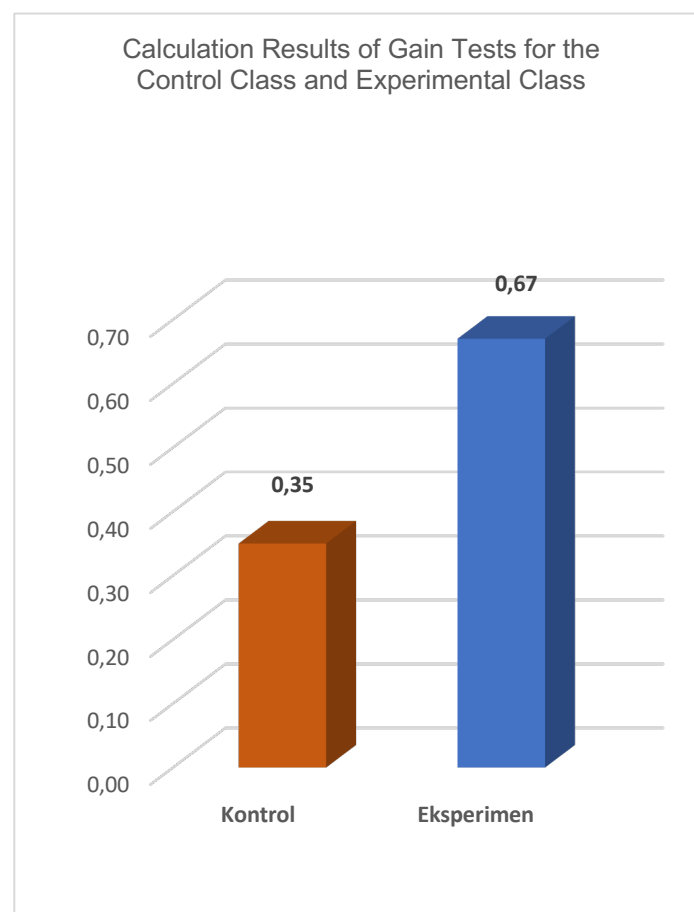


Figure 1. Comparison of N Gain in the Experimental and Control Groups
Source: Research 2025

Figure 1 provides a more precise comparison of the N-gain scores across the two groups. Digital literacy competencies are assessed using Gilster's dimensions. The subsequent table presents the N-gain score improvements in both the experimental and control groups for each aspect of digital literacy.

Table 11. Results of the N Gain Test for Digital Literacy Skills

Aspect	Control Class		Experimental Class	
	N-Gain	description	N-Gain	description
Internet search	0,41	Currently	0,59	Currently
Hypertext navigation guide	0,28	Low	0,61	Currently
Evaluation of information content	0,31	Currently	0,68	Currently
Knowledge compilation	0,08	Low	0,47	Currently

Source: Research 2025

According to **Table 11** above, scores increased across all aspects of digital literacy in both the experimental and control classes. In the experimental class, all aspects of improvement were in the moderate category, with the highest increase of 0.68 in information content evaluation. Meanwhile, in the control class, two aspects of improvement were in the low category: hypertext navigation (0.28) and knowledge organization (0.08). Then, two aspects were in the moderate category, namely the internet search aspect at 0.41 and the information content evaluation aspect at 0.31. The lowest increase in the control class was 0.08 in the knowledge organization aspect. Meanwhile, in the experimental class, the knowledge structuring aspect was 0.47. These results indicate that improvements in students' digital literacy skills in the experimental class taught using the RQA Model were greater than those in the control class using conventional learning methods.

Discussion

This study seeks to investigate how the Reading, Questioning, and Answering (RQA) instructional model impacts the digital literacy skills of senior high school learners in Informatics. Data were collected from pretest and posttest in the experimental class (RQA) and the control class (conventional). The results show that students' digital literacy skills were low in both classes, with an average pretest score of 53.37 in the experimental class and 56.34 in the control class. Several factors contributing to these low scores include a lack of student preparation, limited mastery of technology, and a monotonous learning model. Observations show that students are less active in using digital devices and often copy and paste without in-depth analysis. After implementing the RQA model, the posttest results showed a significant increase, with the average score in the experimental class rising to 82.51, up 29.14 from the pretest. In contrast, the control class only increased by 13.15 to 69.49. The N-gain test showed a larger increase in digital literacy in the experimental class (0.67) than in the control class (0.35), although both were in the moderate category.

This discussion covers several aspects of students' digital literacy skills, starting with internet search skills. In the experimental class, students showed an increase with an N-gain of 0.59, while the control class showed only a 0.41 N-gain. This increase was due to students being asked to create and answer questions based on the information they read, which increased their curiosity and their courage to ask questions. In contrast, in the control class, students tended to be passive because the teacher was more dominant in explaining the material. Furthermore, in terms of hypertext navigation, the experimental class had an N-gain of 0.61, with an increase of 0.28 from the control class. Students began to get used to exploring information on search engines. Understanding hypertext is important in navigating information effectively, including how the web works and the characteristics of web pages. For information content evaluation, the experimental class achieved an N-gain of 0.68, showing a significant increase compared to the control class, which scored 0.31. Students in the experimental class were more critical in assessing the

information they found, with three evaluation indicators covering the ability to distinguish content display, search for sources, and recognize web addresses.

Finally, in terms of knowledge construction, the experimental class had an N-gain of 0.47, while the control class had an N-gain of 0.08. This improvement reflects the students' ability to construct knowledge through question-building activities. The skills of gathering, evaluating, and organizing information are essential, especially in the digital age, where critical analysis is needed to avoid false or misleading information. This occurs because implementing the reading strategy requires students to read to follow the learning process and complete the task of asking questions and finding answers (Darussyamsu & Fadilah, 2017). Through the habit of reading, individuals can distinguish authentic information and develop their comprehension and literacy skills (Jose, 2021; Librea et al., 2023; Oh et al., 2022). Therefore, it is hoped that, at the reading stage, students can understand and process information appropriately and summarize the content and subject matter. Then, the information obtained will raise cognitive questions that aim to explore the information, provide appropriate assumptions, and further develop the basic and more advanced aspects of previous understanding, thereby involving literacy skills.

The significant improvement in the experimental class can be attributed to the active engagement promoted by the RQA model. This model, which emphasizes reading, questioning, and answering, encourages students to engage more deeply with the learning material. This aligns with previous research supporting the effectiveness of the RQA model in improving critical thinking, learning outcomes, and information literacy. For example, studies found that the RQA model improved students' conceptual understanding and critical thinking skills in biology education (Nur et al., 2023). Similarly, research demonstrated that RQA could enhance students' active participation and information literacy in project-based learning environments (Rumahlatu et al., 2021). Other studies have shown that question-based learning strategies, such as RQA, enhance students' metacognitive abilities, enabling them to manage their thinking processes more effectively (Leasa et al., 2023). This is particularly important in the context of digital literacy, as students need to navigate, evaluate, and synthesize information from various digital sources.

The RQA model, by promoting reflective and inquiry-driven learning, is well-suited to enhancing these skills. Recent research also highlights the positive impact of integrating the RQA model into digital learning environments. Their findings indicate that the model fosters improved student collaboration, communication, and higher-order thinking skills, key components of 21st-century competencies (Putri et al., 2022; Tendrita & Sari, 2020). This aligns with Ng's work in *Integrating Digital Literacy into Education: Frameworks and Practices*, which emphasizes that strengthening digital literacy and critical thinking through active learning is crucial for students to succeed in a technology-driven world. In the present study, the significant improvements in the experimental group were most apparent in areas such as internet searching, hypertext navigation, content evaluation, and knowledge compilation—core aspects of digital literacy as defined by Gilster in a book titled *"Digital Literacy"*. The reading stage of the RQA model encouraged students to engage deeply with online information, thereby improving their ability to search for, evaluate, and organize digital content.

These findings echo previous research that showed the RQA model's effectiveness in improving digital literacy and critical thinking skills (Putri et al., 2022; Tendrita & Sari, 2020). The RQA model has proven effective in improving high school students' digital literacy skills, particularly in the context of Informatics education. The model not only enhances students' technical skills but also fosters critical thinking, metacognition, and the ability to manage information, skills essential for 21st-century learners to work independently. This research contributes to the growing body of evidence supporting the integration of active learning models, such as RQA, into digital literacy education, aligning with broader educational trends that foster higher-order thinking and collaboration (Leasa et al., 2023; Maulida & Mayasari, 2019).

Future research could further explore the application of the RQA model in various academic disciplines and digital learning environments to assess its broader applicability and effectiveness.

CONCLUSION

This study shows that applying the Reading, Questioning, and Answering (RQA) learning model significantly improves students' digital literacy skills in Informatics. The RQA model has been proven to develop critical thinking skills through reading, questioning, and answering activities that require students to actively search for, evaluate, and compile knowledge from various digital sources. Consistent improvements in the four dimensions of digital literacy information search, hypertext navigation, content evaluation, and knowledge organization indicate that this model is effective in fostering high-level cognitive abilities relevant to the demands of 21st-century learning. Scientifically, this research contributes to the development of a digital literacy-based learning approach by emphasizing that reflective, inquiry-oriented activities, such as those in the RQA model, can help build students' critical and independent thinking skills in the digital age. However, this study has several limitations, namely its scope, which is limited to one school and one subject, and its use of a quasi-experimental design that does not fully control for external variables. Therefore, further research is recommended to expand the context of RQA application across various levels and fields of study by involving a larger sample and a mixed-methods approach to obtain a more comprehensive understanding. As a result, teachers are advised to integrate the RQA model into digital technology-based learning to improve students' digital literacy and higher-order thinking skills. In addition, the results of this study can serve as a reference for curriculum developers and educators in designing training programs that strengthen digital literacy in formal education settings.

AUTHOR'S NOTE

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