The Effectiveness of the Questioning, Answering, Sharing, Extending, and Evaluating Learning Model on Improving Students Critical Thinking Skills

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Abstract: The purpose of this research is to examine the efficacy of the QASEE learning model in increasing critical thinking abilities of students in class XI at UPT SMA Negeri 6 Wajo. This study was carried out at SMA Negeri 6 Wajo during the academic year 2021/2022. The sample strategy employed is a basic random sampling method with a quasi-experimental design pattern with nonequivalent control groups. Essay exams were used to collect data on critical thinking abilities. The acquired data was then examined using the ANOVA test. Data study using the SPSS 26 for Windows tool reveals that the QASEE learning model has an impact on developing students' critical thinking abilities. The experimental class's N-Gain value for critical thinking abilities is 0.71, whereas the control class's N-Gain value is 0.42. Based on the ANOVA test findings, the significant value of critical thinking skills is less than 0.05, indicating that the QASEE learning model has an impact on increasing students' critical thinking abilities.

Keywords: Critical Thinking Skills; Learning Model; QASEE.

Introduction

Automation controlled by artificial intelligence and digital physical frameworks characterize the twenty-first century, also known as the Industrial Revolution 4.0 (Rahmatullah et al., 2022; Shahroom & Hussin, 2018; Teo et al., 2021). The fourth industrial revolution brought about improvements in many areas of life, including education (Ghufron, 2018; Lase, 2019; Risdianto, 2019). The education sector, as the primary investment in creating and progressing the next generation, must likewise adapt to the changes (Bali & Hajriyah, 2020; Dito & Pujiastuti, 2021; Santika, 2021).

To compete and contribute worldwide in the Industrial Revolution 4.0 age (Lase, 2019; Pursitasari et al., 2020), superior and quality human resources with a balance of knowledge and skills are required (Mardhiyah et al., 2021; Putra et al., 2018). The four Cs of 21st century capabilities are creativity (creativity & innovation), critical thinking (critical thinking & problem solving), cooperation (collaboration), communication (communication), and creativity (creativity & innovation) (Khoiri et al., 2021; Weng et al., 2022). These abilities are extremely likely to be deliberately boosted via schooling. These abilities may be taught to pupils at a young age via school-based teaching and learning activities, and they become essential learning goals that are emphasized in accordance with 21st-century trends (Chu et al, 2017; Thaiposri & Wannapiroon, 2015).

Having good critical thinking skills is essential in today's workplace (Geisinger et al., 2016; McGunagle et al., 2020; Ruqoyyah et al., 2020). Students need the ability to think critically if they are to succeed in an environment that is always changing (Leach et al., 2011; Viera & Tenreiro-Viera, 2014). The goal of critical thinking is to arrive at a decision in a methodical and rational manner. According to this definition, a person's ability to apply critical thinking is a reflective thinking

process that requires accuracy in decision-making via a set of procedures that investigate, test, and evaluate information in a purposeful manner. Every individual must be able to think critically considering the ever-increasing complexity of everyday s

Critical thinking is a major goal of scientific education (Vieira et al., 2016). Critical thinking skills must thus be promoted in schools (Nilson et al., 2013; Rennie et al., 2001). As a result of this, schools can provide services to pupils in the form of educational activities that promote critical thinking skills. Because of this, a clear picture of the development of pupils' critical thinking skills can be established (Dahlia et al., 2018)

As a result of this, the national curriculum has been updated to reflect the 21st century, notably regarding the 2013 curriculum. An emphasis on critical thinking abilities should be included into educational curricula. The number of teaching methods that specifically aim to improve students' cognitive capacities is presently rather few. Treating this problem promptly is considered to affect critical thinking abilities in the future (Furness et al., 2017; Saefi et al., 2017).

SMAN 6 Wajo is one of the schools that has implemented the 2013 curriculum. In biology learning, currently teachers have implemented several learning models. However, there are still many students who think that biology is difficult to understand, boring and boring so that not a few students who have difficulty understanding the current biology learning process are limited to providing declarative knowledge in solving problems. As a result, students' ability in learning biology is only limited to the ability to memorize a set of facts presented by the teacher and does not lead to understanding. In learning students tend to be passive, students only accept the material presented and do not take advantage of the opportunity to ask questions, but when the teacher asks the students, no one wants to answer but they answer at the same time so that the voice is not clear. Students' curiosity in finding information is still low which is an indicator of low critical thinking skills of students.

The QASEE model, which stands for Questioning, Answering, Sharing, Extending, and Evaluating, is one of the learning strategies that may assist students in developing their critical thinking skills. The QASEE learning paradigm includes five phases: (1) questioning the learning material that they have not fully understood; (2) answering questions they have independently written; (3) sharing information with group members and then presenting it to the class; (4) extending their understanding through knowledge transfer activities; and (5) conducting evaluation on their own after completing the learning activities (Saputri et al, 2020). Based on the issue description, the goal of this research is to assess the efficacy of the QASEE learning model in increasing students' critical thinking abilities.

Method

This study is a quasi-experimental design with "nonequivalent control group design" as shown in Table 1.

Table 1. Research Design Nonequivalent Control Group Design

Group	Pretest	Treatment	Posttest
Experiment	O_1	X	O_2
Control	O_3	-	O_4

(Sugiyono, 2011)

The participants in this research were all students from UPT SMAN 6 Wajo's class XI. The sample approach used was basic random sampling. One control class and one experimental class are included. The experimental group received therapy in the form of the QASEE learning model, while the control group received learning without the use of a traditional model. This research included one independent variable, learning using the QASEE learning paradigm, and one dependent variable, critical thinking.

The QASEE learning model is applied with reference to the syntax developed by Saputri et al., (2022), which consists of five phases, namely: (1) Questioning (thinking about the questions relating to the learning material that has not been understood); (2) Answering (searching for the answers to questions that have been written independently) ,(3) Sharing (sharing information with group members followed by a presentation to the class) ,(4) Extending (strengthening comprehension through knowledge transfer activity), and (5) Evaluating (doing evaluation independently after a series of learning activities. critical thinking. abilities measured based on indicators of critical thinking skills developed by Finken & Ennis (2013).

The test procedure performed the data gathering approach. The essay's test results were attained using critical thinking skills. The essay test has been approved for use in this study after being evaluated by learning specialists. Reliable instruments result from valid instruments (Ursachi et al., 2015). The critical thinking skill rubric, which was modified from the Illinois Critical Thinking Essay Test was used to score the essay test answers (Zubaidah et al., 2015). A test was employed in this research as an instrument. Normality, homogeneity, ANOVA, and N-Gain tests were performed to analyze the data. The result of Normality, homogeneity presented in the Table 2 dan Table 3.

Table 2. Normality Test Results for Experiment Class and Control Class

Sample Group	Sig	Conclusion
Pretest Experiment	0.126	Normal
Posttest Experiment	0.064	Normal
Pretest Control	0.080	Normal
Posttest Control	0.160	Normal

Table 3. Homogeneity Test Results

Data	Sig	Conclusion
Pretest in Both Class	0.589	Homogeneous
Posttest in both Class	0.868	Homogeneous

Result and Discussion

The outcomes of the research include the effect of the QASEE learning paradigm on the development of critical thinking abilities. Class XI MIPA 2 as the experimental class and Class XI MIPA 3 as the control class were selected as the sample class based on the results and analysis of research data. The consequences of students' critical thinking skills are shown in Table 4.

Table 4. Descriptive Statistics

Score	Experiment		Control	
	Pretest	Posttest	Pretest	Posttest
Max	60.00	95.00	50.00	80.00
Min	30.00	70.00	25.00	50.00
Mean	4.83	84.00	37.76	64.31
Standard deviation	7.51	6.21	6.35	6.64

Following information is displayed by the data in Table 5. Using the ANOVA test to assess the hypothesis of critical thinking skills, the value of sig = 0.000 is less than alpha 0.05 (p 0.05), indicating that the implementation of the QASEE learning model is beneficial in increasing students' critical thinking abilities.

Table 5. Anova Tests of Between-Subject Effects Dependent Variable: Critical Thinking Skills

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	39316.969[a]	3	13105.656	291.824	.000
Intercept	389694.138	1	389694.138	8677.319	.000
Class	39316.969	3	13105.656	291.824	.000
Error	5119.684	114	44.910		
Total	435725.000	118			
Corrected Total	44436.653	117			

a. R Square = .885 (Adjust R Squared = .882)

Table 6. N-Gain test

Class	Means	Category
Experiment	0.71	High
Control	0.42	Medium

According to Table 6. The experimental class's N-Gain value for critical thinking abilities is 0.71, whereas the control class's N-Gain value is 0.42. The difference in the average rise in the N-Gain score indicates that the experimental class has a higher average N-Gain value than the control class. As a result, there is a difference between students' critical thinking abilities after using the QASEE learning paradigm in their instruction and those who use more traditional methods.

The findings of this research are consistent with those of Quitadamo et al. (2008), who demonstrate that attempts to increase critical thinking abilities may be carried out via a variety of studies using a variety of models, methodologies, and approaches. Furthermore, the study's findings Saputri et al., (2020) indicated that the QASEE learning model may be used to enhance the critical thinking abilities of pre-service teachers. According to the study data in Table 2, the QASEE learning model is successfully employed to increase critical thinking abilities of UPT SMAN 6 Wajo class XI students. Table 2 shows that the experimental class pupils had better critical thinking abilities than the control class.

The QASEE learning model's effectiveness in enhancing students' critical thinking abilities is inextricably linked to its the process learning which as previously indicated consists of questioning, answering, sharing, extending, and evaluating. The use of the learning syntax has given the students room to reflect on questions, cooperative learning groups, oral presentations, real-world learning experiences, and written reflections. This has been characterized as a productive activity for enhancing critical thinking abilities (Bezanilla et al., 2019). Additionally, the syntax encourages students to think critically and communicate logically, which is seen to be essential for becoming a critical student (Kusaeri & Aditomo, 2019).

The students were required to participate in group presentations and discussions as part of the traditional learning process. However, because there were no activities that required students to study or prepare questions and answers prior to enrolling in a class, only the groups making presentations and a small number of students were able to grasp the learning materials. While some students simply listened and took notes on what their peers and lecturers had to say during the discussion. Acquiring basic information is crucial for enhancing pre-service teachers' capacity for critical thought. Basic information is crucial for pupils' development of critical thinking abilities (Kusaeri & Aditomo, 2019; Mahanal et al., 2019). The students' abilities to critique the information/material that was presented to them by their peers or lecturers were consequently underdeveloped. The QASEE learning model is superior to traditional learning models because it allows pre-service instructors to reflect on their own

teaching practices and encourages students to develop their own knowledge both alone and in groups with peers.

Model QASEE for leaning by creating questions (the asking phase) and responding to questions (the answering phase), which are carried out before class, each student builds their starting knowledge on their own. These exercises are within the category of reading comprehension techniques that have been shown to be successful in developing critical thinking abilities (Din, 2020). This is since all students are urged to practice analyzing, evaluating, and selecting material necessary to complete their projects when posing and responding to questions.

The sharing phase is the next learning activity, where the future teachers build their knowledge through both group and classroom conversations. Students can learn from this activity to sharpen their critical thinking skills by exchanging information and evaluating questions and responses with one another throughout the group discussion (Mahanal et al., 2019; Rahmawati et al., 2022). Critical thinking abilities may be improved by teachers employing learning methods that involve students actively in the learning process, concentrate on the learning process rather than just material, and apply tactics that give learning rather than just remembering or memorizing (Peter, 2012).

The application of the QASEE learning paradigm begins with the activity of creating and answering questions prior to the commencement of the class. These exercises are classified as reading comprehension tactics that have been shown to be beneficial for developing critical thinking abilities (Akkaya, 2012). The following learning exercise is a group conversation. Students' critical thinking abilities may be improved by including them in the learning process, such as via dialogues. They are exchanging information and evaluating one other's queries and replies to benefit from these activities in order to strengthen their critical thinking abilities (Mahanal et al., 2019).

The extending phase requires the students to apply their information from the three prior activities to a new situation, which goes beyond group work. Genuine assignments that address issues in actual life has been shown to be successful in raising pre-service teachers' cognitive engagement, which encourages higher order thinking and critical thinking. In the end, asking questions and presenting arguments to support each other's positions helps them develop their reasoning and critical thinking abilities (Kusaeri & Aditomo, 2019). Meanwhile, the expansion phase consists of more than simply group work to apply what they learned in the prior three activities to a new setting.

Finally, the QASEE learning approach encourages students to reflect on what they have discovered throughout the assessment process. This practice indirectly helps children to think reflectively, which is the foundation for critical thinking (Tican & Taspinar, 2015; Vong & Kaewurai, 2017). Evaluation activities packaged as self-reflection on learning experiences have been identified as a significant component in developing enhanced metacognition (Dang et al, 2018; Duman & Semerci, 2019; Zhang & Petrick, 2012).

Conclusion

The study's results and data analysis revealed that the QASEE learning model had a favorable influence on the students of class XI at UPT SMAN 6 Wajo in terms of their capacity to develop their critical thinking skills. Students who were trained utilizing the QASEE model had much higher critical thinking skills than students who were educated using more conventional learning methodologies.

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