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How Does the Scientific Approach Matter to School Students' Higher Level Thinking Ability?

Mariana Lestari[1]*, Komang Sutawan[2], Widiyanto[3]

[123]Jinarakkhita Buddhist College of Lampung, Jl. Raya Suban, Pidada, Kec. Panjang, Kota Bandar Lampung, Lampung, Indonesia

*marianalestari@sekha.kemenag.go.id https://orcid.org/0009-0003-0072-5642

Abstract: The research was conducted to find the effect of the practice of scientific views on the ability of high-level of students in thinking. The problems that occur to students are that there are students who are passive in question-and-answer sessions during the learning process or raise questions from learning videos and subject matter, there are students who are not creative in analyzing a case according to the learning topic, there are students who live with way of think issue at a learning process at class with high level thinking, there are some students do not know how to apply the way to analyze and evaluate in the Buddhist education subjects. Learning with a scientific approach can bring the impact to learning through the systematic and holistic thinking practices. This research brought the approach of quantitative and developed a survey method. The respondents is in total 70 people. The research place has been done at Buddhist School in Jakarta City. The data analysis result showed that can be interpreted that the scientific approach positively affected of student in thinking ability with high-level standard. The result recommendation to bring the perspective of the ability of school students in high-level thingking to create a tremendous way of learning in thinking level at class, so the schools and government can formulate the proper policy in school national standard and criteria. The research is limited in research time and methodology development, for new researchers can manage the time to explore more detail and concrete in the data collection using a direct observation and case study procedure in qualitative approach.

Keyword: Scientific Approach; Thinking Ability; Student Thinking Skill

1. Introduction

The concept of education trains students with skills according to the school level, namely knowledge, values, attitudes, and the ability to carry out tasks or approach nature, the social environment, the cultural environment, and regional needs. The current educational situation in our country is more colored by approaches that rely on conventional learning models refers to teachers are more active and students are less actively involved at class during teaching and learning process. The learning issues are far away from the role of education in efforts to educate good citizens and intelligent humans. An alternative learning approach that can be developed to meet these needs is the scientific learning approach. The scientific approach refers to teaching to investigate natural phenomena that use observation, experimentation, and data analysis to develop and test hypotheses.

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In the learning with its development and process perspective for student learning, the scientific practice is used a process of scientifically thinking. The approach and practice of scientific brought way to bridge the developing students' in through attitudes, skills, and knowledge personal capabilities [1] Refarding to the policy from Permendikbud with No. 81 A of 2013, it stated that the conception that the practice and approach of the scientific during learning consisted with components: way of observing, developing way of questioning, doing the possibility by trying, development of a way for processing, describing way of presenting, how to bring way of inferring, and the art of creating. The implementation of a scientific practice can be applied based on teacher's creativity, and the teacher books will be a supplementary. Teachers cultivate their capability through the situation and condition in the education environment of their respective students and schools. According to Permendikbud Number 103 of 2014, the scientific approach is operationalized through learning activities, which contain learning experiences in the form of observing, questioning, collecting information (trying), reasoning (associating), and communicating. To obtain these five experiences, the scientific approach includes two patterns of reasoning: *inductive* and deductive. A cause of inductively way from something in specific to general, whereas a cause of deductively way from a common statement to specific. Inductive reasoning is empirical, concluding the whole, whereas deductive reasoning gives rational properties to scientific knowledge and is consistent with previously accumulated knowledge. In the scientific approach, the two patterns of reasoning are used alternately according to the state of the object of disciplines and the development of sciences and knowledges [2].

Students with high-level with capabilities of seeing and thinking can bring to the flow of analyzing and evaluating the phenomenon with issues to formulate the solutions. The skill of students in high level of thinking can create a way to think critically and creatively roadmap of big views. Students' abilities should be measured and improved by providing a learning model of higher-level thinking skills that include analysis (C4), evaluation (C5), and creating (C6) [3] Research by [4], [5] shows that scientific approaches significantly improve 82.4% of high-level thinking skills. The abilities of thinking in high level within students during learning process can support and help them be more aware and mindful of their way of thinking and encouraging a way of learning with the process simultaneously according to development and growth of their cognitive capabilities. Cognitive ability refers to high-level thinking, is a crusial and fundamental in education. It will drag to an academic success and rooted to a societal relationship. High-level thinking involves mental activity to deepen a concrete of creativity and experiences that cultivate to consciously achieve the goals. By acquiring discipline and knowledge to involve the elements of analytical in thinking, synthetic of conclusion making process, and thinking levels way in evaluation [6], [7].

The researcher obtained information that students lack understanding of the material delivered by the teacher, students lack knowledge of the foundation and theory in learning, students lack critical thinking when conducting group discussions, students are less creative in analyzing learning, and students find it challenging to compose appropriate and appropriate questions during group discussions and classroom learning.

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To prevent problems that occur to students, the process of carrying out scientific methods needs to be carried out because the practice of scientific approach is beneficial in directing students in favorable terms. The case to be studied is the need for the abilities way of thinking with high level standard during the process of learning at class to reduce these things. Habits and environmental factors cause students to lack ability in the learning process [8]. So, it needs in-depth research. The high level of thinking skill is formed in oneself, starting from learning with complete seriousness and concentration through a scientific approach. The most crucial high-level thinking ability is that when learning occurs, students should master the big picture of matters in the classroom, think critically, and analyze the lesson who delivered by the tutor at that moment.

The scientific practice implementation aims to help students overcome student ineffectiveness. The scientific approach is carried out in the classroom together to instill an understanding of student performance, helping students control their thoughts, and instilling a broad meaning so that learning is more effective in every positive behavior so that the scientific method teaches benefits for students helps improve student learning achievement and can guide students' future, can foster a positive attitude in themselves and can overcome problems in learning.

2. Methods

The research was developed with research method showing that the study used the quantitative research approach with survey method. The study aims to explore profoundly regarding the effect in connection and to analysis descriptively how to know the relationship each variable [9]. The instrument from this research developed a questionnaire was used as an instrument to get the concreate of the research data. The population of this study is 70 students in grades VIII and IX of Ekayana Dharma Budhi Bhakti Junior High School. The research methodology describes in research design with procedures to determines and analyze data in the variables that will be summerized as the research topic. A design of the study is a strategy researchers use to systematically connect each element of research to be more effective and efficient [10]. This research design includes observation activities, background preparation, problem identification and formulation, and the conclusion of research results. Researchers also develop theoretical foundations relevant to scientific approaches and high-level thinking skills, determine research variables, compile research instruments. The data were grouped based on all respondent variables and then to be analyzed to fulfil the research questions and test hypotheses. In the analysis part of the research will be supported by the SPSS 26.0 statistical data processing program to analysis the reliable results.

3. Results

Based on the reliability instrument test, the reliability coefficient was obtained on 76 valid items; the results of reliability with value of 0.878 which means to be declared reliable. It can be described that the study instruments can be used and it passed the requirements and showed the strong reliability.

Table 1 Instrument Reliability Test

Reliability Statistics	
Cronbach's Alpha	N of Items
.878	76

(Source: SPSS 23.0 data processing results)

According to the table above mentioned that the sample data requirements is normally distributed with a significant and distributed. The results of the normality calculation using the Kolmogorov Smirnov One Sample test are pictured in table below as follow.

Table 2 Normality Test

One-Sample Kolmogorov-Smirnov Test		
		Unstandardized Residual
N		70
Normal Parameters[a,b]	Mean	.0000000
	Std. Deviation	10.22115961
Most Extreme Differences	Absolute	.100
	Positive	.044
	Negative	-.100
Test Statistic		.100
Asymp. Sig. (2-tailed)		.080[c]

(Source: Data processing results in 2024 using SPSS 23.0)

According to the table above mentioned, it can be described that both of the data is identified as homogeneous data. The details data is shown on the following table below.

Table 3 Homogeneity Test

Test of Homogeneity of Variances			
Effect of X on Y			
Levene Statistic	df1	df2	Sig.
.237	1	68	.628

(Source: Data processing in 2024 using SPSS 23.0)

Data analysis techniques are used to answer research questions posed through hypotheses. The hypothesis testing of the research used a simple linear regression formulation, and the data was analyzed supporting a SPSS 23.0 program. Testing with simple linear regression gives the following results.

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Table 4 Output of Regression Equations

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	56.116	11.402		4.922	.000
	Pendekatan Saintifik	.575	.080	.657	7.189	.000
a. Dependent Variable: Kemampuan Berpikir Tingkat Tinggi						

(Source: 2023 data processing results using SPSS 23.0)

Regarding to the coefficients output results, shows that the scientific approach increases or develops, the higher-level thinking ability variable will increase. The formulated math was described as follows.

Y=56,116 + 0,575X

The statistical hypothesis in this study is:

H_a: The scientific approach positively and significantly influences students' ability to think at a high level.

H_o: There is no positive and significant influence of the scientific approach on the high-level thinking ability of students.

The criterion for hypothesis testing is to reject Ho if the > calculation < significance 0.05 or 5%. Based on data analysis, a $_{count}$ value of 7.189 was obtained, and the $_{table}$ value with df=n-2 was df=68 of 1.667 with a significance value of 0.000 because the absolute value of tally was 7.189> 1.667 and the significance of 0.000 < 0.05, then Ho was rejected and accepted Ha. It shows that a scientific approach influences the high-level thinking ability of students. The hypothesis testing criteria used an alpha of 5% (0.05), namely Ho was rejected if ≤ 0.05, as showing in the ANOVA following table below.

Table 5 ANOVA Analysis Output

ANOVA[b]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5478.225	1	5478.225	51.677	.000[b]
	Residual	7208.575	68	106.008		
	Total	12686.800	69			
a. Predictors: (Constant), Scientific Approach						
b. Dependent Variable, Higher Thinking Skills						

(Source: Data processing results in 2024 using SPSS 23.0)

Based on the ANOVA analysis output results, shows that the scientific approach affects students' higher-level thinking skills significantly.

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Table 6. Values of R Square Coefficient of Determination

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.657[a]	.432	.423	10.296
a. Predictors: (Constant), Scientific Approach				

(Source: Data processing results in 2024 using SPSS 23.0)

4. Discussion

This section discusses the research findings (level one title). Regarding the research background, previous research, and the research data analysis showed that the scientific approach and student way of thinking high-level ability. It can be interpreted that a scientific approach is critical for students because it can improve the skills of high-level way of thinking in students by instilling an understanding of student performance, helping students control their thoughts, and instilling a broad meaning so that learning is more effective in every positive behavior. It can reduce problems such as being passive in question & answer sessions during the learning process or raising questions from learning videos and subject matter, not being creative in analyzing a case according to the learning topic, not being able to think at a high level of processing in learning at the class, not being able to analyze and evaluate Buddhist education subjects, and passive/less creative in the making/answering questions.

The analysis of the data shows that the whole aspects align to the precious research [11], [12] which says that learning by applying of the scientific high-level emphasis in the class will observe and able to record observations from schoolwork, be able to observe learning carefully by identifying problems, and be able to ask questions when learning is taking place, increasing efficiency, competence, and The relationship with the task and also the motivation to complete the task so that it can improve students in high-level thinking. The scientific approach significantly impacts the success of enhancing students' ability to develop of the cognitive knowledge in thinking at a higher level. A scientific approach can determine students' learning conditions, so steps need to be taken to provide students with an understanding of the approach using scientific steps and principles in the teaching and learning process. In the way of delivering a lesson in the development of learning process, students can explore in big data by collecting the resources through implementing the data collections by applying the observation, delivering the questions, practicing with a trial, following the processing, bringing the presentation, and giving a chance for learners or scientific approaches accord to the four characteristics: 1) the insight of student-centered, 2) the experiences of involving capabilities and bringing the assignments concept, 3) developing in a cognitive processes that have principles development in intellectual skills especially in students thinking level way, 4) Living with the insightful characters in students [13]

The existence of an excellent scientific approach is expected to help students build a better experience through observations, interviews and questioning, trying in a trail, cultivate the way to see the reasoning behind the context, and reporting in communicating.

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Learning activities emphasize more on learning for fun and meaningful learning for every learner. Observing and asking questions during learning is the beginning of arousing the motivation and courage of students to ask questions and develop their learning actively. One aspect that affects success with a scientific approach is the tutor skills to cultivate and help the class process management in learning and to determine the methods used; in the process, the management must be directed to become a meaningful and conducive process in forming students' abilities. Therefore, the excitement in the class regarding to session of activities process in learning for student and teaching for teachers, in addition to being developed systematically, effectively, and efficiently, also needs a variety of activities as an alternative to grow and develop students' motivation and activities in teaching [14] A scientific approach designs learning activities to make the class community will actively build their character, views, and abilities. Learning that uses a scientific approach encourages students to develop way of solving the problem with critical, analytical, and precise skills. Meanwhile, teachers are tasked with directing and providing corrections to the concepts built by students [15]

The scientific approach in this study is intended to be carried out by students. The existence of an excellent scientific approach can formulate theoretical concepts through a process with five elements of characteristic consisted of observing way, questioning practices, collecting the data information, to formulate the ways of reasoning, and bringing the insightful communicating. The implementation of scientific practices to enhance and improve the learning process. It can be achieved by presenting the material using the scientific approach steps under the plan. The use of time has been carried out as optimally as possible so that it is to the plan made (Rachmawan et al., 2022). In Buddhism, learning begins with listening to teachings or information from reliable sources. It aligns with the scientific approach, which starts with collecting data from observations or experiments. The scientific approach and learning process taught by the Buddha emphasized the importance of critical thinking, logical analysis, and proof through hands-on experience, all of which are integral to deep understanding and the development of valid knowledge (M. I, 95).[18] Based on descriptive analysis, students apply a scientific approach to the high category. It give the big picture with the average value of the scientific approach variable, which obtained a percentage of 79% with the details of each indicator, namely in the indicators of observing, questioning, gathering information, and reasoning/associating, while in the indicators of communicating with the average respondent answered in the high category. This means students have applied the way to think with scientific practices well in the class with a well-trained of learning process.

The dialogue between Bhikkhuni *dhammadinnā* and *visākha* is a clear example of the use of higher-order thinking skills. They memorize or understand basic concepts and analyze, evaluate, and synthesize Buddhist teachings to achieve a deeper understanding. This process reflects the critical and reflective thinking required to confront complex problems and apply real-world wisdom. Thus, this dialogue emphasizes the importance of higher-order thinking skills in understanding profound teachings such as *anattā* and *cetovimutti*, as it requires careful and thoughtful understanding, analysis, evaluation, and

application (M. I, 44). The conclusion of the analysis result of the study states that of high-level thinking ability describes students performing high-level thinking skills with an average in the high category on the indicators of way to think the problem background with a skillful analyzing, with the support of way to evaluate, and with making a report to create pricisely. The lack of learning with high-level thinking in students is due to various factors, such as students' inability to learn in the aspect of knowledge, resulting in a lack of accuracy from the students themselves when working on problems, students' inability in the element of knowledge, lack of use of technology to learn in the classroom, and evaluation of less varied assessments. This results in a need for more precision from the students themselves when working on the questions. Learning difficulties can occur if students make mistakes in solving problems that have been solved [19].

5. Conclusion

Regarding to the analysis and the discussion from the study's results, it can show that the effect of scientific approach on the class community with way of higher-order thinking capability has a significant effect. The practice of scientific approach bringing the effect to enhance the students' thinking abilities in creating the better experiences through procedures of the step of observing, the step of questioning, the step of trying in a trail, the step of formulate the reasons, and the final step to formulate the communication. Learning activities emphasize fun and meaningful learning for each student. It is the beginning to build motivation and courage to develop along with learning activities. The scientific approach correlates with the teachings of the Buddha when the learning process starts by hearing his teachings from reliable sources. Buddha taught us to examine things carefully and equally through direct experience, which is integral to building valid knowledge. Higher-order thinking skills mustn't be memorized or just understanding the basic concepts of knowledge, but a robust analysis is needed to reach a deeper understanding. You can find students with low interest in learning in one educational environment. This shows the diverse characteristics of students. Factors that influence students' low interest in learning are students' inability to acquire knowledge, which causes less thoroughness while the period of way to teach and way to learn. The innovation of the practice of scientific approach is expected to cultivate a good way to learn in environment for educating the school community who involves the students and teachers, and stakeholders, as educators are always sensitive to student learning changes. Generally, this research is fundamental in improving students' thinking and learning outcomes.

References

[1] Cherry, “T1_432013009_Bab I (1),” *Universal Declaration of Human Rights*, pp. 2–4, 2020.

[2] I. W. Suja, “Pendekatan Saintifik dalam Pembelajaran Abad XXI,” 2019.

[3] M. Amdah, D. Sugandi, and A. Yani, “Utilization of Interactive Learning Media Tutorial Models in Geographic Learning (Geographic Information System

Learning)," *Journal of International Conference Proceedings*, vol. 3, no. 1, 2020, doi: 10.32535/jicp.v2i4.790.

[4] N. W. Rasmini, "STEM : Pembelajaran Saintifik Berbasis Kearifan Lokal Tri Ramana terhadap Capaian Profil Pelajar Pancasila Anak Usia Dini," *Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini*, vol. 7, no. 5, pp. 5719–5732, Oct. 2023, doi: 10.31004/obsesi.v7i5.5283.

[5] Susanto, "Transformation Of Learner Learning: Improving Reasoning Skills Through Artificial Intelligence (AI)," *Journal of Education, Religious, and Instructions (JoERI)*, vol. 1, no. 2, pp. 37–46, 2023, [Online]. Available: https://ejournal.stiab-jinarakkhita.ac.id/index.php/joeri

[6] F. A. Sofyan, "IMPLEMENTASI HOTS PADA KURIKULUM 2013," *INVENTA*, vol. 3, no. 1, 2019, doi: 10.36456/inventa.3.1.a1803.

[7] Poniman, Susanto, A. Andriyaningsih, Taridi, and E. P. Lestari, "Educational Leadership: Teacher Leadership Improves Student's Spiritual Intelligence," *Journal of Education, Religious, and Instructions(JoERI)*, vol. 1, no. 1, pp. 19–23, May 2023.

[8] B. Burmansah, R. Rugaiyah, and M. Mukhtar, "A case study of mindful leadership in an ability to develop focus, clarity, and creativity of the buddhist higher education institute leader," *International Journal of Higher Education*, vol. 8, no. 6, pp. 57–69, 2019, doi: 10.5430/ijhe.v8n6p57.

[9] Miftahuddin, "Hubungan Antara Kelembaban Relatif Dengan Beberapa Variabel Iklim Dengan Pendekatan Korelasi Pearson di Samudera Hindia," *Jurnal Siger Matematika*, vol. 2, no. 1, pp. 25–33, 2021, doi: 10.23960/jsm.v2i1.2753.

[10] E. Y. Putri, S. Suyanto, and G. P. Sari, "Pengaruh Kemudahan, Keamanan, Dan Resiko Terhadap Minat Menggunakan Ceria Digital Pada Anggota KSPPS BMT Assyafi'iyah KC Metro," *Expensive: Jurnal Akuntansi dan Keuangan*, vol. 1, no. 2, pp. 48–63, 2022, doi: 10.24127/exclusive.v1i2.3001.

[11] R. A. Putra and A. Hanggara, "Pengaruh Pendekatan Pembelajaran Saintifik Berorientasi Higher Order Thinking Skills (HOTS) Terhadap Pemahaman Belajar Siswa," *Equilibrium: Jurnal Penelitian Pendidikan dan Ekonomi*, vol. 15, no. 2, 2018.

[12] R. A. Putra and A. Hanggara, "PENGARUH PENDEKATAN PEMBELAJARAN SAINTIFIK BERORIENTASI HIGHER ORDER THINKING SKILLS (HOTS) TERHADAP PEMAHAMAN BELAJAR SISWA (Studi Kasus pada kelas X SMAN 1 Baregbeg)," *Equilibrium: Jurnal Penelitian Pendidikan dan Ekonomi*, vol. 15, no. 02, 2019, doi: 10.25134/equi.v15i02.1618.

[13] J. Derivat, H. Effendi, and H. Sabantaro, "PROSES BELAJAR MENGAJAR SISWA KELAS VIII," vol. 7, no. 2, pp. 65–74, 2020.

[14] Andiana, Marzuki, and S. Utami, "Strategi Implementasi Pendekatan Saintifik Dalam Pembelajaran Tematik Di Sekolah Dasar Negeri Kota Sintang," *Jurnal Pendidikan dan Pembelajaran Khatulistiwa*, vol. 7, no. 4, 2020.

[15] G. S. Sari, "Penerapan Pendekatan Saintifik untuk Meningkatkan Hasil Belajar IPA Siswa Kelas V SD Inpres Jenetallasa Kecamatan Pallangga Kabupaten Gowa. Jurusan …," pp. 1–13, 2023.

[16] P. Rachmawan, M. Jazeri, and B. Mauah, "Penerapan Pendekatan Saintifik Dalam Pembelajaran Tematik Terpadu Di SD," *Nusantara of Research : Jurnal Hasil-hasil Penelitian Universitas Nusantara PGRI Kediri*, vol. 9, no. 1, pp. 28–38, 2022, doi: 10.29407/nor.v9i1.16162.

[17] M. Nikāya, *Pikiran*. 2020.

[18] B. Ñāṇamoli and B. Bodhi, Eds., *The Middle Lenght Sayings (Majjhima Nikaya) Vol. I. 1995*, vol. 1. London: Pali Text Society, 1997.

[19] S. Wulandari, "Kesulitan Belajar Siswa Dalam Berpikir Tingkat Tinggi Berdasarkan Teori Newman," *Jurnal Tunas Bangsa*, vol. 10, no. 1, pp. 48–59, 2023, doi: 10.46244/tunasbangsa.v10i1.2020.