Nazhruna: Jurnal Pendidikan Islam
Vol. 5 Issue 3, 2022. pp. 1253-1265 E-ISSN: 2614-8013
DOI: https://doi.org/10.31538/nzh.v5i3.2509

THE EFFECT OF BRAIN-BASED LEARNING (BBL) MODEL WITH AUDIOVISUAL MEDIA ON STUDENT'S HIGH-LEVEL THINKING ABILITY

Gita Dwi Wardani[1], Retno Dwi Suyanti[2], Daulat Saragi[3]
Universitas Negeri Medan, Indonesia
Email: gytasastrowarno@gmail.com

Received: 14-08-2022 Revised: 20-09-2022 Accepted: 26-10-2022

Abstract

The purpose of this study was to obtain scientific information about students' higher-order thinking skills with the Brain-Based Learning (BBL) learning model using audiovisual media guided by students' learning motivation to develop teaching materials, especially in science subjects "substances and mixtures", as well as to measure the validity, practicality, and effectiveness of science learning. The design used in this study is quasi-experimental. by using a pretest and posttest control group design. However, before the pretest, the questions tested had been tested for homogeneity considering children's different abilities. This design involves two classes, namely the experimental group class and the control group class. From the results of the study, there are differences in students' higher-order thinking skills between classes using the Brain-Based Learning (BBL) model and types using conventional methods with an average post-test score of higher-order thinking skills using the Brain-Based Learning (BBL) model of 87,044 and the average posttest value of higher order thinking skills with conventional methods is 77,193.

Keywords: Science, Brain-Based Learning, Audiovisual Media, Higher Order Thinking Skills.

Abstrak

Tujuan dari penelitian ini adalah untuk memperoleh informasi ilmiah tentang kemampuan berpikir tingkat tinggi siswa dengan model pembelajaran Brain Based Learning (BBL) menggunakan media audiovisual ditunjau dari motivasi belajar siswa untuk mengembangkan bahan ajar, terutama pada mata pelajaran IPA materi "zat dan campuran", serta untuk mengukur validitas, kepraktisan, dan keefektifan pada pembelajran IPA. Rancangan yang digunakan dalam penelitian ini adalah quasi eksperimen. dengan menggunakan pretest and posttest control group design. Namun sebelum pretest, soal yang diujikan sudah di uji homogenitas mengingat kemampuan anak berbeda-beda. Desain ini melibatkan dua kelas yaitu kelas kelompok eksperimen dan kelas kelompok kontrol. Dari hasil penelitian terdapat perbedaan kemampuan berpikir tingkat tinggi peserta didik antara kelas yang menggunakan model pembelajran Brain Based Learning (BBL) dengan kelas yang menggunakan metode konvensional dengan perolehan skor rata-rata posttest kemampuan berpikir tingkat tinggi yang menggunakan model Brain Based Learning (BBL) sebesar 87,044 dan rata-rata dari nilai posttest kemampuan berpikir tingkat tinggi dengan metode konvensional 77,193.

***Kata Kunci**: IPA, Brain Based Learning, Media Audiovisual, Kemampuan Berpikir Tingkat Tinggi*

INTRODUCTION

The results of the 2018 PISA study released by the OECD show interesting findings that Indonesia is in the low-performance quadrant with high equity. Then, it was also found that the gender gap in performance shows that the gap in learning performance between women and men is not significant. According to the Ministry of Education and Culture 2019, through its website, it shows that female students are better than male students in all fields at PISA, while for science (IPA), 40 percent of Indonesian students are still below the minimum expected ability.[1] One of the learning processes is to deal with problems that exist in Natural Sciences (IPA) as knowledge obtained by unique methods, namely theoretical science based on the process of observing and experimenting on natural phenomena that occur (Umamah et al., 2014: 2). Science is essentially built based on scientific products, scientific processes, and scientific attitudes.[2]

Science learning is intended to provide opportunities for students to learn about the relationship between theory and facts seen in the surrounding environment by developing scientific attitudes obtained from the class and sharpening skills in practising scientific methods.[3] Learning is a combination when someone absorbs then, organises and manages information through the human mind in absorbing, handling and conveying information with visual, auditorial and kinesthetic categories, which are characterised by specific behavioural characteristics described by Bobby De Porter & Mike Hernacki in their presentation through the book Quantum Learning: Unleashing the Genius In You:[4] Familiarize Learning Comfortable and Fun. They focus on efforts to optimally utilise the potential of the human brain which shows that real learning is a thinking process or is a process of utilising and utilising thinking power to the fullest.[5]

Identification of human thinking power is found in two parts, namely the left brain and right brain, each of which has specificity in the topicalization of human abilities. learning activities that use brain performance are expected to influence behaviour change as a form of success in the learning process.[6] So, it is necessary to stimulate the brain in training students' thinking skills to be more objective by seeing things and responding to what they are facing.

---

[1] Dini Haryati, "Efektivitas Pemanfaatan Lingkungan Sekolah Sebagai Sumber Belajar Terhadap Hasil Belajar Ipa Peserta Didik Kelas Iv Sd Inpres Btn Ikip I Makassar," *AULADUNA: Jurnal Pendidikan Dasar Islam* 3, no. 2 (2016): 17, https://doi.org/10.24252/auladuna.v3i2a4.2016.

[2] Benny Angga Permadi, "Pengembangan Modul IPA Berbasis Integrasi Islam Dan Sains Untuk Meningkatkan Hasil Belajar Siswa Kelas Vi Min 2 Mojokerto," *Nazhruna: Jurnal Pendidikan Islam* 1, no. 2 (17 Oktober 2018): 294–311, https://doi.org/10.31538/nzh.v1i2.62.

[3] Ankuj Arora dkk., "A Review of Learning Planning Action Models," *The Knowledge Engineering Review* 33 (ed 2018), https://doi.org/10.1017/S0269888918000188.

[4] I. Gusti Made Widya Sena, "Kinesiologi Yoga Asanas (Kunci Kebahagiaan Tubuh, Pikiran Dan Jiwa)," *Jurnal Yoga Dan Kesehatan* 1, no. 1 (2018): 15–21.

[5] Lisa Cordeiro dkk., "Evaluating Social Interactions Using the Autism Screening Instrument for Education Planning-3rd Edition (ASIEP-3): Interaction Assessment in Children and Adults with Fragile X Syndrome," *Brain Sciences* 10, no. 4 (April 2020): 248, https://doi.org/10.3390/brainsci10040248.

[6] Víctor González-Calatayud, Paz Prendes-Espinosa, dan Rosabel Roig-Vila, "Artificial Intelligence for Student Assessment: A Systematic Review," *Applied Sciences* 11, no. 12 (Januari 2021): 5467, https://doi.org/10.3390/app11125467; Rebecca Marrone, Victoria Taddeo, dan Gillian Hill, "Creativity and Artificial Intelligence—A Student Perspective," *Journal of Intelligence* 10, no. 3 (September 2022): 65, https://doi.org/10.3390/jintelligence10030065.

The most important task of the brain is good at thinking and think by solving problems that arise from handling answers from the surrounding environment.[7]

BBL (Brain Based Learning) learning is a teaching model that considers how the brain works when retrieving, processing and interpreting information that has been absorbed. There are three steps in learning science with the application of Brain-Based Learning namely: (1). Orchestrated immersion, which creates a learning environment that challenges students' thinking skills. (2). Relaxed Alertness, namely creating a pleasant learning environment. (3). Active Processing, namely creating an active and meaningful learning situation for students.[8] The problems faced are almost always the same from year to year that science is seen as a fairly complicated lesson for some students, especially in areas as shown from the data on student learning outcomes for class V MIN (Madrasah Ibtidaiyah Negeri) 15 Langkat Regency as a result of the experience of researchers, who have been teaching in Class V MIN 15 Langkat Regency. After evaluating students regarding the material of single and mixed substances, it turns out that there are still many student learning evaluation results that have not been completed. Only 6 students out of 30 students completed it. If it is calculated as a percentage, only 20% of students complete while those who do not complete reach 80% (MIN 15 Langkat).

The minimum completeness criteria (KKM) that have been determined by MIN 15 Langkat is 70. This shows that this learning needs to be improved because student learning outcomes are low, especially in single and mixed substances. From these problems, the teacher should create a learning process that makes students motivated to learn, be more active and develop all students' thinking skills.[9] Because the brain does not always only absorb rote, and teachers should be able to optimize the performance of the students' brains for learning. In addition, the teacher must be able to create meaningful learning so that students can understand the material well.[10] so that students only become monotonous and boring class objects. The greater the motivation, the greater the success in learning, so th has an impact on increasing student achievement.[11]

It is known that learning motivation has meaning as generating more effort, during the lesson and using strategies that can support the learning process such as planning, organizing and practising questions on the subject matter, reviewing the level of understanding of a

---

[7] Neriman Aral, "Visual Perception in Specific Learning Difficulties," *Theory and Practice in Child Development* 1, no. 1 (15 Desember 2021): 25–40, https://doi.org/10.46303/tpicd.2021.3.

[8] Narun Pat dkk., "Longitudinally Stable, Brain-Based Predictive Models Mediate the Relationships between Childhood Cognition and Socio-Demographic, Psychological and Genetic Factors," *Human Brain Mapping* n/a, no. n/a, diakses 19 Oktober 2022, https://doi.org/10.1002/hbm.26027.

[9] Erika K. Coles dkk., "From Consultation to Student Outcomes: The Role of Teacher Knowledge, Skills, and Beliefs in Increasing Integrity in Classroom Management Strategies," *School Mental Health* 7, no. 1 (Maret 2015): 34–48, https://doi.org/10.1007/s12310-015-9143-2; Mishal Liaqat dkk., "Efficacy of pedagogical framework in neonatal resuscitation skill learning in a resource-limited setting: a randomized controlled trial," *BMC Medical Education* 21, no. 1 (2021): 436, https://doi.org/10.1186/s12909-021-02846-x.

[10] Faith M. Gunning dkk., "Brain-Based Mechanisms of Late-Life Depression: Implications for Novel Interventions," *Seminars in Cell & Developmental Biology*, Special Issue: Myelin edited by Gonçalo Castelo-Branco and Roman Chrast / Special issue: Aging in the nervous system edited by Mara Mather, 116 (1 Agustus 2021): 169–79, https://doi.org/10.1016/j.semcdb.2021.05.002.

[11] Imam Hanafi dan Eko Adi Sumitro, "Perkembangan Kognitif Menurut Jean Piaget Dan Implikasinya Dalam Pembelajaran," *Alpen: Jurnal Pendidikan Dasar* 3, no. 2 (2019), https://doi.org/10.24929/alpen.v3i2.30.

material, as well as connecting new material with science and knowledge. The knowledge that has been mastered.[12] In this regard, students who have high learning motivation will also lead achievement motivation. Student achievement motivation can be divided into two main types.[13] Achievement motivation is the driving force in students to achieve the highest possible level of achievement, in accordance with what is determined by the student concerned. For this reason, students are required to be responsible for the level of success that will be obtained. Various efforts have been made to improve science learning outcomes in class V students of MIN 15 Langkat Regency, one of which is by carrying out various improvements in the learning process through the implementation of learning models that can develop self-confidence and motivate students, in science subjects, especially with single substance and Mixture.[14]

It requires the involvement of students who are more proactive by contributing knowledge about nature that can be utilized from the subjects that have been studied.[15] The use of technology in the application of science subjects will be seen in the delivery of material by teachers who explain that the digital literacy culture that is being loved is not used as an acceleration of knowledge transfer to students in the classroom so that the use of multimedia is very rarely used. It is mostly used as a messenger in the classroom therefore students experience boredom when learning takes place in the classroom.

METHOD

This research will be carried out at MIN 15 Langkat which is located at Jln. Gen. Sudirman Peace Village, Langkat Regency, North Sumatra Province and carried out in the even semester of the 2021/2022 school year. The population in this study is the fifth-grade students at MIN 15 Langkat in the 2021/2022 academic year as many as three classes, where the total population can be seen in the following table:

Table 1. Number of Class V. students

No.	Class	All student
1	V-A	29
2	V-B	28
3	V-C	27

[12] Elizabeth B. Hurlock, *Adolescent development*, Adolescent development (New York, NY, US: McGraw-Hill, 1949); Elizabeth Bergner Hurlock, *Child Development* (Ratna Sagar, 1950).

[13] Hege Marie Gjefsen, "Wages, Teacher Recruitment, and Student Achievement," *Labour Economics* 65 (1 Agustus 2020): 101848, https://doi.org/10.1016/j.labeco.2020.101848; Nurun Najmi, Muhammad Husnur Rofiq, dan Muhammad Anas Maarif, "The Effect Of Cooperative Learning Model Type Of Teams Games Tournament (Tgt) On Student's Learning Achievement," *At-Tarbiyat :Jurnal Pendidikan Islam* 4, no. 2 (28 Agustus 2021), https://doi.org/10.37758/jat.v4i2.291.

[14] Lai Wei Foon dkk., "E-Counselling: The Intention, Motivation and Deterrent among School Counsellors," *Universal Journal of Educational Research* 8, no. 3C (Maret 2020): 44–51, https://doi.org/10.13189/ujer.2020.081605.

[15] J. Ansong, E. Gissi, dan H. Calado, "An Approach to Ecosystem-Based Management in Maritime Spatial Planning Process," *Ocean & Coastal Management* 141 (1 Juni 2017): 65–81, https://doi.org/10.1016/j.ocecoaman.2017.03.005; Tamar Icekson dkk., "Learning Difficulties and Loneliness in College and Beyond: The Mediating Role of Self-Efficacy, Proactive Coping, and Hope," *International Journal of Environmental Research and Public Health* 18, no. 19 (2021): 10508, https://doi.org/10.3390/ijerph181910508.

Total	84

(MIN 15 Langkat, 2021)

From the two fifth grades in the school, two research samples were taken, namely: grades V-B and V-C. Sampling was done by purposive sampling. After selecting the class, the V-B class was chosen as the experimental class which was taught with the Brain-Based learning model based on Audio Visual Media, while the control class was taught using the conventional learning model, the V-C class was chosen.

The variables in this study consisted of 3 (three) types, namely the independent variable, the dependent variable, and the moderator variable. The design used in this study is quasi-experimental. by using a pretest and posttest control group design. However, before the pretest, the questions tested had been tested for homogeneity considering the different abilities of children. This design involves two classes, namely the experimental group class and the control group class.

This study was conducted to determine the effect of the Brain-Based Learning (BBL) learning model with audiovisual media on higher-order thinking skills in science learning in terms of student learning motivation from the group that was treated with the group that was not given treatment but only taught by using learning conventionally.

RESULTS AND DISCUSSION

Research Instrument Test

The instrument was tested on class VI students at MIN 15 Langkat in science subjects with single and mixed substance material that was adjusted to the Higher Order Thinking Skill (HOTS) indicators after the instrument was tested on students. Researchers analyzed the experimental data. the instrument. Management in this study using Microsoft excel program.

Instrument testing is done as a matter of knowing the description of an effect of treatment on the object to be observed in a study. Data from the Higher Order Thinking Skill (HOTS) test trial was obtained by testing 10 items in the form of a description of single and mixed substance materials that had been tested in class V who had already received lessons on the material. The data obtained were analyzed by means of testing the validity, reliability, level of difficulty and discriminating power to determine whether or not the questions were worthy of being used in research.

Higher Order Thinking Skill (HOTS) Validity Test

A trial was conducted on the questions in order to find out whether each item was valid or not so that each item could be used for research. An instrument validity test was tested using a formula, namely Product Moment correlation. So that the following results are obtained:

Table 2.
The results of the validity of the Higher Order Thinking Skill (HOTS) Question Instrument

No	Pre-test			Post-test		
	r_{hitung}	r_{tabel}	Classification	r_{hitung}	r_{tabel}	Classification
1.	0,504	0,381	Valid	0,488	0,381	Valid

2.	0,762	0,381	Valid	0,719	0,381	Valid
3.	0,418	0,381	Valid	0,511	0,381	Valid
4.	0,534	0,381	Valid	0,503	0,381	Valid
5.	0,675	0,381	Valid	0,427	0,381	Valid
6.	0,669	0,381	Valid	0,403	0,381	Valid
7.	0,409	0,381	Valid	0,403	0,381	Valid
8.	0,682	0,381	Valid	0,596	0,381	Valid
9.	0,541	0,381	Valid	0,707	0,381	Valid
10.	0,704	0,381	Valid	0,703	0,381	Valid

Based on the table data above, from 10 pretest and posttest questions that have been tested on fifth-grade students of MIN 15 Langkat, 10 items are declared valid. Each valid item is used during the research to determine Higher Order Thinking Skills (HOTS).

Higher Order Thinking Skill (HOTS) Reliability Test

Calculation of the reliability of a test instrument for higher order thinking skills or Higher Order Thinking Skills (HOTS) obtained a reliability coefficient of 0.636 pretests and 0.697 post-test, so from the test trial, it can be concluded that the question has moderate reliability and is suitable to be used as an instrument for study.

Table 3.
Reliability of Higher Order Thinking Ability Test Thinking Skills (HOTS)

r_{11}		Interpretation		Keterangan
Pre-Test	***Post-Test***	***Pre-Test***	***Post-Test***	Reliability
0,636	0,697	Sedang	Sedang	

By looking at the critical r Product Moment table with a significant level of 5% and N = 27, it is obtained rtable = 0.381 so it can be concluded that the instrument is reliable.

Higher Order Thinking Skill (HOTS) Difficulty Test

After testing the validity and reliability of an instrument, each item is analyzed for its level of difficulty, so that the following results are obtained.

Table 4. Level of Difficulty in Higher Order Thinking Skills (HOTS)

Question Number	Pre-test		Post-test	
	P	Classification	P	Classification
1	0,75	simple	0,70	medium
2	0,59	medium	0,70	medium
3	0,55	medium	0,62	medium
4	0,37	medium	0,55	medium
5	0,48	medium	0,77	simple
6	0,17	difficult	0,16	difficult
7	0,775	simple	0,875	simple
8	0,675	medium	0,65	medium
9	0,875	simple	0,7	medium

10	0,375	medium	0,5	medium

From the analysis of the results of the difficulty level test, it was obtained questions that had easy, medium and difficult categories. In the pretest, there were 3 questions in the easy category, 6 questions in the medium category, and 1 question in the difficult category. For the pretest, the questions in the easy category are numbered 1, 7, and 9, the medium category is number 2, 3, 4, 5, 8, and 10 and the difficult category is number 6. Meanwhile, there are 2 questions with the easy category, 7 questions with the category medium, and 1 question with a difficult category. Post the questions in the easy category at numbers 5, and 6, the medium category at numbers 1, 2, 3, 4, 8, 9, and 10 and the difficult category at number 6.

Higher Order Thinking Skill (HOTS) Distinguishing Test

After testing the validity, reliability and level of difficulty of the questions in the analysis, a different power test was carried out and the following results were obtained:

Table 5. Differential test of Higher Order Thinking Skill (HOTS)

Question	Pretest		Post-test	
	D	Classification	D	Classification
1	0,39	Enough	0,616	Good
2	0,549	Good	0,467	Good
3	0,329	Enough	0,473	Good
4	0,418	Good	0,478	Good
5	0,483	Good	0,313	Enough
6	0,566	Good	0,418	Good
7	0,5	Good	0,5	Good
8	0,55	Good	0,6	Good
9	0,75	Excellent	0,85	Excellent
10	0,7	Good	0,6	Good

Based on the table above shows that the pre-test questions consist of 2 questions that have sufficient categories, namely at numbers 1 and 3 and 4 questions that have good categories, namely at numbers 2, 4, 5, 6, 7, 8, 10, and 1 question with a very good category at number 9. While the post-test questions consist of 1 question that has a sufficient category, namely at number 5, 8 questions that have good categories, namely at numbers 1, 2, 3, 4, 6, 7, 8, and 10, a question with a very good category at number 9.

Data Analysis of Post-test Values Higher Order Thinking Skills (HOTS)

Answering a research hypothesis on higher-order thinking skills through the data analysis stage. In this study, a two-way analysis of variance with unequal cells was used. A two-way analysis of variance with unequal cells was carried out by fulfilling two prerequisite tests, namely the normality test and the homogeneity test.

Normality Test of Two-Way Analysis of Variance with Dissimilar Cells

Normality Test for Experimental Class (KE) and Control Class (KK) on Higher Order Thinking Skills (HOTS). The results obtained from the normality test of the experimental class and control class can be seen in the appendix, the analysis of the normality test data shows that the higher-order thinking skills of the experimental class and control class students are as follows.

Table 6. Normality Test of Experiment Class and Control Class on Higher Order Thinking Skill (HOTS) Pretest

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Standardized Residual for Nilai	.150	55	.114	.957	55	.148

The data shows that the data is normally distributed, as is known in the Kolmogorov-Smirnov table, the sig is 0.114. The value of sig > 0.05 where 0.114 > 0.05 means that the experimental class and the control class for higher-order thinking skills (HOTS) are normally distributed.

Table 7. Normality Test for Experimental Class and Control Class on Higher Order Thinking Skill (HOTS) Posttest

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Standardized Residual for Nilai	.079	55	.200*	.975	55	.299

*. This is a lower bound of the true significance.

Homogeneity Test of Two-Way Analysis of Variance with Dissimilar Cells

Test of Homogeneity of Experiment Class and Control Class on Higher Order Thinking Skill (HOTS)

Table 8. Levene's Test of Equality of Error Variances[a]

Dependent Variable: Nilai

F	df1	df2	Sig.
1.263	5	49	.295

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

Based on the data above, the sig value is 0.295. Because the sig value is 0.295 > 0.05, it can be concluded that the variance of higher order thinking skills (HOTS) is homogeneous.

Hypothesis Testing Two-Way Analysis of Variance with Dissimilar Cells

The test was conducted as a prerequisite test for the two-way analysis of variance with unequal cells for testing the research hypothesis. As this test was conducted to find out the differences in higher-order thinking skills using Brain-Based Learning (BBL) learning with conventional learning, and differences in higher-order thinking skills using Brain-Based Learning (BBL) learning models that have high, medium or low motivation. As well as interactions regarding the use of the Brain-Based Learning (BBL) learning model with

motivation on higher-order thinking skills. As obtained the calculation of the two-way analysis of variance with unequal cells is as follows.

Differences in Higher Order Thinking Ability of Students Who Learned with Brain-Based Learning (BBL) Learning Method Using Audiovisual Media with Conventional Learning Method Using Picture Media.

Results of Two-Way Analysis with Dissimilar Cells

Table 9. Tests of Between-Subjects Effects

Dependent Variable: Nilai

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	3308.152[a]	5	661.630	81.317	.000
Intercept	261336.561	1	261336.561	32119.371	.000
Model_Pembelajaran	940.181	1	940.181	115.552	.000
Kemampuan	2618.714	2	1309.357	160.926	.000
Model_Pembelajaran * Kemampuan	108.279	2	54.140	6.654	.003
Error	398.684	49	8.136		
Total	402443.000	55			
Corrected Total	3706.836	54			

a. R Squared = ,892 (Adjusted R Squared = ,881)

Based on the analysis of the data calculations in the table, it can be seen that the sig value is 0.000. Because the value of sig 0.000 < 0.05. So, it can be concluded that there are differences in students' higher-order thinking abilities who are taught by the Brain-Based Learning (BBL) learning method using audiovisual media with conventional learning methods using image media.

Analysis

MIN 15 Langkat is the place where the research is carried out, with Class V-B and V-C as a sample with a total of 55 students. Class V-B as an experimental class during the learning process using the (BBL) learning model and class V-C as a control class during the learning research process using conventional methods in accordance with those in schools. Single and mixed substances as subject matter used during the research process. Single and mixed substance materials were taught during the research process as material for data collection to test hypotheses, each experimental class and control class of researchers taught for 2 weeks with every week there were 3 hours of lessons in one meeting.

The first and second meetings were conducted for teaching and learning activities and one meeting was held as an evaluation in the form of a final test to measure higher-order thinking skills (HOTS) after the learning process by applying the experimental class Brain-Based Learning (BBL) model and conventional models. control class. Measuring higher-order thinking skills (HOTS) at the end of the lesson (Posttest), the instrument was previously adjusted to the Higher Order Thinking Ability indicator. The instrument that has been made is validated by the validator as an expert lecturer on the research instrument by Mrs. Dr. Ani Sutiani, M.Pd.

After the instrument is validated by the validator, then construct validation tests are carried out in the form of validity, reliability, level of difficulty and differentiating power. The instrument trial was tested on 27 students of MIN 15 Langkat in class V who had studied single and mixed substances before. After the feasibility test was carried out on the respondents from the 10 questions made, 10 items were obtained that were declared valid. Each valid item is used during the research to determine Higher Order Thinking Skills (HOTS). In addition to the validation test, then a reliability test is carried out because an instrument is said to be good if it has a reliability of more than 0.381 so that it can be seen whether the question is reliable or not.

After doing the calculations, the pretest was 0.636 and the post-test was 0.697, which means that the items can produce relatively the same data even though they are used at different times. Data from the difficulty level test with easy, medium and difficult categories were obtained. In the pretest, there were 3 questions in the easy category, 6 questions in the medium category, and 1 question in the difficult category. For the pretest, the questions in the easy category are numbered 1, 7, and 9, the medium category numbers 2, 3, 4, 5, 8, and 10 and the difficult category is number 6. Meanwhile, there are 2 questions with the easy category, 7 questions with the category medium, and 1 question with a difficult category. To post the questions in the easy category at numbers 5, and 6, the medium category at numbers 1, 2, 3, 4, 8, 9, and 10 the difficult category at number 6.

In the difference power test, the pre-test questions consist of 2 questions that have sufficient categories, namely at numbers 1 and 3 and 4 questions that have good categories, namely at numbers 2, 4, 5, 6, 7, 8, 10, and 1 question. with a very good category at number 9. While the post-test questions consist of 1 question that has a sufficient category, namely at number 5, 8 questions that have a good category, namely at numbers 1, 2, 3, 4, 6, 7, 8, 10 , a question with a very good category at number 9.

The learning motivation questionnaire instrument was adapted from a motivational book which was then carried out with construct validation tests in the form of validity and reliability tests. The instrument trial was tested on 27 students of MIN 15 Langkat in class V. After the feasibility test was carried out on the respondents from 20 items of learning motivation questionnaire statements that had been tested on students of class VI MIN 15 Langkat, 20 items of questionnaire statements were declared valid. In addition to the validation test, then a reliability test is carried out because an instrument is said to be good if it has a reliability of more than 0.381 so that it can be seen whether the question is reliable or not. After doing the calculation, it obtained 0.87324 so it can be concluded that the instrument is reliable.

Based on the instrument that has been validated, it can be concluded that in this study 10 items are valid and worthy to be used as research test materials that have been adjusted to the indicators of higher-order thinking skills (HOTS). Higher-order thinking skills in this case are higher-order thinking that is higher than just memorizing facts and revealing information only to someone, but the ability to be able to capacitate what is given with an action that reflects a critical attitude to evaluate a thing. basic consciousness.

Prerequisite tests which include normality tests and homogeneity tests are carried out as a step in determining a hypothesis test to be carried out in each experimental class and

control class. To find out whether a population of data is normally distributed or not, a normality test is carried out using the Kolmogorov-Smirnov method. In addition, the Fisher method is used to analyze the homogeneity of data to determine whether some of the variances of the data population is the same or not. The first prerequisite test, namely the normality test that has been carried out in the experimental class, shows that the existing data is distributed, it is known that the Kolmogorov-Smirnov table has a sig of 0.114. The value of sig > 0.05 where 0.114 > 0.05 means that the experimental class and the control class for higher-order thinking skills (HOTS) are normally distributed. And the normality test that has been carried out on the control class shows that the existing data is distributed, it is known that the Kolmogorov-Smirnov table has a sig of 0.200. The value of sig > 0.05 where 0.200 > 0.05 means that the experimental class and the control class for higher-order thinking skills (HOTS) are normally distributed. From both experimental and control classes, it can be stated that the two data are normally distributed. After the data is known to be normally distributed, it is continued by conducting a test by conducting a homogeneity test, the homogeneity test is the second prerequisite test after the normality test. The homogeneity test is calculated on the dependent variable or the "Y" variable, namely the ability to think at a higher level, the results of the calculation are obtained by X2count < X2table, then H0 is accepted, meaning that both samples are from the same population (homogeneous).

The analysis of variance test of two unequal cell nets is a test that is carried out next after the prerequisite test is carried out which includes the normality test and homogeneity test. Analysis of the calculation of hypotheses with two-way variance analysis with unequal cells obtained a value of F-a-count > F-a-table, it is concluded that there are differences in students' higher-order thinking skills between classes using the Brain-Based Learning (BBL) learning model and classes using conventional methods with an average score. The average posttest of higher-order thinking skills using the Brain-Based Learning (BBL) model is 87,044 and the average posttest value of higher-order thinking skills using conventional methods is 77,193.

CONCLUSION

After doing research, the results of data analysis and hypothesis testing are obtained, it can be concluded that: There are differences in students' higher-order thinking abilities who are taught by the Brain-Based Learning (BBL) learning method using audiovisual media with conventional learning methods using image media. There are differences in the higher-order thinking abilities of students who have high, medium and low learning motivation.

The field of education is the main key to shaping the character of a nation. It can be seen that nations and countries that have good quality human resources are superior to others. Because they are able to manage the country and cultivate its natural wealth. The purpose of national education is basically directed at the development of various character values in accordance with the Indonesian state, even though in reality the process of providing education is still far from what is intended in the law. National education should contain character values education as well, not just for academic education.

REFERENCES

Ansong, J., E. Gissi, dan H. Calado. "An Approach to Ecosystem-Based Management in Maritime Spatial Planning Process." *Ocean & Coastal Management* 141 (1 Juni 2017): 65–81. https://doi.org/10.1016/j.ocecoaman.2017.03.005.

Aral, Neriman. "Visual Perception in Specific Learning Difficulties." *Theory and Practice in Child Development* 1, no. 1 (15 Desember 2021): 25–40. https://doi.org/10.46303/tpicd.2021.3.

Arora, Ankuj, Humbert Fiorino, Damien Pellier, Marc Métivier, dan Sylvie Pesty. "A Review of Learning Planning Action Models." *The Knowledge Engineering Review* 33 (ed 2018). https://doi.org/10.1017/S0269888918000188.

Coles, Erika K., Julie Sarno Owens, Verenea J. Serrano, Janine Slavec, dan Steven W. Evans. "From Consultation to Student Outcomes: The Role of Teacher Knowledge, Skills, and Beliefs in Increasing Integrity in Classroom Management Strategies." *School Mental Health* 7, no. 1 (Maret 2015): 34–48. https://doi.org/10.1007/s12310-015-9143-2.

Cordeiro, Lisa, Marcia Braden, Elizabeth Coan, Nanastasia Welnick, Tanea Tanda, dan Nicole Tartaglia. "Evaluating Social Interactions Using the Autism Screening Instrument for Education Planning-3rd Edition (ASIEP-3): Interaction Assessment in Children and Adults with Fragile X Syndrome." *Brain Sciences* 10, no. 4 (April 2020): 248. https://doi.org/10.3390/brainsci10040248.

Foon, Lai Wei, Zaida Nor Zainudin, Yusni Mohamad Yusop, dan Wan Norhayati Wan Othman. "E-Counselling: The Intention, Motivation and Deterrent among School Counsellors." *Universal Journal of Educational Research* 8, no. 3C (Maret 2020): 44–51. https://doi.org/10.13189/ujer.2020.081605.

Gjefsen, Hege Marie. "Wages, Teacher Recruitment, and Student Achievement." *Labour Economics* 65 (1 Agustus 2020): 101848. https://doi.org/10.1016/j.labeco.2020.101848.

González-Calatayud, Víctor, Paz Prendes-Espinosa, dan Rosabel Roig-Vila. "Artificial Intelligence for Student Assessment: A Systematic Review." *Applied Sciences* 11, no. 12 (Januari 2021): 5467. https://doi.org/10.3390/app11125467.

Gunning, Faith M., Lauren E. Oberlin, Maddy Schier, dan Lindsay W. Victoria. "Brain-Based Mechanisms of Late-Life Depression: Implications for Novel Interventions." *Seminars in Cell & Developmental Biology*, Special Issue: Myelin edited by Gonçalo Castelo-Branco and Roman Chrast / Special issue: Aging in the nervous system edited by Mara Mather, 116 (1 Agustus 2021): 169–79. https://doi.org/10.1016/j.semcdb.2021.05.002.

Hanafi, Imam, dan Eko Adi Sumitro. "Perkembangan Kognitif Menurut Jean Piaget Dan Implikasinya Dalam Pembelajaran." *Alpen: Jurnal Pendidikan Dasar* 3, no. 2 (2019). https://doi.org/10.24929/alpen.v3i2.30.

Haryati, Dini. "Efektivitas Pemanfaatan Lingkungan Sekolah Sebagai Sumber Belajar Terhadap Hasil Belajar Ipa Peserta Didik Kelas Iv Sd Inpres Btn Ikip I Makassar."

AULADUNA: Jurnal Pendidikan Dasar Islam 3, no. 2 (2016): 17. https://doi.org/10.24252/auladuna.v3i2a4.2016.

Hurlock, Elizabeth B. *Adolescent development*. Adolescent development. New York, NY, US: McGraw-Hill, 1949.

Hurlock, Elizabeth Bergner. *Child Development*. Ratna Sagar, 1950.

Icekson, Tamar, Oranit Davidson Begerano, Michal Levinson, Jenny Savariego, dan Malka Margalit. "Learning Difficulties and Loneliness in College and Beyond: The Mediating Role of Self-Efficacy, Proactive Coping, and Hope." *International Journal of Environmental Research and Public Health* 18, no. 19 (2021): 10508. https://doi.org/10.3390/ijerph181910508.

Liaqat, Mishal, Muhammad Hussain, Muhammad Afzal, Maryam Altaf, Sadia Khan, Syed Amir Gilani, dan Iram Liaqat. "Efficacy of pedagogical framework in neonatal resuscitation skill learning in a resource-limited setting: a randomized controlled trial." *BMC Medical Education* 21, no. 1 (2021): 436. https://doi.org/10.1186/s12909-021-02846-x.

Marrone, Rebecca, Victoria Taddeo, dan Gillian Hill. "Creativity and Artificial Intelligence—A Student Perspective." *Journal of Intelligence* 10, no. 3 (September 2022): 65. https://doi.org/10.3390/jintelligence10030065.

Najmi, Nurun, Muhammad Husnur Rofiq, dan Muhammad Anas Maarif. "The Effect Of Cooperative Learning Model Type Of Teams Games Tournament (Tgt) On Student's Learning Achievement." *At-Tarbiyat :Jurnal Pendidikan Islam* 4, no. 2 (28 Agustus 2021). https://doi.org/10.37758/jat.v4i2.291.

Pat, Narun, Yue Wang, Richard Anney, Lucy Riglin, Anita Thapar, dan Argyris Stringaris. "Longitudinally Stable, Brain-Based Predictive Models Mediate the Relationships between Childhood Cognition and Socio-Demographic, Psychological and Genetic Factors." *Human Brain Mapping* n/a, no. n/a. Diakses 19 Oktober 2022. https://doi.org/10.1002/hbm.26027.

Permadi, Benny Angga. "Pengembangan Modul IPA Berbasis Integrasi Islam Dan Sains Untuk Meningkatkan Hasil Belajar Siswa Kelas Vi Min 2 Mojokerto." *Nazhruna: Jurnal Pendidikan Islam* 1, no. 2 (17 Oktober 2018): 294–311. https://doi.org/10.31538/nzh.v1i2.62.

Sena, I. Gusti Made Widya. "Kinesiologi Yoga Asanas (Kunci Kebahagiaan Tubuh, Pikiran Dan Jiwa)." *Jurnal Yoga Dan Kesehatan* 1, no. 1 (2018): 15–21.