The Effect of Enrichment on Science Subjects Respiration System and Animal Digestion System Materials for Cognitive Improvement of Grade 4 and 5 Students at SD NU Hasyim Asy'ari, Kedungkandang District, Malang City

Sophia Dewi Saphira[1(✉)], Indah Amalia Amri[2], and Fajar Shodiq Permata[2]

[1] Bachelor Program of Veterinary Medicine, Faculty of Veterinary Medicine, Universitas Brawijaya, Malang, Indonesia
sophiadewisaphira@gmail.com

[2] Faculty of Veterinary Medicine, Brawijaya University, Malang, Indonesia

Abstract. Kampus Mengajar 2021 were a program from the Ministry of Education and Culture that aimed to help schools affected by the pandemic so that they can continue to carry out learning lesson. SD NU Hasyim Asy'ari is one of the affected schools with an accreditation value of C so it became a priority in getting assistance during the COVID-19 pandemic. The study aimed to (1) determined the increase in the post-test result after the enrichment given; (2) determined whether there was an equal understanding between 4th and 5th graders; (3) determined the distribution of students' cognitive improvement based on the weight of the questions. This research used Two-Group Observational Comparison with a Pretest-Posttest research design. The population of the study was 12 students in grade 5 and 10 students in grade 4. The data were analyzed with correspondence analysis, dependent t-test, and independent t-test with the SPSS version 22 application. The result: (1) There was a significant cognitive improvement in each student from the pretest to the post-test; (2) The understanding of grade 4 students has not been able to be equaled to the 5th-grade students; (3) There was a cognitive increased in all students in terms of increasing the ability to solve on every weight of the questions. There was an increase in the ability to answer difficult category questions on the respiration and digestion material in both grades.

Keywords: Enrichment · Student Cognitive · T-test · Correspondence Analysis · Kampus Mengajar

1 Introduction

Education is the main thing as a provision for the future so that all can be well directed. Through education improvement, many benefits in many sectors can obtain, including some economic benefits so that the school and the parents can save expenditure on providing learning media and learning materials. The implementation of education can

Y. A. Yusran et al. (Eds.): BIC 2022, AEBMR 235, pp. 418–426, 2023.
https://doi.org/10.2991/978-94-6463-140-1_42

be obtained through an educational institution or institution, such as a school. However, during the COVID-19 pandemic, the emergence of a high threat to health led to the issuance of a policy of closing public facilities including schools, so that direct learning had to be stopped [1, 2]. As a result of this policy there was a decrease in the intensity of learning activities and interactions between teachers and students [3]. The physical school closure and the implementation of distance education lead the student to spend less time learning, stress, and lack of learning motivation [4].

SD NU Hasyim Asy'ari is one of the elementary schools that conducts online learning during the pandemic. Based on Reference Data from the Ministry of Education and Culture, SD NU Hasyim Asy'ari is still accredited C, so it is a priority for the government to get assistance during the COVID-19 pandemic. The application of the online learning system that was carried out at the beginning of the pandemic was deemed unsuccessful because it had many problems such as limited mastery of technology for teachers and students and not all students had mobile phones. In addition, students feel bored when studying at home and parents cannot monitor children's learning activities because they are busy working which results in the inhibition of learning [5, 6].

In science subjects for 5th grade elementary school students, the digestive and respiratory systems of living things have been studied. In these two topics, the organs that make up the two organ systems are introduced [7], but have not studied physiology and anatomical structure of the digestive and respiratory systems in animals. Based on the problems above, the authors held an enrichment program for science subjects using learning media such as PPT, educational videos, and direct animal introductions to improve students' cognitive abilities of the learning material presented.

2 Materials and Method

2.1 Materials

The materials for this activity were a laptop, projector, speaker, internet, pretest worksheet, post-test worksheet, and questionnaire forms.

2.2 Method

2.2.1 Field Observation

Observations were carried out by observing, directly taking notes, and documentation for the collection of initial data and information based on the results of interviews with teachers at schools. This observation is aimed at planning and designing learning methods, selecting learning media, and making questions and questionnaires to support the research.

2.2.2 Learning Method Design

The determination of learning methods is adjusted to the conditions in the school and the basic competencies of students. The learning method chosen is enrichment in science subjects because it is related to the scope of veterinary medicine as well as can improve students' cognitive.

2.2.3 Learning Media

Learning media serves to increase students' understanding in this enrichment program, with innovations in learning media from which usually only use textbooks to powerpoints, educational videos, and direct animal introductions.

2.2.4 Making Pretest, Posttets, and Questionnaires

The questions made totalled 25 questions for each material. The purpose of the questionnaire was to assess satisfaction with the enrichment learning method provided.

2.2.5 Enrichment Program Implementation

The program for enrichment of science subjects on respiratory and digestive system materials for 4th and 5th graders of SD NU Hasyim Asy'ari was carried out offline in the classroom, the participants of the activity were all 4th and 5th graders of SD NU Hasyim Asy'ari with details of the number of participants as many as 10 students in grade 4 and 12 students in grade 5. The enrichment program is implemented by implementing strict health protocols. Material delivery is divided into two meetings. At the first meeting, the material on the digestive system was presented, and the second meeting the for the respiratory system with a time of 1 h at each meeting. The implementation of the program starts with giving a pretest, delivering material, showing educational videos, presenting material with PowerPoint, and ending with giving a posttest and questionnaire.

2.2.6 Data Analysis

Data were analyzed quantitatively using dependent T-test, independent T-test, and correspondence analysis using SPSS software version 22. An Independent T-test was conducted to determine differences in understanding between grade 4 and grade 5 students and a Dependent T-test to determine differences increase in posttest scores after being given enrichment. Correspondence analysis was used to map the level of difficulty of the questions with the number of questions answered correctly and incorrectly by students.

3 Results and Discussion

3.1 Cognitive Improvement at Each Grade Level

Based on Table 1, the significance value or p value of the four Independent T-Tests performed is less than 0.05 (<0.05), which means that there are significant differences in the pretest and posttest scores for both grade 4 and 5 students in both materials. In the form of an increase in the value of the posttest which is almost twice that of the pretest due to the provision of enrichment. This can occur due to the use of various kinds of learning media that are adapted to meet the needs of each type of student learning style. Resulting in increased student interest in learning so that the material presented can be understood well and results in increased learning outcomes. Learning styles play a significant role in influencing student academic achievement like learning outcomes [8]. Learning styles have an important role in the learning process with the fulfillment

Table 1. The results of the average grades 4 and 5 of SD NU Hasyim Asy'ari on the Dependent T-Test.

Respiration System Material			
No.	**Variable**	**Average ± SD**	***P Value***
1.	4^{th} grade pretest	21.20 ± 14.37	0.001
	4^{th} grade posttest	36.80 ± 15.18	
2.	5^{th} grade pretest	42.00 ± 16.05	0.000
	5^{th} grade posttest	64.67 ± 14.35	
Digestive System Material			
No.	**Variable**	**Average ± SD**	***P Value***
1.	4^{th} grade pretest	30.4 ± 8.68	0.001
	4^{th} grade posttest	56.4 ± 16.05	
2.	5^{th} grade pretest	40.7 ± 15.62	0.000
	5^{th} grade posttest	74.0 ± 18.95	

Note: There is a significant difference between the average pretest and posttest for grades 4 and 5 with $P < 0.05$.

of the needs of student learning styles will help students absorb information optimally so that effective learning can be created [9].

In the pretest grades, 4 and 5 students in both materials had low results which could be caused by the student's knowledge base or poor input. This can happen due to many factors, one of which is environmental factors (family and school), parent's educational background, and school location. The family environment plays an important role in an individual getting an education because it is the first primary environment in getting the basic foundation for further learning at school. The school environment is the second main environment in the form of formal educational institutions which is also important in determining student learning success because schools are places where educational activities and processes take place [10]. There is a significant relationship between parents' educational background and student learning outcomes [11]. Parents with low education backgrounds will invest too little in schooling [12]. The higher the last education of parents, the better the way of parenting children so that it will have a good effect on the process of child development. On the other hand, the lower the level of parental education, the less good way of parenting is, and will affect the child's development [13]. School location has a significant main effect on variation in pupils' achievement scores [14]. The location of the school in the middle of a densely populated settlement can also be one of the factors causing poor input results. The existence of community activities and passing vehicles causes noise and disrupts student concentration, resulting in unsatisfactory learning outcomes.

3.2 Cognitive Improvement Between Grade Levels

Based on Table 2, the significance value or p value of the four Independent T-Tests performed is less than 0.05 (<0.05), which means that there is a significant difference in the pretest and posttest scores of grades 4 and 5 students in both materials, with an average grade 5 student score. Higher than 4th grade students. This can happen because of the short duration of material delivery for 4th graders who can understand the material well. In addition, the implementation time of the enrichment program during the day can also affect student learning outcomes because during the day students are tired or not as fresh as in the morning. There is a significant effect on the duration of learning with student learning outcomes. There is a positive impact on the learning outcomes of students who study long enough [15]. There is a significant effect between study time on learning outcomes, with an increase in learning outcomes when students study in the morning [16]. Productivity is higher in the morning than in the afternoon and this variation in productivity can increase the efficiency of the learning process. The morning is the time when the atmosphere is still fresh and not hot. The afternoon is the time when the students are sleepy and tired because in the morning, they are already active and the air is already hot. The existence of differences in the basic knowledge of grade 5 students regarding the topics presented can also affect student learning outcomes. Repetition of material can make it easier for students to understand and process material well on similar topics, resulting in higher learning outcomes. Repetition with increasing detail enhances retention of knowledge to a greater extent than stricter assessment [17]. Repetition of learning can deepen and broaden students' understanding so that better learning outcomes are produced [18].

Both grade 4 and grade 5 students still have not been able to reach the standard of minimum completeness (SMC) that has been determined, which is 70, in the majority

Table 2. The results of grades 4 and 5 of SD NU Hasyim Asy'ari on the Independent T-Test

Respiration System Material			
No.	**Variable**	**Average ± SD**	***P Value***
1.	4^{th} grade pretest	21.2 ± 14.37	0.005
	5^{th} grade pretest	42.0 ± 16.05	
2.	4^{th} grade posttest	36.8 ± 15.18	0.000
	5^{th} grade posttest	64.7 ± 14.35	
Digestive System Material			
No.	**Variable**	**Average ± SD**	***P Value***
1.	4^{th} grade pretest	30.4 ± 8.68	0.079
	5^{th} grade pretest	40.7 ± 15.62	
2.	4^{th} grade posttest	56.4 ± 16.05	0.031
	5^{th} grade posttest	74.0 ± 18.95	

Note: There is a significant difference in the average pretest and posttest between grades 4 and 5 with $P < 0.05$.

of the pretest and posttest given. Not achieving the specified SMC can be caused by the use of medical terminology in enrichment materials that are foreign and difficult for elementary students to memorize. This causes the information absorption process to be less than optimal. For students who have not finished, they should be given remedial which serves to help students understand the material that is difficult for them and at the same time to achieve the expected SMC target. However, this remedial activity has not been carried out by the author due to the implementation of the Class 1 Teaching Campus activities in 2021 in the middle of the school year where the school's academic calendar has been compiled. This resulted in the limited time allocation, duration of material delivery, and the number of enrichment program meetings.

3.3 Cognitive Improvement of Various Question Weights

Based on Table 3 and Table 4 which have been presented, it is known that there is a fairly close difference in the increase in the number of students who answered correctly the easy category of respiratory system material between the two grade levels. The difference in improvement that was quite close between grade levels again occurred, but in the material of the digestive system. This means that there is an increase in the ability of grade 4 students from previously not knowing to know so that there is an increase in the ability to answer questions correctly and can be almost equivalent to grade 5 students. In the category of difficult questions, it is known the average value of answering correctly from both grade levels. at the pretest was 0 and then improved well in both grade levels at the posttest. The average grade 4 students' correct answers on the respiratory and digestive system materials increased by 16.25% and 27.78%, respectively. Medium the average value of correct answers for grade 5 students on the respiratory and digestive system materials increased by 28.13% and 51.85%, respectively.

Table 3. The results of the average number of respondents are based on the level of difficulty of the material on the respiratory system.

Respiration System Material					
Question Difficulty Level	**Answer**	**Grade 4**		**Grade 5**	
		Pretest	***Posttest***	***Pretest***	***Posttest***
Easy	Correct	3.56	5.33	6.89	9.22
	Improvement (%)	17.78		19.44	
	Wrong	6.44	4.67	5.11	2.78
Medium	Correct	1.63	2.88	5.13	7.13
	Improvement (%)	12.5		16.67	
	Wrong	8.38	7.13	6.88	4.88
Difficult	Correct	1.00	2.63	2.75	6.13
	Improvement (%)	16.25		28.13	
	Wrong	9.00	7.38	9.25	5.88

Table 4. The results of the average number of respondents are based on the level of difficulty of the material on the digestive system.

Digestive System Material					
Question Difficulty Level	**Answer**	**Grade 4**		**Grade 5**	
		Pretest	***Posttest***	***Pretest***	***Posttest***
Easy	Correct	6.50	8.70	9.50	11.50
	Improvement (%)	22		16.67	
	Wrong	3.50	1.30	2.50	0.50
Medium	Correct	1.83	4.83	4.50	8.50
	Improvement (%)	30		33.3	
	Wrong	8.17	5.17	7.50	3.50
Difficult	Correct	0.00	2.78	0.00	6.22
	Improvement (%)	27.78		51.85	
	Wrong	10.00	7.22	12.00	5.78

The description above shows that the enrichment program provided was able to significantly improve cognitive understanding for all 4th graders and 5th graders in terms of increasing the average value of correct answers from the pretest to the posttest after the enrichment program was given in all categories of questions. The increase in cognitive learning outcomes is indicated by an increase in the percentage of students who correctly answer the items tested [19]. The improvement in the ability to correctly answer questions in various categories by 4th and 5th graders at SD NU Hasyim Asy'ari can be caused by giving concrete examples through the various learning media used, especially direct animal recognition media so that they can attract attention and increase students' interest in learning to make the learning process and experience more interesting because it can liven up the classroom atmosphere and result in learning process effectivity, not monotonously and not boring [20].

4 Conclusion

From this research, several conclusions can be drawn, there is an increase in understanding or cognitive at SD NU Hasyim Asy'ari students significantly at each grade level, in terms of increasing pretest to posttest scores. A significant difference occurs in comprehension or cognitive between 4th graders and 5th graders of SD NU Hasyim Asy'ari. This can occur due to the short duration of material delivery for 4th grade students and the enrichment implementation time during the day when students are tired. There is an increase in understanding or cognitive in grades 4 and 5 of SD NU Hasyim Asy'ari indicated by an increase in the ability to answer correctly on various weights of questions given. Based on this research economic benefits may be obtained, namely saving learning media and learning materials expenses by implementing learning improvement

using a low-budget learning media with PowerPoint and educational videos to provide each student learning style.

Acknowledgments. Thank you to the Ministry of Education and Culture (MOEC) for the opportunity so that the author to be able to join the Class I Kampus Mengajar in 2021. Thank you to Fajar Shodiq Permata DVM as Deputy Dean of Academic Faculty Veterinary Medicine Universitas Brawijaya as well as an advisory lecturer and a mentor who has given his time, advice, and guidance to the author during the preparation of this research as well as possible. Thank you to the NU Hasyim Asy'ari Elementary School which has allowed and willing to help carry out this research.

References

1. Abidah, A., Hidaayatullaah, H. N., Simamora, R. M., Fehabutar, D., & Mutakinati, L. The impact of covid-19 to indonesian education and its relation to the philosophy of "merdeka belajar". Studies in Philosophy of Science and Education. 2020; 1(1), 38-49.
2. Pokhrel, S., & Chhetri, R. 2021. A literature review on impact of COVID-19 pandemic on teaching and learning. Higher Education for the Future, 8(1), 133-141.
3. Sahu, P. 2020. Closure of universities due to coronavirus disease 2019 (COVID-19): impact on education and mental health of students and academic staff. Cureus, 12(4).
4. Di Pietro, G. B., Biagi, F., Dinis Mota Da Costa, P., Karpinski, Z., & Mazza, J. 2020. The Likely Impact of COVID-19 on Education Reflections Based on the Existing Literature and Recent International Datasets. Luxembourg: Publications Office of the European Union
5. Mustafa, N. 2020. Impact of the 2019–20 Coronavirus Pandemic on Education. International Journal of Health Preferences Research, 1–12.
6. Zhang, X. 2020. Thoughts on Large-Scale Long-Distance Web-Based Teaching in Colleges and Universities Under Novel Coronavirus Pneumonia Epidemic: A Case of Chengdu University. In Proceedings of the 4th International Conference on Culture, Education and Economic Development of Modern Society (ICCESE 2020) (pp. 1222–1225). Amsterdam: Atlantis Press
7. Maryanto, & Purwanto. 2009. Ilmu Pengetahuan Alam 5 untuk SD/MI Kelas 5. Jakarta: Galaxy Puspa Mega.
8. Komarraju, M., Karau, S. J., Schmeck, R. R., & Avdic, A. 2011. The Big Five personality traits, learning styles, and academic achievement. Personality and individual differences, 51(4), 472-477.
9. Cahyani, A., & Sumilah. 2018. Hubungan Motivasi Belajar dan Gaya Belajar terhadap Hasil Belajar IPS. Joyful Learning Journal, 7(1): 48–54.
10. Wahid, F. S., Setiyoko, D. T., Riono, S. B., & Saputra, A. A. 2020. Pengaruh Lingkungan Keluarga Dan Lingkungan Sekolah Terhadap Prestasi Belajar Siswa. Syntax Literate; Jurnal Ilmiah Indonesia, 5(8): 555–564.
11. Sunain, S. 2017. Pengaruh Tingkat Pendidikan Orang Tua Terhadap Tingkat Kecerdasan dan Keaktifan Siswa dari Kelas Satu Sampai dengan Kelas Enam Pada Semester I. Pedagogia: Jurnal Pendidikan, 6(2): 160–176.
12. Björklund, A., & Salvanes, K. G. 2011. Education and family background: Mechanisms and policies. In Handbook of the Economics of Education (Vol. 3, pp. 201–247). Elsevier
13. Cholifah, T. N., Degeng, I. N. S., & Utaya, S. 2016. Pengaruh Latar Belakang Tingkat Pendidikan Orangtua Dan Gaya Belajar Terhadap Hasil Belajar Siswa Pada Kelas Iv Sdn Kecamatan Sananwetan Kota Blitar. Jurnal Pendidikan, 1(3): 486-491.

14. Adedoja, G., Abidoye, J. A., & Afolabi, A. K. Effects of Two Puzzle-Based Instructional Strategies on Primary School Pupils' Learning Outcomes in Social Studies in Ondo State, Nigeria. African Educational Research Journal. 2013; 1(2), 58-63.
15. Sari, N. P. 2019. Pengaruh Model Pembelajaraan Problem Based Learning (PBL) Terhadap Hasil Belajar pada Mata Pelajaran IPA Siswa Kelas V Sekolah Dasar Negeri 76 Kota Bengkulu [Thesis]. IAIN Bengkulu.
16. Pope, N.G. 2016. How the Time of Day Affects Productivity: Evidence from School Schedules. Review of Economics and Statistics, 98(1), 1–11.
17. Bergman, E. M., De Bruin, A. B., Herrler, A., Verheijen, I. W., Scherpbier, A. J., & Van Der Vleuten, C. P. 2013. Students' perceptions of anatomy across the undergraduate problem-based learning medical curriculum: a phenomenographical study. BMC medical education, 13(1), 1-11.
18. Herlina, H., Chamdani, M., & Susiani, T. S. 2020. Penerapan Model Auditory Intellectually Repetition Untuk Meningkatkan Hasil Belajar Ppkn Tema 5 Pada Siswa Kelas III SDN 5 Panjer Tahun 2019/2020. Kalam Cendekia: Jurnal Ilmiah Kependidikan, 8(3): 332-337
19. Firdaus, F. M. 2018. Pengaruh Teknik Takalintar terhadap Kemampuan Proses Kognitif Siswa Sekolah Dasar. Mosharafa: Jurnal Pendidikan Matematika, 7(3): 445–454.
20. Pakpahan, A. F., Ardiana, D. P. Y., Mawati, A. T., Wagiu, E. B., Simarmata, J., Mansyur, M. Z., & Iskandar, A. 2020. Pengembangan Media Pembelajaran. Jakarta: Yayasan Kita Menulis.