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The Effect of Application of theChildren Learning in Science Model (CLIS) on Science Process Skills

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Abstract: Science process skills are one of the learning approaches that involve intellectual, manual, and social skills in a scientific method and science development to gain new knowledge and develop knowledge. This study aims to measure the learning model of Children Learning in Science (CLIS) on student science process skills. Quasi experiment method with Posttest Only Control Group Design was used in this study. A total of 17 science process skills -based multiple choice questions were given to respondents who had been determined by cluster random sampling by giving. The average science process skills assessment results in the experimental class showed a score of 82.4 which was included in the good criteria and 70.4 for the control class (sufficient criteria). The difference in science process skills value in this study is not very significant so it is necessary to hold further research on learning models that can improve students' science process skills. The application of the CLIS learning model should make students conduct scientific activities and be active in learning. The low science process skills value is thought to be due to learning strategies that have not been attributed to the skills.

Keywords: learning in science, science process skills, pedagogic practice, reproductive systems

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Introduction

One of the main tools in learning is the curriculum. Curriculum is a guideline in the form of a set of learning implementation plans to achieve educational goals. The curriculum has 4 aspects, namely the aspects of knowledge, skills, attitudes and behaviors (Aslan, 2018). The 2013 curriculum in Indonesia emphasizes a scientific approach that is used in science learning and students are trained to recognize facts, know differences and similarities of facts, seek relationships between facts and their own knowledge (Sajadi et al., 2013). So that students can easily apply science and make decisions(Chapoo et al., 2014)

Science learning contains 4 aspects as follows: process (scientific processes), products (Scientific attitudes), development skills and applications(Hasse et al., 2014)(Caingcoy, 2020). This aspect can be obtained through scientific activities to obtain scientific products in the form of facts, principles, laws, or theories (Hultén, 2013)(Riyan Rizaldi et al., 2021). Learning to students is not only about conveying science products in the form of facts, concepts, laws, but students are trained to develop scientific activities to obtain information based on science process skills (Ambross et al., 2014).

Science process skills are one of the learning approaches involving intellectual, manual, and social skills (Ferreira, 2015). Science process skills is very important for students as a provision in a scientific method and science development with the aim of gaining new knowledge or developing knowledge(Aslan, 2015). Science Process Skills include certain skills including observing, grouping or classification, interpreting, predicting, formulating hypotheses, using tools and materials, planning experiments, asking questions, applying concepts, and communicating (Chowdhury & Halder, 2016).

One of the activities that is able to create a frame of mind to create an active learning environment for students is the Children Learning in Science (CLIS) model(Karamustafaoğlu, 2011)(S Pasaribu, 2021). The CLIS model contains a series of stages to shape the knowledge process into the student's memory, so that it can last a long time by producing conceptual changes and encouraging students to conduct investigative activities and improve various skills (Udeani et al., 2016).The CLIS model directly supports students in developing and practicing process skills through the observation, experimentation, and use of student worksheets(Lynn et al., 2020). The CLIS model is based on a constructivist view where students build their own knowledge based on their experience(Ogonnaya & Abonyi, 2016).

The CLIS model makes students actively engaged in learning, active students will have a better understanding of passive students and listen to explanations from teachers(Darling-Hammond et al., 2019). High School Physics Learning conducted by Ismail (2017) in improving Science Process Skills with children learning in science (CLIS) model provides effective results in improving science process skills in learning. Sulistri (2019)Although there has been a lot of research on the effect of applying the CLIS model on of science process skills, but CLIS testing on student of science process skills is still done little. This study aims to uncover about CLIS learning model of science process skills.

Method

Participant

A total of 60 students of science program at a high school in Jakarta were respondents in this study. The selected respondents have obtained reproductive system materials in the 2nd semester. Data collection in the form of 17 multiple choice instruments with indicators of science process skills. In this study, two groups of experiments (n=30) were taught with CLIS models and control groups (N=30) were taught using conventional learning. Cluster Random Sampling is used for the selection of samples in the place of research objects. The research design uses posttest only group design with quasi-experiment.

Research Instruments

The instrument used in the research is a science process skills test instrument using posttest questions as many as 17 multiple choice questions.

Table 1. Post-test Problem Instrument Grid.

Indicator	**Number of Item**	**Number of Questions**
Observe	5, 9, 13	3
Communicate	1, 4, 8, 16	4
predict	6, 7, 10	3
Interpreting	1, 12, 14, 15	4
Ask a Question	3, 11, 17	3
Total item		**17**

ResearchProcedures

The use of CLIS models and conventional learning models is carried out for almost 4 weeks. Clis model group there are 30 students divided into 5 groups consisting of 5 students and each given a Student Worksheet of reproductive system material based on science process skills. In learning students are trained to conduct science process skills -based activities such as observing, interpreting, predicting, communicating, and asking questions. Learning to students is done using the syntax of the CLIS model. Each CLIS model meeting is 4 hours per week.

In the conventional learning model group, 30 other students were followed for 4 hours per week for almost 4 weeks, and were given the same material as the CLIS model class of the reproductive system. After the instrument is validated, the instrument is given to students after learning by applying CLIS model and conventional model to measure the skills of science process in both groups.

DataCollection and Data Analysis

The data collected was posttest with 17 multiple choice questions about reproductive system material. The posttest problem is in accordance with the skill aspect of the science process. This question is specifically designed to inviduce students' science process skills of observing, communicating, interpreting, predicting, and asking questions. The test is conducted for 45 minutes and each correct answer is given a score of 1 with a minimum score of 0 and a maximum score of 17. The question instrument is tested using validity and reliability tests. Data obtained in the analysis with normality test, homogeneity test using Fisher test with signification level 0.05, hypothetical test (t test) signification 0.05, and science process skills assessment criteria (Purwanto, 2013).

Result

The results of the study in the form of a description of student science process skills data from posttest using normality test, homogeneity, and T test. The data is presented with the following details:

Table 2. Post-test result data in experiment class and control class

Component	Experimental class	Control class
Number of students	30	30
Highest score	94	88
Lowestscore	65	56
Average	82,16	70,20
Standard deviation (SD)	8,10	10,81
Normality Test	3,78	7,00
Homogeneity Test	2,51	
Hypothesis Test	2.39	

Based on Table 2, we could see the average value of students' science process skills in the experiment and control group. The experimental group scored a higher average of 82.16. Meanwhile, from the control group is 70.20. in addition, below are indicators of the skills of the science process of each group of experiments and controls.

Table 3. Data post-test skills process science control class.

Indicator	Control class		Experimental class	
	Percentage (%)	kategori	Percentage (%)	kategori
Observation	70	Cukup	92	Baik sekali
Interpretation	69	Cukup	84	Baik
Communication	76	Baik	92	Baik sekali
Prediction	74	Cukup	88	Baik
Ask a question	63	Cukup	56	Kurang

Ability of control class science process skills with good category indicators i.e. communication indicators (76%). While observation (70%), interpretation (69%), prediction (74%), and asking questions (63%) classified as a sufficient category. The skills of the experimental class of science process of each indicator are classified as good, good, and lacking categories. On the observation indicator (92%) and communication (92%) classified as a very good category. On interpretation indicators (84%) and predictions (88%) classified as a good category. While the category is less on the indicator asking questions (56%). Based on the data in Table 3 shows the difference in the skills of the science process in experimental classes and control classes. Here's a comparison of experiment class and control class indicators.

Table 4. Comparison of post-test results of the ability of the science process skills of the experiment class

Indicator	Percentage (%)	
	Experimental class	Control class
Observation	92	70
Interpretation	84	69
Communication	92	76
Prediction	88	74
Ask a question	56	63

Based on Table 4 it appears the experimental class dominates. In the experimental class the indicators of science process skills on observation indicators (92%) and communication (92%). In the control class the science process skills capability indicator is highest on the prediction indicator (76%).

Meanwhile, the lowest indicator in both classes belongs to the same indicator which is asking questions.

Discussion

After the learning process on the reproductive system materials, students are given a posttest in the form of a science process skills test. The average value of the experiment class after posttest is higher than the control class, which is the average test class value of 80.16 and the average control class value of 70.20. From the results of the analysis and the description given, it can be said that there is an influence on the application of children learning in science learning model to students' science process skills on reproductive system materials.

The CLIS learning model consists of orientation, emergence of ideas, reorganization of ideas, application of ideas, and establishment of ideas. Children Learning In Science learning model has the advantage, namely, (1) CLIS model emphasizes more on students' activities in getting ideas, adapting to existing science, solving and discussing problems that arise so that students can express their own opinions; (2) There is a good interaction between students due to the formation of cooperation in constructing ideas; (3) Students are directly involved in learning the learning atmosphere to be more active, creative, and fun; (4) Teachers teach effectively so that learning becomes more meaningful (Astiti et al., 2017).

The learning model of CLIS is the elicitation of idea stage begins with displaying images or videos related to the material presented. In this phase students can develop the ability to observe an object. Proven by achieving the percentage value of observation indicators of 92% in the experimental class is greater than the control class of 70%. This is because observing is the main activity that becomes the basis of skills, so observation is the main category that must be mastered first before mastering other process skills(Habig et al., 2018). Observing activities can provide more meaningful learning, because students observe phenomena that exist in the environment(Gerber et al., 2010).

Furthermore, the use of CLIS model at the restructuring stage of ideas is where students make an observation, experiment, and observation. At this stage the science process skills are trained through the student worksheets, in line with the CLIS learning model of creating an environment that allows teaching and learning activities involving students in observation and experiment activities using the Student Worksheet (Ismail, 2017). At this stage students build their own ideas through graphs and tables. In the worksheet there are indicators including communicating and predicting activities. As evidenced by the achievement of percentage values on the indicator communicates by 92% and predictions of 88% in the experimental class. This is because students are required to make written or oral communication based on a data so as to train students to communicate. In addition, students who already have good observation skills can train to know the patterns and skills to make predictions (Eccles & Wang, 2016). This is because the experimental activities through LKS students are more participating in the learning process actively in accordance with constructivist theory (Kennedy & Odell, 2014).

In the learning model syntax Application of idea is where students apply the results of discussions with their group (Mullins, 2016). In this syntax students can convey ideas to solve the given problem so that students are easy and accustomed to give conclusions from an observation and experiment (Marfilinda et al., 2019). Proven by achieving the percentage value of interpretation indicators that is 84% in the experimental class, and 69% in the control class. This is because interpretation skills can help develop students' thinking skills gained after students make observations (Koksal & Berberoglu, 2014). It is at this stage that students are trained to develop ideas to conclude, compare and interpret (Capps & Crawford, 2013).

At the review stage change in ideas on this syntax students are assisted by the teacher to strengthen the material, which indirectly helps students to draw overall conclusions on the material being taught. In this syntax also teachers try to train students to ask questions, so that the percentage obtained in the experimental class 58% ask questions. and in the control class by 63%. This happens because the experiment class enthusiastically asks smaller questions compared to the control class such as shy of asking. According to the study (Pheeraphan, 2013)that asking questions including oral activities can be caused by the presence of anxiety of communicating such as shyness, fear of speaking.

Based on Table 4. the achievement of percentage in the experimental class of observation and communication indicators reached the highest indicator compared to other indicators which reached

92%. This is because in the learning model CLIS conducts observation or observation in power points or images on student worksheets in groups. So from the pictures displayed arise communication between students. During the learning process, students show positive responses in practicing science process skills such as, observing, interpreting, predicting, communicating, and asking questions. While in the control class the percentage achieved by 70%.

Conclusion

Based on data analysis and discussion on each science process skills indicator shows that there is an influence of CLIS model on science process skills on reproductive system material. Through the CLIS model, students can conduct scientific activities such as observing, interpreting, communicating, predicting, and asking questions so that students are active in teaching and learning activities.

Reference

Ambross, J., Meiring, L., & Blignaut, S. (2014). *The implementation and development of science process skills in the natural sciences : A case study of teachers ' perceptions. February 2015*, 37–41. https://doi.org/10.1080/18146627.2014.934998

Aslan, O. (2015). How Do Turkish Middle School Science Coursebooks Present the Science Process Skills? *International Journal of Environmental & Science Education*, *10*(6), 829–843. https://doi.org/10.12973/ijese.2015.279a

Aslan, O. M. (2018). From an Academician's Preschool Diary: Emergent Curriculum and Its Practices in a Qualified Example of Laboratory Preschool. *Journal of Curriculum and Teaching*, *7*(1), 97. https://doi.org/10.5430/jct.v7n1p97

Astiti, N. P. M., Ardana, I. K., & Wiarta, I. W. (2017). Pengaruh Model Pembelajaran Childrens Learning in Science (CLIS) Berbantuan Media Lingkungan Terhadap Kompetensi Pengetahuan IPA. *Journal of Education Technology*, *1*.

Caingcoy, M. E. (2020). University-Wide Extension Project: Its Impact on Holistic Wellness of Third Agers and Contribution to Development Goals. In *International Journal of Engineering, Science& InformationTechnology*. https://doi.org/10.5281/zenodo.3928491

Capps, D. K., & Crawford, B. A. (2013). Inquiry-Based Instruction and Teaching About Nature of Science: Are They Happening? *Journal of Science Teacher Education*, *24*(3), 497–526. https://doi.org/10.1007/s10972-012-9314-z

Chapoo, S., Thathong, K., & Halim, L. (2014). Biology Teacher's Pedagogical Content Knowledge in Thailand: Understanding & Practice. *Procedia - Social and Behavioral Sciences*, *116*, 442–447. https://doi.org/10.1016/j.sbspro.2014.01.237

Chowdhury, S., & Halder, S. (2016). Educational Dissemination through Newspaper Daily. *Journal of Education and Practice*, *7*(7), 1–12.

Darling-Hammond, L., Flook, L., Cook-Harvey, C., Barron, B., & Osher, D. (2019). *Implications for educational practice of the science of learning and development*. https://doi.org/10.1080/10888691.2018.1537791

Eccles, J. S., & Wang, M. Te. (2016). What motivates females and males to pursue careers in mathematics and science? *International Journal of Behavioral Development*, *40*(2), 100–106. https://doi.org/10.1177/0165025415616201

Ferreira, M. E. (2015). Enhancing Children ' s Success in Science Learning : An Experience of Science Teaching in Teacher Primary School Training. *Journal of Education and Practice*, *6*(8), 24–31.

Gerber, B. L., Cavallo, A. M. L., & Marek, E. A. (2010). Relationships among informal learning environments, teaching procedures and scientific reasoning ability. *International Journal of*

Science Education, *23*(5), 535–549. https://doi.org/10.1080/09500690116971

Habig, B., Levine, B., & Adams, J. D. (2018). Research in Science Education An Informal Science Education Program's Impact on STEM Major and STEM Career. *Research in Science Education*, *4*, 1–24.

Hasse, S., Joachim, C., Bögeholz, S., & Hammann, M. (2014). Assessing Teaching and Assessment Competences of Biology Teacher Trainees: Lessons from Item Development. *International Journal of Education in Mathematics, Science and Technology*, *2*(3). https://doi.org/10.18404/ijemst.58240

Hultén, M. (2013). Boundary objects and curriculum change: The case of integrated versus subject-based teaching. *Journal of Curriculum Studies*, *45*(6), 790–813. https://doi.org/10.1080/00220272.2013.812245

Karamustafaoğlu, S. (2011). Improving the Science Process Skills Ability of Science Student Teachers Using I Diagrams. *International Journal of Physics & Chemistry Education*, *3*(1), 26–38. https://doi.org/10.51724/IJPCE.V3I1.99

Kennedy, T. J., & Odell, M. R. L. (2014). Engaging Students In STEM Education. *Science Education International*.

Koksal, E. A., & Berberoglu, G. (2014). The Effect of Guided-Inquiry Instruction on 6th Grade Turkish Students ' Achievement , Science Process Skills , and Attitudes Toward Science. *International Journal of Science Education*, *36*(November 2014), 66–78. https://doi.org/10.1080/09500693.2012.721942

Lynn, K., Id, M., Mcguire, L., Hoffman Id, A. J., Goff, E., Rutland, A., Winterbottom, M., Balkwill, F., Irvin, M. J., Fields, G. E., Burns, K., Drews, M., Law, F., Joy, A., & Hartstone-Rose, A. (2020). *Interest and learning in informal science learning sites: Differences in experiences with different types of educators*. https://doi.org/10.1371/journal.pone.0236279

Marfilinda, R., Zaturrahmi, & Suma Indrawati, E. (2019). Development and application of learning cycle model on science teaching and learning : a literature review. *Journal of Physics: Conference Series*, *1317*(1). https://doi.org/10.1088/1742-6596/1317/1/012207

Mullins, K. (2016). IDEA Model from Theory to Practice: Integrating Information Literacy in Academic Courses. *Journal of Academic Librarianship*, *42*(1), 55–64. https://doi.org/10.1016/j.acalib.2015.10.008

Ogonnaya, U. P., & Abonyi, O. S. (2016). Effects of Concept Mapping Instruction Approach on Students ' Achievement in Basic Science. *Journal of Education and Practice*, *7*(8), 79–84.

Pheeraphan, N. (2013). Enhancement of the 21st Century Skills for Thai Higher Education by Integration of ICT in Classroom. *Procedia - Social and Behavioral Sciences*, *103*, 365–373. https://doi.org/10.1016/j.sbspro.2013.10.346

Riyan Rizaldi, D., Doyan, A., Fatimah, Z., Zaenudin, M., & Zaini, M. (2021). Strategies to Improve Teacher Ability in Using The Madrasah E-Learning Application During the COVID-19 Pandemic. *International Journal of Engineering, Science and Information Technology*, *1*(2). https://doi.org/10.52088/ijesty.v1i2.47

S Pasaribu, J. (2021). Development of a Web Based Inventory Information System. *International Journal of Engineering, Science and Information Technology*, *1*(2). https://doi.org/10.52088/ijesty.v1i2.51

Sajadi, M., Amiripour, P., & Rostamy-Malkhalifeh, M. (2013). The Examinig Mathematical Word Problems Solving Ability under Efficient Representation Aspect. *Mathematics Education Trends and Research*, *2013*, 1–11. https://doi.org/10.5899/2013/metr-00007

Sulistri, E. (2019). Students' Integrated Science Process Skills Through CLIS Model. *JIPF (Jurnal Ilmu Pendidikan Fisika)*, *4*(1), 39. https://doi.org/10.26737/jipf.v4i1.945

Udeani, U. N., Atagana, H. I., & Esiobu, G. O. (2016). The Implementation of Action Research for the Improvement of Biology Teaching and Learning in Senior Secondary Schools in Nigeria. *Journal of Education and Practice*, *7*(7), 57–69.

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