The Effect of Picture Storybook Based on Scientific Approach through Inquiry Method toward Student's Inference Skill

Nur ATIKOH[1] , Zuhdan Kun PRASETYO[1]

[1] Yogyakarta State University

ABSTRACT

Many recent studies have reported that picture storybook plays a very important to make a meaningful learning. However, there is lack of the picture storybook that supports the learning process using a scientific approach. Thus, the student's scientific process skill will not develop optimally if the presentation of the material is less interesting and the students are not directly involved in the learning process. This study aimed to examine the difference of students' inference skill after they were taught using picture storybook based on scientific approach through inquiry method and using textbook of curriculum 2013. The used research design was quasi-experiment with the model of pre-test and post-test control group design. The population of research used in this research was grade 5 students of the elementary school in Bantul, Yogyakarta. The sample of research consisted of 47 students. 23 students as experiment class using picture storybook based on scientific approach through inquiry method, whereas 24 students as control class using textbook of curriculum 2013. The result of research showed that there was a significant difference in learning student's inference skill using picture storybook based on scientific approach through inquiry method and using textbook of curriculum 2013. It could be seen from the significance value (Sig.) lower than the significance level (α), (0,01 < 0,05). The implication of this research is the learning design will be more creative, innovative, and comprehensive.

Keywords: inference skill; inquiry method; picture storybook; scientific approach.

INTRODUCTION

The process of teaching science in elementary schools emphasizes the provision of direct learning experiences through the use and development of process skills and scientific attitudes (Subali & Mariyam, 2013). Students are expected to have the process skills to investigate the natural surroundings, solve problems, and make decisions by applying scientific process skills. So that student thinking ability can be developed. Therefore, one of the most important things in the success of science learning is the realization of student literacy skills. One of the keys to

realize student literacy skills is improving student inference skills. Meanwhile, inference skills can be used in the science subject (Froschauer, 2013: 27).

The inference skill is essential for students because it includes one of the higher-order thinking skills (HOTS) that must be developed (Kopitski, 2007). Moreover, the inference skill is a powerful way of thinking and an important 21st-century skill for all students to use and develop across the curriculum (Bintz, Moran, Brendt, Ritz, Skilton & Bircher, 2012: 16-24). The inference skill is a popular but nebulous term because it has been defined in many ways. Among others, it has been defined as making predictions, drawing conclusions, using context clues, activating background knowledge, filling gaps, creating interpretations, visualizing meaning, and dealing with ambiguity. These definitions share two important understandings about inference which are "the heart of meaning construction for learners of all ages" (Anderson & Pearson, 1984: 107) and "involving the ability to read between the lines" (Harvey & Goudvis, 2007).

Several studies indicated that inference skills can be improved through organizing learning steps (Rosnawati, 2012), repetition of the material core into the subject, giving questions relevant to the material, making the mapping or the subject matter map (Purnama, 2016) and use of innovative learning methods (Purwaningsih, 2014; Putri, 2016; Utami, Fatmaryanti & Sriyono, 2017). Thus, the student inference skills will not develop optimally if the presentation of the material is less interesting and the students are not directly involved in the learning process (Froschauer, 2013: 27).

In Indonesia, the change of the 2013 Curriculum is one of the constructive efforts to improve the quality of education and teaching. The 2013 Curriculum primarily changes the learning process which is implemented through the application of integrative and scientific thematic approach. The scientific approach to learning adopts the steps of science in building scientific knowledge. Meanwhile, integrative thematic learning is a learning approach that integrates the various competencies from various subjects into lesson themes (Kemendikbud, 2013).

In relation to the implementation of the 2013 Curriculum, teachers are among the stakeholders who are the determinants of the success of every educational effort (Arini, Syahrudin & Sudatha, 2013). Teachers should be sensitive to changes that occur especially in education and teaching. In addition, Anam (2016: 11) argued that one of the keys to the success of the learning process is to position students as an important part of the learning process and invite them to be actively involved in every learning process. Since, the actual learning process has not been optimized that prioritizes student activity, it affects the low learning outcomes of the science subject. In general, low student learning outcomes in the science subject is also reported in many previous studies (Arini, Syahrudin & Sudatha, 2013; Subarjo, Sudhita & Suarjana, 2014; Neka, Marhaeni & Suastra, 2015; Winantara & Jayanta, 2017).

Problems of low student learning outcomes encourage researchers to investigate further into the ongoing learning process. After further investigation, it is found that there are materials that are not in accordance with the concept and there are some errors in the textbook of curriculum 2013. Therefore, it must be addressed by the correction of concepts in order to avoid misconceptions in students. In addition, the distribution of textbooks of curriculum 2013 is often late. As a result, the learning process becomes impeded and the students must be willing to answer the problems in other paper (Krissandi & Rusmawan, 2015).

Another weakness is the time management in the textbook of curriculum 2013 is not balanced (the material does not match the time allocation) (Putri, Jalmo & Marpaung, 2015). The teacher's lack of understanding of the 2013 curriculum also becomes one of the weaknesses (Zulkarnain, Setyowati & Mahanal, 2014). Teachers are not involved in the curriculum

development process. So, teachers are unfamiliar and confused. In practice, some teachers have difficulty in coordinating several lessons on one theme, and teachers find it difficult to understand the learning model offered in the Curriculum 2013. Whereas, textbooks have an important role in the learning process.

Presentation of quality textbooks will greatly assist students in acquiring knowledge and understanding the material (Prihatina, 2016). The field observation results show that the learning resources used in most primary schools are limited to 2013 Curriculum textbooks. In addition, teachers also complained about incomplete 2013 Curriculum textbook materials and very limited book illustrations. Thus, the students are less interested in reading them. The limited illustration impeded the student imagination to understand the taught concepts. Whereas, according to the level of cognitive development, elementary students are in the concrete operational stage (Baharuddin & Wahyuni, 2015:174). This means elementary students are in enormous need of books that feature many pictures.

Empirically, students tend to like picture books that are colorful and contain realistic images or cartoon (Kustiawan, 2016: 32). Through picture storybook based on scientific approach, students are helped to remember the term and understand the meaning in the book by looking at the picture. Moreover, characteristics of scientific approach according to Daryanto (2014: 53) and Hosnan (2014: 36) include: (1) student-centered; (2) involve the skills of the process of science in constructing concepts, laws or principles; (3) involves potential cognitive processes in stimulating the development of the intellect, especially the students' high-order thinking; and (4) can develop student character. This means that learning that applies a scientific approach will encourage students to become active learners, opens opportunities for students to find sources of learning from the environment. Students are accustomed to learn not only by listening, but by using all five senses, and learning is not only seen from the learning but also from activity in the learning process.

The limited textbooks that support the scientific-based learning process and the lack of teacher innovation in designing the learning process have a negative impact on passive students which leads to the low science literacy skills. Empirically, the low science learning outcomes are proven by studies in several years (Arini, Syahrudin & Sudatha, 2013; Subarjo, Sudhita & Suarjana, 2014; Neka, Marhaeni & Suastra, 2015; prasetyo & Prasojo, 2016; Winantara & Jayanta, 2017). Therefore, it needs a supplement book as teaching materials and the application of teaching methods that support the learning process to be more interesting, which is expected to improve students' inference skills. The study aimed to test the effectiveness of a supplement book which was a picture storybook based on a scientific approach with inquiry method. The application of the storybook was expected to improve the students' inference skills.

METHOD

a) Procedure

This study used quasi-experimental methods with a non-equivalent quantitative design of pre-post control group design. The research conducted of two classes, one class as the control class and the other as the experimental class which were selected randomly. The students in both experimental and control classes were given pretest and posttest before and after treatment. At the beginning of the lesson, a set of pre-tests were given to the control and experimental class. The experimental class was taught using picture storybook based on scientific approach

through inquiry method, whereas the control group was taught using Curriculum 2013 textbooks. The design of this research can be seen in below (Table 1):

Table 1. *Design of quasi-experimental research*

Group	Pre-test	Treatment	Post-test
Experimental	O_1	X	O_2
Control	O_3	-	O_4

O_1 : *Pretest* of experimental group, O_2 : *Posttest* of experimental group, O_3 : *Pretest* of control group, O_4 : *Posttest* of control group, X : lesson using picture storybook based on scientific approach through inquiry method, -: lesson using Curriculum 2013 textbooks

The learning of using picture storybook based on scientific approach through inquiry method has several stages in its application. The stages in the inquiry method consist of Engage, Explore, Explain, Elaborate and Evaluate or known as 5E model (Moore, 2015). The summary of implementation picture storybook based on scientific approach through inquiry method is illustrated in Table 2.

Table 2. *Stages of 5E learning model*

Stage	Activity in learning	Implementation in picture storybook
Engage	Students find and identify problems	Read the story and discover the problems of the character encounters through the conversation in the story and the invitation to find out through the activity of "Ayo Amati (Let's Observe)!"
Explore	Students are directly involved into phenomena and learning resources	The invitation of a character to find answers based on the information presented by the figure through the activity of "Tahukah Kalian (do you Know)?" and "Ayo Cari Tahu (Let's Find Out)!"
Explain	Students analyze their exploration results by placing the abstract experience into a communicable form	The invitation to cultivate understanding becomes a form that can be communicated through questions about the conceptual understanding through activity of "Aku Tahu (I Know)!" and "Ayo Lakukan (Let's Do It)!"
Elaborate	Students present the findings or what they understand	A call to express what is understood through activities of "Ayo Simpulkan (Let's Conclude)!"
Evaluate	The teacher evaluates and determines whether the student has reached an understanding of concepts and knowledge	Presentation of concept comprehension evaluation through activity of "Latihan (Practice)".

b) Participants

A total of 47 students were involved in this study with 23 students in the experimental group and 24 students in control group. The demographics of the research sample presents in Table 3.

Table 3. *The demographics of the research samples and treatments*

Group	Treatment	Number of Students (N)
Experimental	taught using picture storybook based on scientific approach through inquiry method	23
Control	taught using Curriculum 2013 textbooks	24

c) Data Collection

The technique of collecting data used in this study is testing techniques. The instrument used in data collection is in the form of test description which amounted to 15 questions to measure the student's inference skills. Each question has a range of 0-3. If the students answered correctly and complete, then got score of 3. If the students answered correctly but not complete, then got score of 2. If the student answered wrong, then got score of 1. If the student did not answer at all, then got a score of 0. The value of student inference skills is obtained through percentage of the score obtained by students in answering questions about inference.

d) Data Analysis

The first data analysis performed was descriptive analysis to determine the average value, standard deviation, minimum value, and maximum value. Furthermore, the increase in pretest and posttest results of student's inference skill was analyzed using a gain score. The data analysis technique in this study was ANOVA technique at significance level of 0,05. However, before ANOVA test, the prerequisite test is performed in the form of normality test and homogeneity test. The normality test is used to find out whether the data come from the normally distributed population or not and the homogeneity test is used to determine whether the population of both groups is homogeneous or not.

RESULT

a) Desrcriptive Analysis

The results of the pre-test and post-test descriptive analysis are shown in Table 4.

Table 4. *The results of descriptive analysis of pretest and posttest on the inference skill*

Description	Experimental Group		Control Group	
	Pretest	**Posttest**	**Pretest**	**Posttest**
The number of the subjects	23	23	24	24
Highest score	66.67	100	73.33	80
Lowest score	26.67	53.33	33.33	40
Average	48.40	72.40	49.67	57.73
Standard Deviation	1.62	2.56	1.61	1.85

b) Improvement of Inference Skill

Data of inference skill from control and experimental class included pretest and posttest data. The increased inference skill of students was shown in gain value from each group and it can be seen on Figure 1.
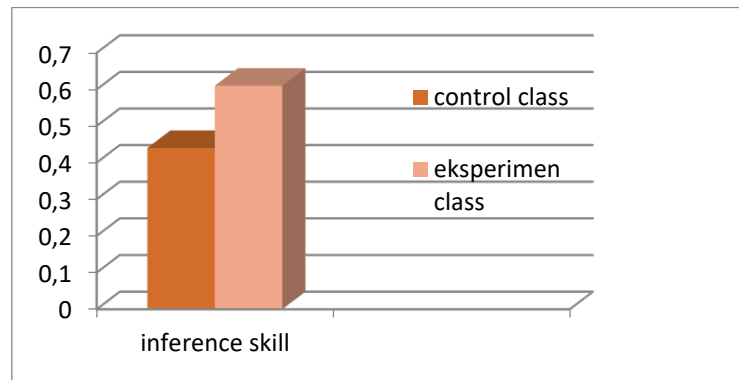

Figure 1. Improvement of the gain value of inference skill

c) Normality and Homogeneity

The univariate assumption tests were performed before the ANOVA test. The univariate assumption tests used in this study were the normality test and homogeneity test. The Kolmogorov-Smirnov normality test was performed on pre-test data of inference skills in experiment and control groups with SPSS 21 program. The results showed that the data were normally distributed or H0 was accepted with the sig.$> \alpha$ at the significance level of 0.05. The normality test results are presented in Table 5.

Table 5. *The normality test results*

Dependent Variable	The Pretest Data of Inference Skill		
	Sig.	Result	Conclusion
Experiment Group	0.289	H_0 is accepted	Normal
Control Group	0.625	H_0 is accepted	Normal

The homogeneity test was performed using Levene's test in SPSS 21. The homogeneity test was performed using Levene's test in SPSS 21. The results show that the data were homogeneous as H0 is accepted with $> \alpha$ at a 0.05 significance level. The homogeneity test results are presented in Table 6.

Table 6. *The homogeneity test results*

Dependent Variable	The Pretest Data of Inference Skill		
	Sig.	Result	Conclusion
Inference Skill	0.348	H_0 is accepted	Homogen

d) Influence of Picture Storybook based on Scientific Approach through Inquiry Method to Inference Skill

As the homogeneity test showed that the data were homogeneous, an ANOVA test then could be performed. The results of the ANOVA test on post-test data of inference skills are presented in Table 7.

Table 7. *The result of ANOVA Test*

Dependent Variable	The Posttest Data of Inference Skill	
	Sig.	Conclusion
Inference Skill	0.001	H_0 is rejected

DISCUSSION

Based on figure 1, the results display that student's inference skill in the experiment group was higher than the control group. This increase was due to the direct student interaction with the picture storybook based on a scientific approach with inquiry method which improved the students' inference skills. Students were motivated to learn since the science learning process was more interactive, and the subject was better understood by the students. It is in line with the opinion of Loh (2016), which stated that the use of picture storybooks creates a relaxed learning environment. Narrative and illustration of picture books reduce cognitive loads. So, the students have a fun of learning process (Hadi, 2013; Kelemen, Emmons, Seston & Ganea, 2014; Loh, 2016). The statement is also supported with Gönen, Durmuşoğlu & Severcan (2009) and Handayani (2010) who explained that picture storybooks enrich a concept and provide students with information.

As present in table 7, it can be concluded that the data for pre-test and post-test between the experiment group and control group also statistically significant difference in inference skill. Thus, a picture storybook based on a scientific approach with inquiry method (which consist of 5E model) affected the inference skill of fifth-grade elementary school students. This is caused by the fact that the student experience is one of the important factors affecting the inference process. This is supported by Kopitski (2007), Froschauer (2013) and Rafferty, Lamar & Griffiths (2012) which stated that the inference process occurs when students combine clues with knowledge that they already have, based on observations of objects or events that have occurred and can also be based on material that students have understood during the learning process. Therefore, the results of this study are highly relevant to the experts' opinions. Kispal (2008) stated that the key to being able to inquire is to read. The picture storybook based on a scientific approach with inquiry method facilitates students to obtain knowledge through reading activities and provide experience through activities existing in the storybook to make an inference based on existing knowledge and experience.

The use of picture storybook based on a scientific approach with inquiry method provides a meaningful student learning experience. This learning experience equips students with the knowledge, which relates to the observed facts or information to form an inference. The study results support the theory proposed by Martin (2012) and Froschauer (2013). According to them, inference skills can be obtained through a series of mechanisms or procedures used to test knowledge in a systematic way that includes answering questions, solving problems, and making a decision in a predetermined object, or it can be said that inference is one of the best explanations for the question "why does something happen?".

The picture storybook based on a scientific approach with inquiry method (which consist of 5E model) answers the challenge because there is a series of scientific approach process, which includes observing, asking, reasoning, trying, and networking in the storybook. In the presentation of the narrative, there are steps of inquiry methods illustrated in each scene.

CONCLUSION

Based on the results of the research and discussion above, it can be concluded that picture storybooks based on scientific approach through inquiry method influenced the inference skills of fifth graders in elementary school. This effect is indicated by a significance of 0.01 (significance <0.05). It means, by using picture storybooks based on scientific approach through inquiry method become more active in the learning process, so that students' science literacy become more honed and student inference skills can be improved.

ACKNOWLEDGMENTS

REFERENCES

Anam, K. *Pembelajaran Berbasis Inkuiri Metoda dan Apikasi*. Yogyakarta: Pustaka Pelajar.

Anderson, R. C., & Pearson, P. D. (1984). *A schematheoretic view of basic processes in reading comprehension (Technical Report No. 306).* Urbana: Center for the Study of Reading.

Arini, N. K., Syahrudin, H., & Sudatha, I. G. W. (2013). Pengaruh model pembelajaran addie terhadap keterampilan berpikir kritis dalam pembelajaran IPA siswa kelas V di desa pedawa. *Mimbar PGSD Undiksha, 1*(1).

Baharuddin, B. & Wahyuni, E.N. (2015). *Teori Belajar & Pembelajaran.* Yogyakarta: Ar-Ruzz Media.

Bintz, W. P., Moran, P. P., Brendt, R., Ritz, E., Skilton, J. A., & Bircher, L. S. (2012). Using Literature to Teach Inference Accross the Curriculum. *Voice from the Middle, 20*(1), 16-24.

Froschauer, E. B. L. (2013). *Year Inquiry*: *A Collection for Elementary Educators.* Virginia*:* NSTA Press.

Gönen, M., Durmuşoğlu, M., & Severcan, S. (2009). Examining the views of preschool education teachers on the content, illustrations and physical characteristics of the picture story books used in education. *Procedia-Social and Behavioral Sciences*, *1*(1), 753-759.

Hadi, S. (2013). Pembelajaran Konsep Pecahan Menggunakan Media Komik Dengan Strategi Bermain Peran Pada Siswa SD Kelas IV Semen Gresik. *Jurnal Pendidikan, 3*(4).

Handayani, S. (2010). Perbandingan Efektifitas Pemberian Informasi Melalui Media Cerita Bergambar (Komik) Versi BKKBN dengan Media Leaflet. *Gaster Jurnal Ilmu Kesehatan, 7*(1), 482-490.

Harvey, S., & Goudvis, A. (2007). *Strategies that work: Teaching comprehension for understanding and engagement* (2nd ed.). Stenhouse, Portland, ME.

Kelemen, D., Emmons, N. A., Seston Schillaci, R., & Ganea, P. A. (2014). Young children can be taught basic natural selection using a picture-storybook intervention. *Psychological science, 25*(4), 893-902.

Kemendikbud. (2013). *Peraturan Menteri pendidikan Nasional dan Kebudayaan RI No 67 Tahun 2013 tentang standar proses.* Jakarta: Kemendikbud.

Kispal, A. (2008). *Effective Teaching of Inference Skills for Reading*. Literature Review. Research Report DCSF-RR031. National Foundation for Educational Research. The Mere, Upton Park, Sl (2).

Kopitski, M. (2007). *Exploring the teaching of inference skills*. Doctoral Dissertation, Hamline University.

Kustiawan, U. (2016). *Pengembangan Media Pembelajaran Anak Usia Dini.* Malang: Gunung Samudra.

Loh, E. K. (2016). Picture Storybooks in Teaching Chinese as a Second Language. *CLCWeb: Comparative Literature and Culture, 18*(2), 12.

Martin, D. J. (2012). *Elementary science methods: A constructivist approach. Cengage Learning*. Belmont, CA: Thompson Wadsworth.

Moore, K. D. (2015). *Effective Instructional Strategies: From Theory to Practice 4th ed*. Los Angeles: SAGE Publications.

Neka, I. K., Marhaeni, A. N., & Suastra, I. W. (2015). Pengaruh Model Pembelajaran Inkuiri Terbimbing Berbasis Lingkungan Terhadap Keterampilan Berpikir Kreatif dan Penguasaan Konsep IPA Kelas V SD Gugus VIII Kecamatan Abang. *PENDASI: Jurnal Pendidikan Dasar Indonesia*, *5*(1).

Prasetyo, G., Prasojo, L. D., (2016). Pengembangan Adobe Flash pada Pembelajaran Tematik-Integratif berbasis Scientific Approach subtema Indahnya Peninggalan Sejarah. *Jurnal Prima Edukasia, 4*(1) 54-66.

Prihatina, R. R. N. (2016). Pengembangan Media Pembelajaran Buku Cerita Bergambar untuk Pembelajaran IPS Siswa SMP Kelas VIII. *Social Studies*, *5*(8).

Purnama, F. (2016). Penerapan Model Brain Based Learning (BBL) dalam Pembelajaran Matematika untuk Meningkatkan Kemampuan Berpikir Kreatif Matematis Siswa SMP. *FKIP UNPAS (2).*

Purwaningsih, S. (2014). *Keterampilan Mengelompokkan dan Keterampilan Inferensi Siswa Pada Materi Redoks Melalui Problem Solving di SMAN 1 Trimurjo*. Thesis, Universitas Lampung.

Putri, E., Jalmo, T., & Marpaung, R. R. (2015). Kajian Implementasi Pembelajaran IPA Berdasarkan Kurikulum 2013 Kelas IV Sekolah Dasar Negeri. *Jurnal Bioterdidik*, 3(1).

Putri, D. E. N. (2016). *Penerapan Model Pembelajaran Problem Solving untuk Meningkatkan Keterampilan Keterampilan Inferensi dan Mengkomunikasikan Siswa pada Materi Larutan Penyangga*. Doctoral Dissertation, Universitas Lampung.

Rafferty, A., Lamar, M., & Griffiths, T. (2012). Inferring Learners Knowledge from Observed Actions. *In Educational Data Mining* (pp. 226-227).

Rosnawati, R. (2012). Berpikir Kritis melalui Pembelajaran Matematika untuk Mendukung Pembentukan Karakter Siswa. *Prosiding Seminar Nasional Matematika di Universitas Sanata Dharma,* Yogyakarta Indonesia.

Subali, B., & Mariyam, S. (2013). Pengembangan kreativitas keterampilan proses sains dalam aspek kehidupan organisme pada mata pelajaran IPA SD. *Cakrawala Pendidikan*, *3*(3).

Subarjo, M. D. P., Sudhita, I. W. R., & Suarjana, I. M. (2014). "Pengaruh model CORE terhadap pemahaman konsep IPA siswa kelas V di gugus I NAkula Kecamatan Negara Kabupaten Jembrana". *Mimbar PGSD Undiksha*, *2*(1).

Utami, I. M. B., Fatmaryanti, S. D., & Sriyono, S. (2017). Efektivitas Model Pembelajaran POGIL Menggunakan Brainstorming untuk Meningkatkan kemampuan Keterampilan Inferensi Logika Siswa. *URECOL,* 161-166.

Winantara, I. D., & Jayanta, I. N. L. (2017). Penerapan Model Pembelajaran TPS Untuk Meningkatkan Hasil Belajar IPA Siswa Kelas V SD No 1 Mengwitani. *Jurnal Ilmiah Sekolah Dasar*, *1*(1), 9-19.

APENDIX

Picture Storybook Based on Scientific Approach through Inquiry Method

1. Cover and introduction of characters

2. Story

3.   Steps of Inquiry Method in The Book