

A Tri Hita Karana Oriented Accordion Book to Improve Science Process Skills and Social Attitudes of Fifth Grade Elementary School Students

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Abstract

This research aims to identify how the Tri Hita Karana-oriented accordion book improves fifth-grade elementary school students' science process skills and social attitudes. Data were collected using questionnaires and tests. The study data were analyzed quantitatively using descriptive statistics. This study found that students need engaging learning media that can make them master science process skills and, at the same time, develop their social attitudes. Thus, an accordion book was developed, oriented to the concept of Tri Hita Karana, where the accordion book represented the stages of science process skills and the concept of Tri Hita Karana to teach social attitudes. From the results of expert tests conducted, it was found that the developed accordion book proved to be valid. Furthermore, this study also found that the accordion book improved students' science process skills and social attitudes.

Keywords: *Accordion book, science process skills, elementary school, social attitudes.*

INTRODUCTION

Science process skills are essential skills for everyone to have. Basic science process skills include observing, measuring, classifying, predicting, and communicating (Desstya, 2015; Puspita, 2016). In addition, science process skills relate to processes for developing or discovering new knowledge (Mirawati & Nugraha, 2017). This skill helps someone to understand something more thoroughly and structure it to make better decisions or conclusions in solving problems (Gültekin & Altun, 2022). Furthermore, students' science process skills positively and significantly affect student achievement in science and natural science subjects (Ritonga et al., 2020).

In addition to having science process skills, learning science in schools is also expected to shape students' social attitudes. Social attitude is a person's relatively consistent behaviour when treating others, a person's general view of something or someone else, and behaviour directed toward social goals (Kartono, 2006). Social attitude can also be interpreted as the assertive behaviour of a person or group shown in the family or community environment (Sudarsono, 1997). At school, students associate with friends, teachers, and employees. Thus, these situations and conditions require students to have good social attitudes.

One of the critical social characteristics is social attitude, namely the ability to communicate or blend in with the surrounding environment and behave well in an

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accurate and sustainable manner (Barokah, 2016). Furthermore, the ability to communicate is one of the skills that must be possessed in the 21st century (Fletcher & Tan, 2021). If seen more specifically at the education system in Indonesia, in the 2013 curriculum, it is stated that students are expected to have social attitudes such as honesty, discipline, responsibility, tolerance, cooperation, courtesy, and confidence in interacting with family, friends, teachers, neighbours, and love of the motherland. This means that social attitudes must be instilled through school education.

Although science process skills are essential for students, especially in problem-solving, science is a subject considered difficult by several elementary school students (Nindiarini & Palupi, 2009). Students feel that science is a difficult subject, so many students have low learning motivation to study science (Maryani et al., 2018). Moreover, suppose science learning is only done in conventional classrooms (Faisal & Martin, 2019) to overcome these problems. In that case, variations are needed in implementing learning because students' experience in the classroom influences their motivation to learn (Nasution, 2017).

Another challenge faced when teaching science subjects in elementary schools is the characteristics of young learners. Elementary school children have different characteristics from adolescent and adult students (Tezcan, 2022). Most children at elementary school age are still at the concrete operational stage (Cahan et al., 2008; Maynard & Greenfield, 2003). They understand things that can be seen, held, and felt directly. Children in this period still cannot understand abstract things well (Tamm & Tulviste, 2022). So, in the learning process, they need the help of learning media that are concrete or that can help make the material studied concrete so that it is easy to understand.

In addition, children also like interesting and colourful learning media (Arifah & Setyowati, 2018; Purnama, 2014). With the existence of exciting and colourful learning media, children's students enthusiastically pay attention to the media during the learning process. They like holding exciting and colourful learning media, especially for conveying learning that conveys concepts that require students to focus. Without interesting learning media, it is challenging for young students to focus on the learning process for a long time (Fernando et al., 2021). Children can only concentrate on one thing at a time (Lastari et al., 2020). It is very easy for young students to lose focus and be attracted to other things during the teaching and learning process (Turoman, 2017). Their concentration is diverted when they feel no interesting concrete things in the learning process. This often makes young students divert their attention from the explanations given by the teacher to other things that happen outside the classroom.

However, in reality, the limitations of learning media that are suitable for science learning and interesting for students in elementary schools are still often an obstacle (Winangun, 2022). Not all elementary schools have attractive teaching aids or media to teach science to young students. For this reason, this research aims to identify how the Tri Hita Karana (THK) oriented accordion book could improve fifth-grade students' science process skills and social attitudes. What is newly offered by this study that distinguishes it from previous research is the utilization of the THK concept, which is one of the local wisdom in integrating the understanding of scientific concepts and fostering social attitudes.

Methodology

This research followed the classroom-based action research approach. According to Kemmis et al. (2014), classroom-based action research has four cyclic processes: planning, action, observation, and reflection. To measure science process skills, six aspects of fundamental science process skills are used, which include observing, inferring, predicting, classifying, applying, and communicating. Students' social attitudes

were measured through a social attitude questionnaire, which includes honesty, which is an attitude of harmony between actions and actions; discipline is an act of obeying specific rules; responsibility, which is seriousness in carrying out the task; Polite, which is an attitude of respect through good speech; caring, an attitude that can provide help and feel the situation of others; and self-confidence, an attitude that believes in one's abilities.

Data on science process skills and social attitudes were analyzed quantitatively using descriptive statistics. The calculation of descriptive statistics for data at each stage with the help of SPSS ver 20 for Windows. The value of science process skills and social attitudes is made in the value range of 1 to 100 and categorized using benchmark reference intervals, as shown in Table 1 below.

Table 1. Value Category based on Benchmark Reference Assessment

Score	Category
85-100	Very Good
75-84	Good
60-74	Fair
50-59	Poor
0-49	Very Poor

Findings

Pre-Test Results of Students' Science Process Skills

The researchers conducted a pre-test to ensure students experience problems understanding the scientific process. From the results of the pre-test, based on the categories in Table 1, it was found that 38.5% of students had low science skills, 50% had fairly good science process skills, and only 11.5% had good science process skills. So, from these data, it can be seen that 88.5% of students still need to improve their science process skills. From the descriptive statistical results for the science process skills pre-test results, it was found that the students' mean score was 63.4. The data shows that, in general, students' science process skills are fair. When viewed from the value range, it can be seen that the distance between the scores of students who get the highest and lowest scores is quite far. In other words, the difference in the ability between students who get high scores and those who get low scores is still quite far. A fairly high standard deviation value also supports this, indicating that the data or students' abilities vary. So, in general, students' science process skills still need to be improved. The statistical descriptive results from the pre-test regarding science process skills can be seen in Table 2 below.

Table 2. Descriptive Statistics Results from the Pre-Test Regarding Science Process Skills

Statistics	Result
Mean	63.3846
Median	65.0000
Mode	67.00
Std. Deviation	7.85405
Variance	61.686
Range	25.00
Minimum	50.00

Maximum	75.00
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Pre-Test Results of Students' Social Attitudes

Students' social attitudes were also measured using a pre-test before students were taught using the accordion book learning media. From the results of the pre-test conducted, it was found that 46% of students had poor social attitudes, and the remaining 54% had fair social attitudes. From the data obtained, no students had social attitudes in the good and very good categories. The mean score of the pre-test results of social attitudes was that the student's mean score was 60.4. In other words, in general, according to the categories in Table 1, students have social attitudes that are categorized as fair. Thus, the social attitudes of students still need to be improved. For this reason, these students can be used to test whether the developed accordion book can improve students' social attitudes. The descriptive results of the pre-test statistics for social attitudes can be seen in Table 3 below.

Table 3. Statistical Descriptive Results from the Social Attitudes Pre-Test

Statistic	Result
Mean	60.4231
Median	60.5000
Mode	61.00
Std. Deviation	5.27767
Variance	27.854
Range	22.00
Minimum	51.00
Maximum	73.00

First Post-Test Results of Students' Science Process Skills

After students were taught using the accordion book for three meetings, students were given a post-test to measure their science process skills. The results of the first post-test showed that the students' science process skills began to increase. This can be seen from the frequency of students' science process skills scores, which experienced an increase. The results of the first post-test showed that 42.3% of students had fair science process skills, 50% had good science process skills, and 7.7% had very good science process skills. From the descriptive statistical results of the first post-test to measure students' science process skills, it was also found that the mean score of students' science process skills increased compared to the mean score during the pre-test. According to the data obtained from the analysis using descriptive statistics, it was found that the mean score of the first post-test was higher than the mean score of the pre-test, namely $74.5 > 63.4$. The descriptive statistical results for the first post-test can be seen in Table 3 below.

Table 3. First Post-Test Statistical Descriptive Results for Measuring Science Process Skills

Statistics	Post-Test I
Mean	74.4615
Median	75.0000
Mode	79.00

Std. Deviation	7.00417
Variance	49.058
Range	25.00
Minimum	63.00
Maximum	88.00
Sum	1936.00

First Post-Test Results of Students' Social Attitudes

In addition to giving a science process skills post-test, after students have learned to use the accordion book for three meetings, students are also given the first post-test to measure their social attitudes. From the frequency of scores of students' social attitudes in the first post-test, it was found that they also experienced an increase. It was found that 76.8% had moderate social attitudes, 19.1% had good social attitudes, and the remaining 3.8% had very good social attitudes. When viewed from the descriptive results of the first post-test statistics of students' social attitudes, it can be seen that the mean score is 71.2 (see Table 4). This means that, in general, the value of students' social attitudes is adequate. Given that it was targeted that the implementation of the accordion book could improve students' social attitudes to a good level, the implementation of the accordion book was continued in the second cycle.

Table 4. Descriptive Statistical Results of Students' Social Attitudes in the First Post-Test

Statistics	Post-Test I
Mean	71.2308
Median	69.0000
Mode	68.00
Std. Deviation	6.24377
Variance	38.985
Range	23.00
Minimum	65.00
Maximum	88.00
Sum	1852.00

Results of Students' Science Process Skills in the Second Post-Test

After re-implementing the accordion book for three meetings, the researcher again gave a test to measure students' science process skills. The results of the post-test were found that the students' science process skills were better than those in the first post-test. This can be seen from the increase in student scores in the second post-test compared to the scores in the first post-test. This can be seen from the scores of students who started to be only in the good and very good categories. The data shows that 42.3% of students got good grades, and the remaining 53.7% got very good grades. From the results of data analysis using descriptive statistics, it was also found that the student's mean score was 85.6. According to the score category table shown in Table 1, the student's mean score is in the very good category. So, it can be said that, in general, the scores of students are getting better. When viewed from the standard deviation value, it is also seen that the

standard deviation of student scores in the second post-test (6.56) is smaller than the standard deviation in the first post-test (7.00), indicating that student scores are more evenly distributed. In other words, the more students get scores close to the average score, which is classified as very good. The results of descriptive statistics for the value of students' science process skills in the second post-test can be seen in Table 5 below.

Table 5. Statistical Descriptive Results from the Second Post-Test for Measuring Science Process Skills

Statistics	Post-Test II
Mean	85.5769
Median	88.0000
Mode	88.00
Std. Deviation	6.55544
Variance	42.974
Range	21.00
Minimum	75.00
Maximum	96.00

Results of Students' Social Attitudes in the Second Post-Test

Like science process skills, three meetings were held in the second cycle. The researcher also gave a test to measure students' social attitudes. Based on the data from the post-test results, it can be seen that the students' social attitudes are better than those in the first post-test. This can be seen from the results of the post-test, which showed that 19.1% of students got fair scores, 46.1% got good scores, and 30.6% got very good scores. When viewed from the results of the descriptive statistics obtained for the social attitude scores of students in the second post-test, it was found that the students' mean score was 80.8. This value shows that, in general, students have good social attitudes. Compared to the mean score in the first post-test, it can be seen that the scores of students' social attitudes have increased from 71.2 to 80.8. The descriptive results of the second post-test statistics to measure students' social attitudes can be seen in Table 6.

Table 6. Descriptive Results of the Second Post-Test Statistics for Measuring Social Attitudes

Statistics	Result
Mean	80.7692
Median	79.0000
Mode	79.00
Std. Deviation	6.59883
Variance	43.545
Range	25.00
Minimum	72.00
Maximum	97.00

Discussion

From the description of the research findings above, it can be said that the developed accordion book can assist students in improving their science process skills. This study's results are supported by previous studies, which found that accordion books help increase students' interest and motivation in learning (Elkin & Mistry, 2018; Fajaria, 2016). Using an accordion book motivates students to learn more, improving their learning achievement (Verawati, 2017). Accordion books can motivate students because children like learning media that can be seen and held directly because they like and understand more easily from something concrete (Kejora, 2020; Moreira et al., 2018; Widiyana et al., 2020). Furthermore, the display of an accordion book that can be folded can be designed to represent the stages of the scientific process. The scientific process of observing, measuring, classifying, predicting, and communicating can be represented on each fold (Desstya, 2015; Puspita, 2016). In this study, in the developed accordion book, the first fold is focused on observing activities, the second fold measures, the third fold classifies, the fourth fold predicts, and the fifth fold communicates. Thus, students are accustomed to the steps of the scientific process when studying the material provided in the accordion book. If carried out repeatedly, this habit becomes a culture (Wardhani et al., 2022). In other words, the steps of the science process that are repeated using an accordion book make students accustomed to it and make it a culture. Besides, accordion books can help improve students' character values (2019).

Conclusion

Science process skills and social attitude are two critical things that should be promoted in science education in Indonesia. It is because science process skills will help the students to solve problems logically and scientifically, while social attitude will make them live in harmony. An interesting teaching medium is needed to promote science process skills and social attitudes for young learners. Thus, this study developed an accordion book that interestingly integrates THK values to promote science process skills and social attitudes. Based on the data analysis results, there are three points of conclusion from this study. First, students need learning media that are interesting and can be used offline to support science learning in terms of improving science process skills and social attitudes. Second, the developed Accordion book is proven to have high content validity. Third, the accordion book improves students' science process skills and social attitudes. In other words, this study has successfully developed the accordion book to promote science process skills and social attitudes for young learners.

This research was carried out using a classroom-based action research approach, and it is necessary to carry out further research to carry out summative evaluation using an experimental research approach. It is hoped that this follow-up research will complement the results of this study by proving the effectiveness of the accordion book on science process skills and social attitudes so that the results can be generalized to a wider population.

Conflict of Interest

There is no conflict of interest.

References

- Afidah, N., Budiman, A., & Setianingsih, E. S. (2019). Penerapan model pembelajaran course review horay berbantu media accordion book untuk mengembangkan nilai-nilai karakter siswa [The application of the course review horay learning model is assisted by the accordion book media to develop student character v. *Mimbar Ilmu*, 24(1), 28. <https://doi.org/10.23887/mi.v24i1.17407>

- Arifah, N., & Setyowati, S. (2018). Pengaruh penerapan media kartu huruf warna-warni terhadap kemampuan membaca awal anak kelompok B di TK Islam Hubbul Wathon Kedunganyar [The effect of using colorful letter card media on the early reading ability of group B children at the Hubbul Wathon Is. Universitas Negeri Surabaya. <https://core.ac.uk/download/pdf/230640340.pdf>
- Barokah, F. N. (2016). Hubungan sikap sosial dan keterampilan kewarganegaraan dengan pembentukan karakter pada siswa kelas X SMA negeri Colomadu tahun pelajaran 2015/2016 [The relationship between social attitudes and citizenship skills with character building in Grade X studen. *Jurnal Global Citizen*, 1(1), 390–392.
- Cahan, S., Greenbaum, C., Artman, L., Deluya, N., & Gappel-Gilon, Y. (2008). The differential effects of age and first grade schooling on the development of infralogical and logico-mathematical concrete operations. *Cognitive Development*, 23(2), 258–277. <https://doi.org/https://doi.org/10.1016/j.cogdev.2008.01.004>
- Desstyia, A. (2015). Keterampilan proses sains dan pembelajaran IPA di sekolah dasar: Telaah buku siswa kelas IV SD tema 2 karya Sumini [Science process skills and science learning in elementary schools: A study of grade IV elementary school theme 2 student books by Sumini]. *Profesi Pendidikan Dasar*, 2(2), 95–102.
- Elkin, T., & Mistry, A. (2018). The accordion book project: Reflections on learning and teaching. In *Arts-Based Methods in Education Around the ...* (pp. 107–152). <https://books.google.com/books?hl=en&lr=&id=XcdqDwAAQBAJ&oi=fnd&pg=PA107&dq=project+base+learning&ots=8HHhHEU-vQ&sig=4HevWYCPAMoy3kTtLLOk205A2hM>
- Faisal, & Martin, S. N. (2019). Science education in Indonesia: Past, present, and future. *Asia-Pacific Science Education*, 5(1), 4. <https://doi.org/10.1186/s41029-019-0032-0>
- Fajaria, N. H. (2016). An accordion book project for reluctant writers. *The 61st International TEFLIN Conference*, 980–981.
- Fernando, F., Permana P, N. D., Zarkasih, Z., & Ilhami, A. (2021). Studi analisis keterampilan proses sains melalui penerapan model pembelajaran cooperative ditinjau dari perspektif gender [Study of analysis of science process skills through the application of cooperative learning models from a gender perspective]. *Marwah: Jurnal Perempuan, Agama Dan Jender*, 19(2), 148. <https://doi.org/10.24014/marwah.v19i2.10177>
- Fitria, Y. (2017). Efektivitas capaian kompetensi belajar siswa dalam pembelajaran sains di sekolah dasar [The effectiveness of student learning competence achievements in science learning in elementary schools]. *Jurnal Inovasi Pendidikan Dan Pembelajaran Sekolah Dasar*, 1(2). <https://doi.org/10.24036/jippsd.v1i2.8605>
- Fletcher, E. C., & Tan, T. X. (2021). Examining the 21st century skillset perceptions of academy. *Thinking Skills and Creativity*, 40, 100817. <https://doi.org/https://doi.org/10.1016/j.tsc.2021.100817>
- Gültekin, S. B., & Altun, T. (2022). Investigating the impact of activities based on scientific process skills on 4th grade students' problem-solving skills. *International Electronic Journal of Elementary Education*, 14(4), 491–500. <https://doi.org/10.26822/iejee.2022.258>
- Kartono, K. (2006). *Kamus lengkap psikologi [Complete dictionary of psychology]*. Grafindo.
- Kejora, M. T. B. (2020). The use of concrete media in science learning in inquiry to improve science process skills for simple machine subject. *MUDARRISA: Jurnal Kajian Pendidikan Islam*, 12(1), 1–17. <https://doi.org/10.18326/mdr.v12i1.1-17>
- Kemmis, S., McTaggart, R., & Nixon, R. (2014). *The Action Research Planner: Doing Critical Participatory Action Research*. Springer Singapore.
- Lastari, D. S., Mustafa, S. M., & Aini, Y. N. (2020). Using game-based learning tool to engage young learners in the EFL online classrooms. *INELTAL Conference Proceedings*, 26–33.
- Maryani, I., Husna, N. N., Wangid, M. N., Mustadi, A., & Vahechart, R. (2018). Learning difficulties of the 5th grade elementary school students in learning human and animal body organs. *Jurnal Pendidikan IPA Indonesia*, 7(1), 96–105. <https://doi.org/10.15294/jpii.v7i1.11269>

- Maynard, A. E., & Greenfield, P. M. (2003). Implicit cognitive development in cultural tools and children: Lessons from Maya Mexico. *Cognitive Development*, 18(4), 489–510. <https://doi.org/https://doi.org/10.1016/j.cogdev.2003.09.005>
- Mirawati, M., & Nugraha, R. (2017). Meningkatkan keterampilan proses sains anak usia dini melalui aktivitas berkebun [Improving early childhood science process skills through gardening activities]. *Early Childhood: Jurnal Pendidikan*, 1(1), 13–27. <https://doi.org/10.35568/earlychildhood.v1i1.50>
- Moreira, I. X., Pereira, S., & Gusmão, H. F. (2018). The influence of concrete instructional media on learning achievement. *ISCE: Journal of Innovative Studies on Character and Education*, 2(1), 104–114. <http://iscjournal.com/index.php/isce/article/view/25>
- Nasution, W. N. (2017). The effects of learning model and achievement motivation on natural science learning outcomes of students at state Islamic elementary schools in Medan, Indonesia. *Journal of Education and Training*, 4(2), 131. <https://doi.org/10.5296/jet.v4i2.11144>
- Nindiarini, I. S., & Palupi, V. U. (2009). The challenges faced by an elementary school science teacher in teaching using English: A case study. *Journal of Language Teaching and Research*, 9(2), 83–107.
- Purnama, S. (2014). Elemen Warna dalam Pengembangan Multimedia Pembelajaran Agama Islam. *Jurnal Pendidikan Dasar Islam*, 2(1), 113–130.
- Puspita, S. A. (2016). Analisis keterampilan proses sains yang dikembangkan dalam lembar kerja siswa biologi kelas X yang digunakan oleh siswa MAN di kota Yogyakarta [Analysis of science process skills developed in class X biology student worksheets used by MAN students in the . *Jurnal Pendidikan Biologi*, 5(1), 30.
- Ritonga, N., Gultom, H. S. B., & Nazliah, R. (2020). Peningkatan hasil belajar IPA melalui pendekatan keterampilan proses [Improving science learning outcomes through a process skills approach]. *Jurnal Biolokus*, 3(1), 293. <https://doi.org/10.30821/biolokus.v3i1.742>
- Sudarsono. (1997). Kamus konseling [Counseling dictionary]. Rineka Cipta.
- Tamm, A., & Tulviste, T. (2022). Children's values in early childhood: Age differences in structure and priorities. *Personality and Individual Differences*, 184, 111196. <https://doi.org/https://doi.org/10.1016/j.paid.2021.111196>
- Tezcan, F. (2022). Andragogy or pedagogy: Views of young adults on the learning environment. *International Education Studies*, 15(1), 136. <https://doi.org/10.5539/ies.v15n1p136>
- Turoman, N. (2017). How do kids and grown-ups get distracted in everyday situations? *Frontiers for Young Minds*, 5(March). <https://doi.org/10.3389/frym.2017.00008>
- Verawati. (2017). Peningkatan keterampilan menulis deskripsi dengan menggunakan media accordion book pada siswa kelas I SDN Madyopuro 2 Malang [Improving skills in writing descriptions using the media accordion book for grade I students at SDN Madyopuro 2 Malang].
- Wardhani, N. K. S. K., Mahendradhani, G. A. A. R., & Putra, K. E. (2022). Cultivating elementary school students ' characters through neo- humanistic education. *Kasetsart Journal of Social Sciences*, 43(2), 323–328.
- Widiana, I. W., Tegeh, I. M., Parwata, I. G. L. A., & Hanikah. (2020). Improving student's factual knowledge with concrete media through observing activities in scientific approaches in elementary schools. *Journal of Education and E-Learning Research*, 7(3), 293–299. <https://doi.org/10.20448/JOURNAL.509.2020.73.293.299>
- Winangun, I. M. A. (2022). Analisis problematika proses pembelajaran IPA di sekolah dasar [Analysis of the problematic process of learning science in elementary schools]. *Edukasi: Jurnal Pendidikan Dasar*, 3(1), 37. <https://doi.org/10.55115/edukasi.v3i1.2294>