

THE DEVELOPMENT OF ELEMENTARY SCHOOL

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THE DEVELOPMENT OF ELEMENTARY SCHOOL TEACHING MATERIALS BASED ON INDUSTRIAL REVOLUTION 4.0 AND MULTIPLE INTELLIGENCE SKILLS

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Abstract

Elementary schools in Banjarmasin, South Kalimantan, Indonesia do not yet have open schools that can develop students' industrial 4.0 skills and multiple intelligences. According to survey and observation results, more than 75% of respondents stated that they had not developed industrial 4.0 skills and multiple intelligence in teaching tools and materials, did not know in detail and had never developed skills and multiple intelligences in the learning process. As a result, the provision of teaching materials that can develop the skills of the Industrial Revolution 4.0 as well as develop various student intelligences is a major problem in elementary schools in Banjarmasin. The purpose of this research is to produce innovative teaching materials for elementary school students that combine the development of revolution 4.0 skills and multiple intelligences and test the effectiveness of the developed teaching materials to improve revolution 4.0 skills and multiple intelligences. The research method used is research and development which consists of 10 steps. The trial sample was two schools in Banjarmasin, South Kalimantan, Indonesia using a quasi-experimental method with a non-equivalent control group type. The results of the study obtained scores from material experts / content experts for SD teaching materials 101, scores from media experts 138, multiple intelligences 30, skills 4.0 revolution scores 165, and local wisdom materials for the people of South Kalimantan 173. Thus, the results of the development are declared suitable for use. The results also showed that the experimental class obtained an average of 4.0 industrial evolution skills and multiple intelligence 79,112 (SD 10,339, Independent Sample Test: $t = 2,123$, $df = 66$) and the control class 61,023 (SD11,213, Independent Sample Test: $t = 2.117$, $df = 48,772$). There is a significant difference between the post-test results of the experimental class and the post-test scores of the control class. It can be said that the developed teaching materials are effective for improving industry 4.0 skills and multiple intelligences.

1 INTRODUCTION

Efforts to prepare the younger generation in the era of the industrial revolution 4.0, must start from the learning process that presents skill-based activities for the industrial revolution 4.0. Activities that must be presented in the learning process are the development of critical thinking skills, problem solving, creativity, innovation, collaboration, communication and technological literacy [1]–[5]. Teachers as learning designers must present activities that lead to the development of skills that students must possess. Teachers must also prepare teaching materials that direct students to carry out activities that can practice skills in the era of the industrial revolution 4.0.

The era of the industrial revolution 4.0 expects the younger generation to have critical thinking skills. Learning activities should lead to the development of critical thinking skills. Such as asking various questions from an object, answering logical and diverse questions, seeking truthful information, finding solutions to a problem, expressing logical opinions, and evaluating relevant and irrelevant ideas. [1], [6]–[10]. In addition to critical thinking skills, teachers must also provide learning activities that can develop problem-solving skills. Such as digging up information about current problems, seeking relevant information to solve problems, developing strategies to overcome problems, and analyzing the impact of implementing solutions [4], [8], [9], [11]–[13].

Teachers must also provide learning activities that can develop creative thinking skills and innovation. Such as exploring various ideas, expressing opinions or criticisms of an object, solving problems in a different way from others, generating original ideas or ideas, providing improvements or perfecting existing works or objects. [3], [9], [14]–[16]. In addition to creativity and innovation, teachers must also provide activities that can develop collaboration, communication and technological literacy skills. Such as working collaboratively, being involved in every group activity, being responsible for the assigned tasks, providing solutions to solve problems faced by the group, improving or perfecting the results of group work, giving and receiving information clearly, expressing opinions, responding to the opinions of

others, giving positive response when there is a difference of opinion and use technology in finding solutions to problems [17]–[23].

In addition to developing skills in the 4.0 industrial revolution era, Indonesia's young generation must also have multiple intelligences. Teachers are expected to design student activities that lead to the development of multiple intelligences. Such as linguistic intelligence, musical, mathematical logic, visual-spatial, kinesthetic, intrapersonal, interpersonal, naturalist and existentialist. This is because each student has various intelligences, if not facilitated then the intelligence will not be a triggering factor for student success in the future. [5], [7], [24]–[26].

But the reality shows that currently student activities in elementary schools have not yet developed the skills of the industrial revolution 4.0 and students' multiple intelligences. This is because there are no textbooks that contain innovative, creative, effective, fun learning processes, oriented to various skills in the era of the industrial revolution 4.0 and multiple intelligences. Even though the use of teaching materials can trigger the achievement of skills and multiple intelligences. Agusta (2021) found that the learning process in several elementary schools in the city of Banjarmasin is still a transfer of knowledge and has not developed students' higher-order thinking skills.

The results of observations made from 17 to 31 January 2021 showed that 212 out of 260 teachers in Banjarmasin City still use learning tools that are arranged in a simple way and do not include the development of industrial revolution 4.0 skills and students' multiple intelligences. 223 of the 260 teachers have never done learning with a variety of teaching materials. Specifically, researchers conducted interviews about teachers' knowledge of industrial revolution 4.0 skills and students' multiple intelligences, 185 people stated that they did not know in detail and had never developed these skills in the learning process. They also said that they had never used teaching materials that lead to the development of students' multiple intelligences (Source: field observation on elementary school in Banjarmasin, South Kalimantan, Indonesia).

This shows that there must be a solution in the form of the design of teaching materials that lead to the development of industrial revolution 4.0 skills and multiple intelligence. The teaching materials must contain student learning activities that lead to the development of critical thinking skills, problem solving, creativity, innovation, communication, collaboration. The content of teaching materials must also lead to the optimization of linguistic, musical, mathematical logic, visual-spatial, kinesthetic, intrapersonal, interpersonal, naturalist and existentialist intelligences. This study aims to explore the use of teaching materials based on industrial revolution 4.0 and multiple intelligence skills in improving industrial revolution 4.0 and multiple intelligence skills.

2 METHODOLOGY

This study uses research and development (R&D) methods to develop teaching materials based on industrial revolution 4.0 skills and multiple intelligence for elementary school students. The research steps are as follows:

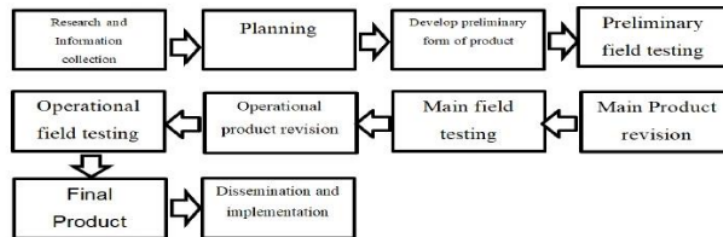


Figure 1 Research Flowchart

This research was carried out in Banjarmasin, South Kalimantan, Indonesia at two elementary schools with geographical locations located in community villages and along the Banjarmasin river, namely the Benua Anyar 9 State Elementary School Banjarmasin and Basirih 3 State Elementary School Banjarmasin. The preparation of these teaching materials involves validators, namely validators for developing content and activities based on skills of the industrial revolution 4.0 and multiple intelligences, validators for materials based on local wisdom of the people of South Kalimantan, Indonesia, media validators and materials or content design.

Data were collected through test techniques, interviews, documentation, product assessment sheets, industrial revolution 4.0 skill observation sheets, and multiple intelligence observation sheets, perception questionnaires and teacher and student response questionnaires. The product feasibility test is carried out to determine the feasibility level of teaching materials. Based on the shortcomings in the test results, the researchers revised the revisions to improve the content of the teaching materials, so as to produce products that were suitable for use.

The feasibility test started with a limited trial. Conducted at Basirih 3 Elementary School Banjarmasin using the One-Shot Case Study design. Students in one class of 30 people are given treatment in the learning process using teaching materials from the development results of which another class is not given treatment, and the test results will be observed. In addition to using tests, researchers also conducted interviews with teachers and students about the effectiveness of teaching materials to develop industrial revolution 4.0 skills and multiple intelligences. And their interest in teaching materials. The results obtained are used as reflection material to revise the content of teaching materials.

The next trial is carried out after completing the revision of the content of the teaching materials. The second phase of the trial used two schools, one school as the experimental class and one school as the control class. SD Basirih 3 Banjarmasin was selected as the experimental class (EC) and the State Benua Anyar 9 Elementary School Banjarmasin was selected as the control class (CC). The trial was carried out using a quasi-experimental method with a non-equivalent control group design type as shown below:

Figure 2 Non equivalent Control Group Design

	<i>Pretest</i>	<i>Treatment</i>	<i>Posttest</i>
<i>Experiment class</i>	O_1	X_1	O_2
<i>Control class</i>	O_3	X_2	O_4

3 RESULTS

This research on the development of teaching materials will be carried out in 2021 in Banjarmasin, South Kalimantan, Indonesia, involving 2 schools with similar geographic locations, which are both located in villages and on the banks of rivers, on the basis of wanting to develop the potential of the environment around the community which will be appointed as part of the content. teaching materials for elementary school students. At this stage of research, one part of the theme of learning in grade 4 elementary school is various jobs around me. It is hoped that this research will continue in the future in the context of developing teaching materials as a whole for the elementary school level.

The research results obtained from the initial collection of interview data received a positive response from the teaching teachers, because until now there has been no teaching material that raises the content of teaching materials based on the environment of the surrounding community, especially the South Kalimantan area, Indonesia. The novelty of the research development of this book consists of selecting and compiling the content of teaching materials based on the wetland environment and raising the local wisdom of the people of Banjarmasin-South Kalimantan, Indonesia. In addition, this book is also equipped with technology-based content that invites riverside students to update on current technological developments, because based on the results of previous surveys not all in the environment, especially riverside communities, update on technological development, especially in the field of education. By incorporating elements of links, barcodes, and learning video media through the youtube link that has been listed in the drawing of this teaching material. Researchers hope that with the presence of teaching materials for fourth grade students based on industrial revolution 4.0 skills, multiple intelligences with wetland environmental content and local wisdom of the people of South Kalimantan, they can still minimize the backwardness of science and technology, and develop the intelligence of riverside communities in the 21st century.

These results are used as a complement to the results of teacher interviews as material for analyzing the needs of developing teaching materials based on the skills of the industrial revolution 4.0, multiple intelligence with the content of the wetland environment and local wisdom of the people of South Kalimantan. Then from the data the researchers tried to improve the quality of the teaching materials based on user input, and the results of the recap of the teacher and student response questionnaires were obtained after the presentation of teaching materials with the theme of various jobs around me, as follows:

Table 1. Recapitulation of Teacher Response Questionnaire Results

No	Indicator	Scor	Value	Criteria
1	Content Feasibility	70	A	Very Good
2	Eligibility Skill-based content industrial revolution 4.0	40	A	Very Good
3	Language	45	A	Very Good
4	Multiple Intelligence	37	A	Very Good

Table 2. Rekapitulasi Hasil Angket Respon Siswa

No	Indicator	Scor	Value	Criteria
1	Appearance	1560	A	Very Good
2	Content	2340	A	Very Good
3	Valuable	1196	A	Very Good

Based on these results, it can be concluded that students' perceptions of teaching materials presented with the theme of various jobs around me are based on the skills of the industrial revolution 4.0, multiple intelligences with wetland environmental content and local wisdom of the people of South Kalimantan get a very interesting category. These results are used as a complement to the needs analysis of the development of teaching materials based on the skills of the industrial revolution 4.0, multiple intelligence with the content of the wetland environment and local wisdom of the people of South Kalimantan.

The following is an example of the preparation stage for using the book:



Figure 3 Examples of activities before using the book (preparing instructions for using the book)



Figure 4. Examples of activities that include 4.0 revolution skills

The development of this book is also equipped with the development of students' multiple intelligences which can be adapted to the interests of each intelligence possessed by students. The elements of the development of multiple intelligences that have been developed include indicators that are packaged in this book, namely the development of verbal-linguistic intelligence, Visual-Spatial, Logical-Mathematical Intelligence, Musical Intelligence, Kinesthetic intelligence, Interpersonal Intelligence, Naturalist intelligence, and Intrapersonal Intelligence. The following are the results of the development of teaching materials from experts for the development of revolution 4.0 skills and the development of multiple intelligences.

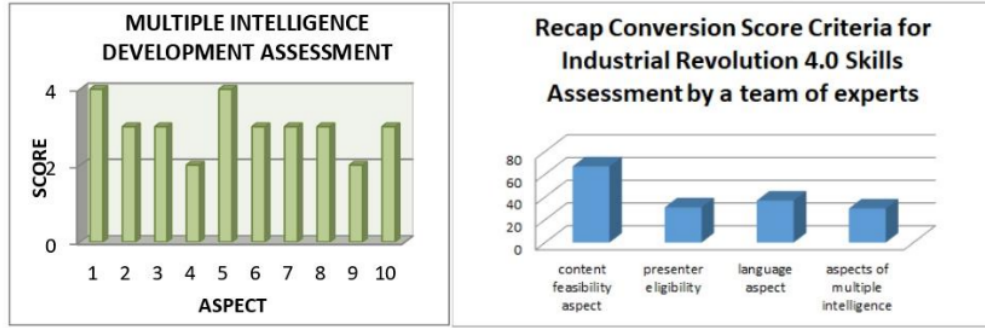


Figure 5. The results of the expert team's assessment of the development of teaching materials

The industrial revolution 4.0 skill assessment score is 165, and for multiple Intelligence scores with a total score of 30, so for a total score of 195 the feasibility of developing teaching materials.

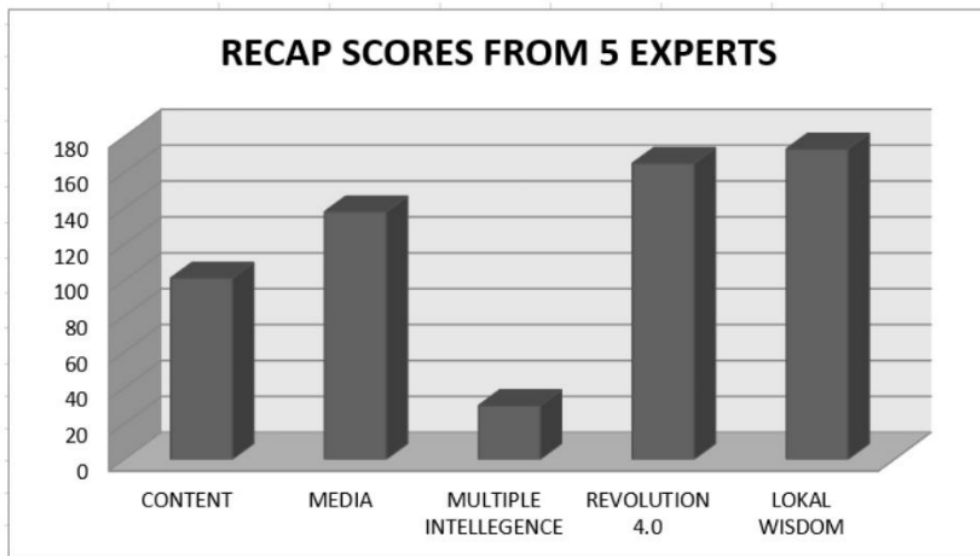


Figure 6. Recap 5 assessments from a team of experts

From the picture above, it can be stated that the total score obtained for the feasibility of thematic textbooks based on skills of the industrial revolution 4.0, multiple intelligence with the content of the wetland environment and local wisdom of the people of South Kalimantan with a total score of 607 with the acquisition of material experts / content of SD 101 teaching materials. media experts got a score of 138, multiple intelligence 30, revolution skills 4.0 a score of 165, and local wisdom of the people of South Kalimantan 173.

To find out the effectiveness of the developed teaching materials to improve the skills of the industrial revolution 4.0 and multiple intelligence in trials, it can be seen in student learning outcomes and the

differences in the effectiveness of the textbooks used in the experimental class and the control class. In this study, the independent sample test was calculated using the SPSS CPU program at 16.0. Before carrying out this test, the analysis prerequisite tests were carried out, namely normality and homogeneity. The following is the analysis of the normality test and homogeneity test:

Table 3 Normality Test Summary

Test	N	Kolmogorov-Smirnov number	Significant number
Pretest (KE)	30	1,064	0,208
Posttest (KE)	30	1,235	0,094
Pretest (KK)	30	0,778	0,580
Posttest (KK)	30	0,983	0,289

Based on the data shown in the table of normality test results, the significant value is greater than the probability of 0.05. Thus H_0 is accepted or the data is normally distributed. In addition to the data normality test as a prerequisite test, there is also a data homogeneity test. The homogeneity test is intended so that the samples used as research subjects are homogeneous or not homogeneous.

Table 4 The homogeneity test summary

Test	N	Levene Statistic	Significant
Pretest and Posttest Experiment Class	90	0,451	0,504
Pretest and Posttest Control Class	90	0,658	0,421

The homogeneity test value is greater than the probability of 0.05. So it can be transmitted or the data is homogeneous. The difference in increasing learning outcomes of the experimental class and the control class based on the normality and homogeneity of the data concluded that the data were normally distributed and homogeneous. Calculation of independent sample t-test using SPSS 16.0 program. The developed textbook product is only effective if the posttest results of the experimental class are better than the control.

Table 5 Different posttest experimental class and statistical group control class

Class	N	Mean	Std. Deviation	Std. Error Mean
Experiment	30	79.112	10.339	1.625
Control	30	61.023	11.213	2.110

The posttest average of students in the experimental class with 30 students was 79,112 with a standard deviation of 10,339, while the control students with 30 students was 61,023 with a standard deviation of 11,213. This means that the average posttest score obtained by students is different between the experimental class and the control class. The average posttest test test in the experimental class is higher than the average posttest in the control class. To see a significant difference in the results, it is necessary to look at the second part of the results of the independent dating sample test for the results of the posttest, experimental class and control class using SPSS 16.0 for Windows as follows:

Table 6 Independent Sample Test From Experiment and Control Class

	Levene's Test for Equality of Variances		t-test For Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Post Equal Tes variances asseumed	.001	.982	2.123	66	.021	6.17333	2.65650	.85622	11.49045
Equal variance not assumed			2.117	48.772	.022	6.17333	2.71123	.73826	11.60840

The results obtained indicate that the use of the developed teaching materials has the potential to improve critical thinking skills, creative thinking and innovation, problem solving, communication and collaboration. The developed textbook also has the potential to increase students' multiple intelligence.

4 DISCUSSION

The development of this textbook is an alternative to train skills in the 4.0 industrial revolution era by integrating local wisdom and mobile learning technology. This is in line with the results of research showing that using mobile learning can develop students' critical thinking [4], [8], [27]. The activities presented in the textbooks lead to the development of critical thinking, solving problems that lie in the activities of Analysis and Observation, Wondering observation results, Analysis of the results and Making experiments by opening students' horizons through presenting a problem in everyday life. The efforts made by the teacher are in line with previous research that learning that poses various problems can increase students' creativity because it is done by developing students' ideas widely through displaying problems. [7], [9], [28], [29].

Another skill development in this teaching material is creative thinking. Activities presented in the form of Task Product Creation. The learning process carried out provides experience for students to create creative projects related to the topic being studied. Students' creativity is trained through creating solution-solving products and meaningful products that can be utilized in everyday life. Similar activities have been carried out by previous researchers with the final results showing that presenting simple project activities has the potential to develop students' creativity. They are free to express their skills and find new solutions or modifications of existing solutions [4], [9], [11], [30]–[32]

The learning activities presented in the developed textbooks are also designed to increase student collaboration through analysis and administer information activities, this activity will train students' collaboration skills starting from working collaboratively, contributing to groups, conveying information clearly, communicating with each other, caring for all group members, and respond to each group's needs and participate fully in various steps to solve problems [11], [28], [33]–[35].

he developed textbooks also develop students' multiple intelligences. Linguistic intelligence is trained when students carry out group work activities, actualize solutions to problems and negotiate. Students will work together to identify each question item to explore information. Students will gather information from various sources and explore information in the surrounding environment. This is in line with previous research that group work activities, negotiations, exploring problems can develop linguistic intelligence [5], [36], [37].

Another activity presented in this textbook is the development of musical and kinesthetic intelligence through various songs and tones. The songs and tones presented come from local wisdom in South Kalimantan, ranging from folk songs, regional musical instruments to community activities that produce tones. In this activity students also carry out moving activities so that their kinesthetic intelligence is trained. This is in line with previous research that through activities presenting songs, notes and physical activities can develop students' kinesthetic and musical intelligence [25], [38]–[40]

The developed textbooks also facilitate the development of visual-spatial intelligence by presenting pictures and videos that attract students' attention. The pictures and videos presented lead to the topic of learning and local wisdom in South Kalimantan. The activity of presenting pictures and videos has the potential to develop students' visual-spatial intelligence [25], [41]–[43]

Students are also trained to have interpersonal intelligence and mathematical logic through Analysis, Actualization of Solution and Battle Games activities. Students will be trained to care for each other with other students, the content presented is in the form of game activities using fun mathematical logic [7], [25], [26], [44].

5 CONCLUSIONS

Research on the development of teaching materials based on the skills of the industrial revolution 4.0 and multiple intelligence of students based on local wisdom in South Kalimantan was declared feasible and able to improve the skills of the industrial revolution 4.0 and multiple intelligence of elementary school students.

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