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## Thematic Subject Specific Pedagogy to Integrate 21st Century Learning Skills

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### ABSTRAK

The development of technological advances in the era of Industrial Revolution 4.0 has provided new challenges for education. Teachers have expected to package the subject matter into a comprehensive and educational set of learning. Nevertheless, most teachers cannot design thorough academic knowledge, especially in integrating HOTS, ICT, character, and competence of the 21st century. This research aims to produce learning tools in integrative thematic based on 21st-century skills. The research method used is research and development. Data collection techniques included expert validation sheets, teacher assessments, and student responses. Subject-specific pedagogy (SSP) consists of three products: syllabus, lesson plan, and student worksheet. They are eligible based on expert validation tests. The syllabus score is 4.8, the lesson plan is 4.8, and the student worksheet is 4.7. The assessment results are in the good category. Students' response to the worksheet from the aspect of content feasibility, presentation aspect, linguistic aspect, and visual aspect entered is in the excellent category. Thus, SSP in 21st-century skills is suitable for elementary school students.

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## Introduction

Currently, education is required to prepare quality human resources and have complete competencies, including 21st-century competencies called 4C (Critical thinking, Creativity, Communication, and Collaboration) [1]. Aware of the needs of 21st century competencies, the Ministry of Education and Culture through its policies has sought to implement the 2013 Curriculum by adapting the 21<sup>st</sup>-century skills as well as authentic assessment [2]. This good step aims to prepare students for Indonesia forward in 2045 so that teachers are expected to be able to pack learning material as a comprehensive kit.

However, the government's efforts have not been balanced with maximum competence by teachers as drivers of education in the field. Based on information obtained in the area through training activities, elementary school teachers cannot yet package material properly. The learning process tends to be conventional and has not developed student creativity. The results by Ref. [3] revealed that elementary school teachers in Mataram still have difficulty planning in carrying out integrative thematic learning. It was mainly in elaborating material relevant to learning content, selecting environmentally oriented media and methods, preparing indicators, and elaborating material pertinent to the theme. Similarly, Ref. [4] convey that teachers in Yogyakarta, Indonesia area still have difficulty integrating elements of 21st-century skills into the syllabus and Learning Implementation Plan, including the integration of Character Strengthening, HOTS, and Literacy.

Other studies also revealed that teaching teachers had not integrated 21st-century competencies into the curriculum, and assessment has not paid attention to systematically implementing innovative learning strategies [5]. Ref. [6], in their research through training activities on 40 teachers at SD Negeri Surakarta, showed that the ability of teachers to compile the role of learning skills that facilitate 21st-century ability, in this case, high order thinking skills (HOTS) for students is still low. Of the 40 teachers studied, 23 or 65.7% did not understand and implement HOTS-based learning as support for 21st-century abilities. Similarly, the results of research conducted by Ref. [7] in MIN 2 Kulon Progo revealed that teachers still have difficulty compiling assessment sheets, student worksheets and lesson plans that are integrated based on HOTS as support for 21st-century abilities. With not yet owning his teacher's ability to pack the material of the field of study into a comprehensive and educational set of learning, especially 21st-century skills according to Ref. [8], very likely graduates of education less competent such lack of critical thinking, unable to overcome problems, inability to communicate, unable to collaborate with the team and others.

Based on a search of the results of previous research, information was obtained concerning the theme studied. Handayani and Wilujeng, in their research, show that subject-

specific pedagogy (SSP)-based inquiry can improve process skills and increase motivation to learn science. Research conducted by Ref. [7] shows that SSP developed worthy of use with good and excellent categories. Prayitno dan Wangit found that SSP developed worthy of service with good categories. Unlike the previous research, this research tries to conduct a study on developing thematic SSP based on 21st-century skills. It is essential to assist teachers in developing 21st-century competencies for elementary school students. There are two objectives of this study, namely:

- knowing the steps for developing integrative thematic SSP based on ab ad 21 skills for elementary school students, and
- knowing the skills-based thematic SSP requirements a foul 21 for <sup>7</sup> elementary school students.

The contribution of the results of this study is to produce 21st-century competency-based thematic SSP products that teachers can use to teach in elementary schools.

## Method

<sup>2</sup> Metode the research used was research and development refer to Ref. [9]. At the development stage, feasibility tests and limited tests were applied. At this stage, needs analysis is carried out through two processes: analysis of the needs of teachers and students in the field and literature analysis. The product design stage is carried out using three steps: format selection, determination of learning tools and SSP design. After carrying out the product design, a draft of a learning tool in the form of SSP is tested for feasibility by experts and limited tests to obtain teacher and student responses. Data collection techniques use expert validation sheets, teacher assessments and student responses.

## Result

This research resulted in an integrative thematic SSP based on 21st-century skills, which includes the syllabus, lesson plan, and student worksheet.

### A. Need Analysis

There are two needs analyses. Namely, field needs analysis and literature analysis. Field needs analysis is carried out through in-depth interviews with teachers and observing learning activities aimed at obtaining accurate information about the needs of students and teachers. This needs analysis was carried out at SD Muhammadiyah Sangonan 1 Sleman Yogyakarta through on school program. The results of the study obtained that teachers in teaching have tried to develop 21st-century skills but have not been maximized. Teachers still have difficulty integrating 21st-century skills into learning tools, including HOTS and ICT-based learning. So, the teaching is still conventional, and students tend to be passive. In addition, the assignments

given to new students are limited to answering questions and have not been activity-based (Observation July-August 2020).

Based on the analysis of teacher needs in the field, the researcher concluded that there is still a need to develop learning tools in the form of Subject Specific Pedagogy (SSP) thematic integrative skills based on 21st-century skills. The development of 21st-century skills needs to be created early, from elementary school age. Because children of primary school age, according to Piaget, are concrete and have high curiosity [10]. Having its characteristics certainly has implications for the learning process. The learning process should focus on the child's thinking or mental processes, not just on the results [11]. It includes the role of students in their initiatives and active involvement in learning activities, understanding the existence of individual differences in developmental progress and prioritizing students' interaction with each other. Creating meaningful learning.

The literature analysis reviews the curriculum, materials, types of SSP devices, core competencies, essential competencies, indicators, methods and learning objectives. The curriculum analyzed is the curriculum that is currently in force, namely the 2013 Curriculum, integrative thematic subjects of 4th-grade student, second theme Always Save Energy, third sub-theme Alternative Energy. The issues combined include; Indonesian, Mathematics, Science, Sports, Civics, Social sciences and History with a duration of 1 week consisting of six lessons. The SSP device developed is an integrative thematic SSP based on 21st-century skills, including the syllabus, lesson plan and student worksheet.

### **B. Product design**

This product design stage uses three steps: format selection, determination of learning tools and SSP design. The chosen product format is oriented towards 21st-century skills, namely by integrating it into the material and learning process by applying an active learning model, namely project-based learning and problem-based learning. Both learning models are called chosen because they are believed to be able to develop 21st-century skills or called 4C (Critical thinking, Creativity, Communication, and Collaboration). The SSP designed in development research includes; a syllabus, lesson plan, and student worksheet.

### **C. Product development**

After the product design, a draft of a learning tool in the form of SSP is produced. The developed SSP is in the form of an A4 with a font size of 12 pt and a Times New Roman. The systematics of the preparation of SSP products contains covers, words of delivery, table of contents, syllabus, lesson plan and student worksheets. The following is a brief description of the design of the learning tools developed.

The cover is designed by customizing the theme and sub-theme. The theme chosen was the 2nd theme, Always Save Energy, and the 3rd sub-theme was Alternative Energy for 4th-grade students. Figure 1 shows an example of a developed SSP cover.



Fig. 1. Product Cover

The developed syllabus refers to the national standard, which contains nine aspects: subjects, essential competencies, competency achievement indicators, learning materials, character strengthening education, assessment, time allocation and learning resources. The learning implementation plan (lesson plan) is prepared as a guideline for implementing learning in the classroom. The lesson plan made refers to the 2013 curriculum of the Minister of Education and Culture no. 22 of 2016 concerning the standards of the primary and secondary education process and the circular letter of the Ministry of Education and Culture no.14/2019 concerning lesson plan independent learning with a one-sheet lesson plan format containing: identity; learning objectives, learning steps include, authentic assessment, and attachment. The 21st-century learning pattern is designed for learning steps by integrating HOTS, character, literacy, ICT, and 4C (Critical thinking, Creativity, Communication, and Collaboration). The learning method is an active learning method based on its-based activities, namely project-based learning and problem-based learning. Learning media uses interactive learning media with articulate storyline applications, while learning resources use the environment and the internet, namely Google and YouTube.

The worksheet is developed activity-based by integrating the 21st-century skills of 4C using active learning models, namely, project-based learning and problem-based learning and scientific steps. The student worksheet arrangement contains the title page, foreword, instructions for use, table of contents, significant competency achievements and indicators, student worksheets and bibliography. In the student worksheet, an assessment sheet was also developed. The assessment is designed to see the development of 21st-century skills by



containing three domains: knowledge <sup>7</sup> in the form of multiple choice questions and brief descriptions. The questions are made HOTS-oriented by referring to the essential competencies that represent aspects of knowledge (KI. 3), 4C-oriented skills, namely Critical thinking, Creativity, Communication, and Collaboration, about necessary competencies that represent aspects of skills (KI. 4) using assessment rubrics including performance, portfolio, and product. The attitude aspect is carried out by observing the process using an observation sheet.

The products that have been developed are then tested for validation by experts (expert judgment), namely teaching experts, media experts, and material experts. The following Table 1 is a presentation of validation results by experts.

**Table 1.** Expert assessment score of learning reviewed aspects of the syllabus

NO	Assessment Indicators	Score
1	Conformity of the syllabus format with BSNP (National Education Standards Agency)	5
2	Compatibility of KI and KD combined	5
3	Conformity of indicators with essential competencies	5
4	Developed indicators are HOTS-oriented	4
5	21st century competence coverage	5
6	The suitability of the learning model used to develop 21st-century skills	5
7	The specificity of the learning experience with indicators	5
8	Adequacy of time with essential competencies	4
9	The alignment of assessment aspects with indicators	5
10	Conformity of sources and tools of materials with indicators	5
Total Score		48
Average Score		4.8
Category		Excellent

Based on Table 3, the feasibility of the developed syllabus product can be known. Where the results of the learning expert validation test, the syllabus product scored 48. Based on the total score, the syllabus product developed falls under the "excellent" criterion with an average score of 4.8.

**Table 2.** Assessment scores of learning experts reviewed aspects of the lesson plan

No	Assessment Aspects	Number of Indicators	Score
1	Subject Identity	3	19
2	Goal Formulation	4	18
3	Learning materials	6	29
4	Learning Strategies	5	24
5	Learning media	4	19
6	Sumber learn	2	10
7	Assessment of learning outcomes	6	30
Total score		30	149
Average score			4.9
Category			Excellent

From Table 2, the lesson plan results from the assessment of SSP product learning experts from the learning implementation plan (lesson plan) obtained a score of 149. Based on the total score, the lesson plan product developed is included in the "excellent" criterion with an average score of 4.9. Data on the results of product validation by learning experts, in addition to the assessment validation score, there are several suggestions and inputs for product improvement. Table 3 shows suggestions for improvement from learning experts on lesson plan products.

**Table 3.** Expert Learning Suggestion and Its Revision

No.	Suggestion	Revision
1.	Learning objectives are adjusted to the rules that include ABCD (Audience, Behavior, Condition, Degree)	Improving learning objectives following the ABCD rule (Audience, Behavior, Condition, Degree)
2.	The instrument item of assessment of cognitive aspects is less HOTS-oriented	Fixing hotspots problem items

**Table 4.** Expert assessment score of the material reviewed aspects of student worksheet

No	Assessment Indicators	Score
1	Conformity of the material to essential competencies and indicators	5
2	The material is compiled comprehensively (facts, concepts, principles, procedures)	4
3	The material is arranged using a logical sequence	4
4	Developing student creativity	5
5	The material is designed close to real life	5
6	student worksheet makes it easier for students to understand the material	5
7	student worksheet following learning indicators and materials	4
8	The suitability of the evaluation questions with the material presented	5
Total Score		36
Average Score		4.5
Category		Good

From Table 4, the expert assessment of the SSP product material from the student worksheet aspect obtained a score of 36. Based on the total score, the student worksheet product developed is included in the "good" criterion with an average score of 4.5. The data from the material expert's product validation results and the assessment validation score are some suggestions and inputs for product improvement. See Table 5 for suggestions for improvement from material experts on student worksheet products.



**Table 5.** Subject Expert suggestion and its revisions

No.	Material Expert Improvement Advice	Revision
1.	Practice questions adapted to the material	Fixing the questions adjusted to the practice questions
2	The material is adapted to the characteristics of the learners	Improving by simplifying the material
3	The material still needs to be comprehensively and contextually recast	Improving the material is complemented by examples that exist in everyday life

**Table 6.** Media expert assessment score reviewed student worksheet aspects

No.	Assessment Indicators	Score
1	21st century skill-based student worksheet is attractively designed	5
2	Ease of students in using 21st-century skills-based student worksheet	4
3	Balance of colour composition in the context of 21st century skill-based student worksheet	4
4	The suitability of 21st century skill-based student worksheet with the characteristics of elementary school students	5
5	Clarity of instructions for the use of 21st century skill-based student worksheet	5
6	Clarity of content or content of 21st-century skill-based student worksheet	4
7	The suitability of the images presented with the material in the 21st-century skill-based student worksheet	5
8	Accuracy on the display of image layouts in 21st-century skill-based student worksheet	4
9	Consistency of use of the font in 21st century skill-based student worksheet	5
10	The background decoration does not interfere with the clarity of the presentation of the material in the 21st-century skill-based student worksheet	5
	Total Score	46
	Average Score	4.6
	Category	Good

From Table 6, the media expert assessment gave a score of 46. Based on the total score, the student worksheet product developed is in the "good" criterion with an average score of 4.6. Data on the results of product validation by media experts, in addition to the assessment validation score, there are several suggestions and inputs for product improvement. Suggestions for enhancements from media experts to student worksheet products are in Table 7.

**Table 7.** Media expert suggestions and revisions

No.	Improvement Advice Media experts	Revision
1.	Include image sources and excerpts and bibliography	Fixed by listing image sources, citations and bibliography
2.	Adjust the font size to the characteristics of the student	Fixed by adjusting the font size with student characteristics
3	On the cover has not listed what class	Fixing by listing class IV SD/MI

Based on the results of validation tests by experts on the developed CNS products can be summarized in Table 8.

**Table 8.** Validation Summary

No.	Aspects	Learning Experts	Material expert	Media Expert	Category
1	Syllabus	4.8			Excellent
2	Lesson plan	4.9			Excellent
3	Student worksheet		4.5	4.6	Good

Furthermore, the input results from the validators are then revised, and limited tests are carried out. Limited trials are conducted to get users' responses, such as students and teachers on 4th-grade students, as many as six students with various levels of ability, namely high, medium and low. The following is the result of the teacher's response and the student's response to the product's quality.

**Table 9.** Teacher assessment score of the product

No.	Aspects	Score		Average	Category
		Teacher 1	Teacher 2		
1	Syllabus	47	48	48	Excellent
2	Lesson plan	149	148	149	Excellent
3	Student worksheet	92	94	93	Excellent

The results of the teacher's (practitioner)'s assessment of the three learning tools, namely the syllabus, lesson plan and student worksheet, are in the category of very feasible to use with an actual score of the average syllabus of 48, lesson plan with an average of 149, student worksheet with an average of 93.

**Table 10.** Student Responses

Respondents	Score	Average Score
Student 1	72	4.8
Student 2	70	4.67
Student 3	72	4.8
Student 4	68	4.53
Student 5	72	4.8
Student 6	70	4.67
Average Score	4.71	
Category	Good	

The feasibility of the student worksheet product, where the results of student responses from the aspects of content feasibility, presentation aspects, linguistic aspects, and graphic aspects were in the good category with an average score of 4.71.

## **Discussion**

The 21st-century skill-based thematic SSP integrated with 4C (Critical thinking, Creativity, Communication, and Collaboration) in learning tools: syllabus, lesson plan and student worksheet. Based on the results of expert assessments, teacher practitioners and student responses to the SSP products developed are declared very suitable for use in thematic learning in elementary schools. It is because the products follow the characteristics of 21st-century learning currently demanded. In addition, design in its education applies active

learning that encourages students to be creative, work together, think critically and communicate.

Active learning is very much in line with the characteristics of elementary school students who, in their development, according to Piaget, think concretely, have a sense of curiosity is high and physically [10]. So that in, learning should focus attention on the way of thinking or mental processes of the child, not just on the result; expressing the role of students in their initiatives and involvement in learning activities; understanding the existence of individual differences in terms of developmental progress; prioritizing the role of students to each other; creating meaningful learning [11].

Two learning models are applied in the 21st century skill-based thematic SSP, which is believed to encourage students to have 21st-century skills, namely project-based learning and problem-based learning. In the learning process, students are asked to observe problems related to the theme, in this case, the source of energy and the sub-theme of energy alternative. Students are asked to find issues related to utilizing energy sources in the surrounding environment; then, students formulate problems to find solutions.

In the process of solving problems in real situations, there will be interaction and discussion with fellow students so that students can work together and exchange ideas in their groups. According to Vigotsky, in the learning process, children build their knowledge and can ask questions to colleagues or people who understand better if the child does not know [12]. The same is also expressed by Ref. [13]; active learning provides students with self-learning opportunities to construct knowledge through inquiry, collaboration, communication and reflectiveness in the real world. Thus, active learning problem-based learning models can optimize 21st-century competencies for students. It is in line with Ref. [14] that the active learning problem-based learning model can encourage students to think critically in problem-oriented situations and problem-solving skills and connect knowledge about problems and real-world issues.

Similarly, applying active learning project-based learning models can also optimize 21st-century competencies. It is corroborated by several research results, including Ref. [15], suggesting that project-based learning can increase student motivation, student creativity, critical thinking and cognitive. It is much improved compared to learning that does not use project-based learning. Similarly, Ref. [16], through the results of their research on students, also said that active learning project-based learning models can encourage students to communicate and collaborate between students. It is because project-based learning has complex activities so that students respect each other's differences of opinion to achieve the main objectives of project implementation. The results of research by Ref. [17] also showed that project-based learning increased student creativity.

Seeing the improvement of 21st-century competencies as shown by various research results, it is further strengthened that the application of active learning model problem-based learning and project-based learning is significant to be applied in 21st-century skill-based thematic learning. The two active learning models impact learners, both the impact of education and inclusion. The effect of knowledge includes: improving students' understanding of the material, developing critical, creative and innovative thinking, students' creativity becomes more productive. The accompanying impacts include: developing the character of students, establishing life skills, improving scientific attitudes, fostering the ability to communicate, argue, collaborate/cooperate [18].

### **Conclusion**

Based on the data and discussions described above, following the objectives of this study, it can be conveyed that the development of integrative thematic SSP based on 21st-century skills produces three products, namely the syllabus, lesson plan and student worksheet. According to the expert validation test, the three devices were declared feasible, with each having an actual score of syllabus 4.8, lesson plan 4.9, and student worksheet 4.6. The results of the teacher's (practitioner)'s assessment of the three learning tools, namely the syllabus, lesson plan and student worksheet, are in the category of very feasible to use with an actual score of syllabus 4.8, lesson plan 4.9, student worksheet 4.6. The student response to student worksheet products developed from content feasibility, presentation, linguistic, and visual aspects is in the good category with an average score of 4.71. Thus, learning tools in the form of integrative thematic SSP based on 21st-century skills are feasible for use for elementary school students.

### **Conflict of Interest**

The authors stated there was no conflict of interest in the study.

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