Design of integrated science student book theme adaptation of the human body to change temperature integrated 21st century learning using integrated types

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Abstract. The implementation of integrated science learning in junior high schools is still not thematic and integrates 21st century learning into the learning process. 21st Century Learning requires students to have literacy skills, knowledge skills, skills and attitudes, and mastery of technology. Increased knowledge, attitudes and skills are caused by the lack of availability of relevant learning resources. One learning resource that can improve 21st-century skills is students' books. The method used in this study is the model of plomp development which consists of three stages, namely preliminary investigation, Prototyping stage, Assessment phase. The research has reached the Prototyping stage and has been tested for validity. The instrument used in this study is a questionnaire consisting of Aspects of content; Construction Aspect; Language aspects; Integrity aspect.

1. Introduction

Student book is a book used by students in the learning process that includes the content of science, inquiry, experiment, materials and examples in life [1]. Natural science student book developed and used as a source of information in which there are facts relating to the concept of learning needed to improve the creativity and skills of students so that students are able to compete in the 21st century. Thus, books are needed that can stimulate patterns think students and can foster 21st century skills / abilities, namely: Critical, Collaborative, Creative and Communicative Thinking.

Through an assessment conducted by PISA in 2016 where PISA released Indonesia's position was ranked 63 out of 69 countries that were members of the OECD [2]. In the PISA assessment the main guideline is how scientific literacy, reading, mathematics and problem solving. This indicates that students in Indonesia are still low in the part of scientific literacy and reading for that is expected to have a solution that can improve the scientific ability of students. One of them is by providing learning resources in the form of interesting and integrated books so that students can learn and increase students' motivation to read.

Based on the science of psychology and education, a student will more easily recognize and understand objects in nature as a whole in advance compared to through the smallest parts. Integrated science learning is very appropriate for junior high school students compared to when given separately. Integrated science learning is believed to be able to foster student creativity and be more fun [3]. Integrated science learning is a combination of several science groups such as Physics, Biology, Chemistry and Earth Sciences and space science. The four science groups are combined in a
complex whole so that there are no more restrictions from each science group. Each group of knowledge will be integrated into a theme that is very close to students [4].

The use of student books has basically been carried out by the Education unit. According to the 2013 Curriculum the science books for junior high school students are integrated science books for students on a thematic basis that are expected to achieve the intended use of student books. The integrated science student book is a student book in which there is learning physics, biology, and chemistry which have been put together in one student book based on the theme. The theme is a binding link between one subject and other subjects. With thematic learning students can build relationships between one experience with another experience or knowledge with other knowledge and knowledge with experience so that it can enable learning to be interesting [6].

Natural Sciences (IPA) deals with how to find out about systematic natural phenomena so that science is not only a collection of knowledge in the form of facts, concepts or principles but also a process of discovery. In general, Natural Sciences (IPA) in junior high schools, covering the field of energy studies and their changes, earth and space, living things and life processes, and the material and nature are very important for students to know and understand natural phenomena. Science learning includes four main elements namely; attitudes, processes, products and applications [7] The four elements are expected to emerge so that students can understand the learning process as a whole, understand natural phenomena through problem solving activities, scientific methods and imitate the way scientists work in discovering new facts.

Integrated learning is learning that combines several subjects to produce meaningful learning and encourage students to solve the proposed problems. Integrated science learning integrates concepts from aspects of Physics, Biology, Chemistry, and IPBA. Basically, the objectives of integrated science learning are; 1) increase the efficiency and effectiveness of learning; 2) increase interest and motivation; 3) some basic competencies can be achieved at once. While the benefits of integrated science learning include: 1) time savings; 2) can see a meaningful relationship; 3) improve students' thinking ability level; 4) presents the application of the real world; 4) can increase student motivation.

An initial analysis was carried out to see the previous situation and the present situation. The analysis results were obtained from a questionnaire given to science teachers in SMPN 3 Talamau Pasaman Barat. This analysis looks at the supporting and inhibiting factors of integrated science learning as seen from the curriculum, educators, students, facilities and infrastructure, and the learning environment. Based on the questionnaire distributed to natural science teachers, sufficient results were obtained on the part of educators, students and infrastructure. From the educator's point of view, the results of the problems regarding the educational background of the teacher are not in accordance with integrated science learning. Educators have not started a good experience in implementing integrated science learning. From the facilities and infrastructure section the results were 58.33%. Supporting materials and components are not enough available and integrated science references are not widely available in the library. In integrated science learning students use textbooks published by the Ministry of Education and Culture and publishers. The teacher has not prepared students to face the 21st century. This results in students' mastery of low science learning. Students are less motivated towards learning science; the attitude and participation of students are not good towards integrated science learning [4].

Analysis of students is done to find out how the characteristics of students. Analysis of students consists of the background of students, students' interest in learning science, students' attitudes, students' motivation and learning styles of students. The results of the analysis obtained good results but there are some that have a low percentage value. Learners still feel the time feels long when the science lessons. Students do not have a strong drive in learning science. Encouragement comes from the teacher and the learning resources available in the learning process. Student books are a source of learning that can be used to improve 21st century skills. Using student books in student learning activities can be directed towards understanding interconnected concepts and increasing student literacy [4].
2. Research Methods

The method used in this research is the Research and Development (R&D) method. The model used is the Plomp development model. The Plomp development model consists of 3 phases: 1) preliminary research 2) development or prototyping phase 3) assessment phase. In the initial phase, student analysis has been carried out, initial and final analysis and curriculum analysis. Next enter the development phase or prototype phase. At this stage the design of the student book will be developed in addition to the design of the student book will also be carried out the development of instruments that will be used for validation, practicality and effectiveness. This phase uses formative evaluation. Formative evaluation is an evaluation aimed at improvement, found in all phases and cycles that are repeated in design research. For this product to be used as intended, its validity needs to be seen. To see the product validity, the validity questionnaire sheet was used. The instrument of validity before use was assessed in the form of a questionnaire that was assessed by 3 experts.

Data obtained from research will be analyzed data. Data analysis techniques using the Likert scale technique. Likert scale is used to measure attitudes, opinions and perceptions of a person or social scale.

3. Result and Discussion

The results of the validation of the validation instrument and the practicality instrument that will be used using a questionnaire in which the questionnaire consists of 6 statements. A statement is given to see whether the instruments used for the validity of teaching materials and practicality in schools are valid for use. The assessment was carried out by three experts who have different educational backgrounds such as language, physics and physics education. The results obtained from the validation instrument assessment can be seen in Figure 1.

![Instrument Validity Assessment](image)

**Figure 1.** Assessment Instrument Validation

Based on Figure 1 results from the instrument validity assessment sheet, obtained very valid results with an average value of 93.06. Therefore, the validation sheet used for student book validation can be used to see the validity of the student book developed. For the results of the student instrument practicality assessment sheet (student response questionnaire). A very valid value is obtained with an average value of 93.05. The results of the practicality instrument assessment sheet can be seen in Figure 2. For the results of the instrument practicality assessment of integrated science students' integrated type books on changes in integrated temperature of 21st century learning (student questionnaire responses) obtained very valid instrument assessment results with an average value of 94, 44 The results can be seen in Figure 3. With the results obtained from the validity and practicality assessment sheets (questionnaire responses of teachers and students) that are very valid, then the validity and practicality sheets can be used to validate the integrated science student book which will be developed can be used for further research. The importance of this assessment sheet is because the
instruments to be used for validation and practicality of student books must be valid and valid in order to get good results.

![Assessment of Practicality Instruments (Teacher's Questionnaire)](image1)

**Figure 2.** Practicality instrument assessment (Teacher’s Questionnaire)

![Practicality Instrument assessment (Student questionnaire responses)](image2)

**Figure 3.** Practicality instrument assessment (Student questionnaire responses)

4. **Conclusion**

Based on the results of the instrument validity and practicality assessment sheets obtained very valid results for each assessment instrument. Therefore, each assessment instrument can be used to validate and see the practicality of an integrated science student book type integrated theme of the adaptation system of the human body to changes in temperature integrated learning in the 21st century.

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