Practicality of student worksheets science based on problem based learning models with the theme of the motion in life using integrated connected type 21st century learning

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Abstract. The problems in the field that are obtained are in accordance with the preliminary analysis that has been carried out before, especially in the field of science, namely learning that is not integrated, to overcome these previous researchers have developed teacher books and student books with thematic integrated learning in the 21st century, but there is a need for integrated learning Student Worksheet 21st century which supports the implementation of teacher books and student books to help students carry out practicum so that the Student Worksheet is used more optimally in facing the challenges of the 21st century. Student Worksheet used in schools is still not in accordance with the character of 21st-century education (4C) where Natural Sciences Student Worksheet has not been seen Critical thinking skills in problem-solving that can improve the ability of students to think at high levels (HOTS), and not be able to put forward creative ideas of students conceptually and practically. The learning process is still teacher-centred with the lecture method so that students are less active and do not have the opportunity to build knowledge independently. To use this Integrated Natural Sciences Student Worksheet, it is necessary to conduct development research. The purpose of developing research is to see the practicality of Integrated Science Student Worksheet assisted by the Problem Based Learning model with the theme of motion in life using the Connected type which is integrated 21st-century learning. The data collection instrument consists of the preliminary research stage instrument, the practicality stage instrument. The results showed that the Integrated Natural Sciences Student Worksheet showed a practical category, so it could be concluded that the Integrated Science Student Worksheet was assisted by the Problem Based Learning model with the theme of motion in life using the Connected type integrated 21st century learning in the practical category.

1. Introduction
Education is one the sectors of national development in an effort to educate the nation's life, has a vision of the realization of an education system as a strong and authoritative social institution to empower Indonesian citizens to develop into qualified human beings so that they are able and proactive in responding to the challenges of the ever-changing times.

National education should function optimally as the main vehicle for quality national development in following the challenges of the 21st century. The 21st century brings about significant changes, namely the rapid development of Science and Technology (IPTEK) affects the change in learning
paradigm marked by changes in curriculum, media and technology. One of the demands of 21st-century learning is the integration of technology as a learning medium to develop learning skills.

Good study skills begin with students learning how to use technology that is essential for everyday life and of course useful in the workplace later. In addition, teaching and learning in the context of 21st-century learning, especially in the 2013 curriculum, is that students learn the material through application, examples, and relevant real-world experiences both inside and outside of school [3]. In order for the demands of the 2013 Curriculum to be fulfilled, the government requires educators to design lesson plans by preparing media according to the characteristics of 21st-century learning [4].

21st-century learning is learning that integrates literacy skills, knowledge skills, skills and attitudes, which encourages students to think critically in problem-solving, communicative, creative and collaborative (4C) through religious attitudes, cooperation, mutual cooperation, integrity and nationalism, so students have high-order thinking skills (HOTS) [9].

There are various kinds of teaching materials that can be used in the learning process. One of them is the Participant Worksheet (LKPD). Student Worksheet are sheets containing tasks that must be done by students. Activity sheets are usually in the form of instructions, steps to complete a task [5]. The advantage of using Student Worksheet is that it makes it easier for educators to carry out learning, and students will learn independently and learn to understand and carry out a written assignment. Quality learning if Student Worksheet is assisted by an appropriate learning model, namely the Problem Based Learning learning model.

Problem Based Learning is a learning model that can help students find information gradually. Problem-based learning can be seen as a process of applying and understanding new situations that are not familiar with new situations so that new ideas, knowledge and new understanding can be obtained "[6]. Problem-based learning is a learning model that requires students to think critically, solve problems, learn independently, and demand skills to participate in teams [7]. The PBL model is a learning model that develops students’ critical thinking skills in problem-solving to gain new understanding and knowledge and helps students develop skills in groups [8]. The PBL learning model emphasizes students to be more active during the learning process, the teacher acts as a facilitator and motivator for students. Science learning will be more effective and efficient if learning is not only focused on one field of science but all fields of science such as physics, chemistry and biology, therefore teaching materials that use the type of connectedness, namely the Connected type.

The type of connection (connected) is a type integration between fields of study. Type of connectedness (connected) is a type of coherence that is deliberately attempted to connect one concept to another, one topic to another and one skill with other skills in one discipline [10],[11]. This type actually organizes or integrates a concept of skills or abilities that are developed in a subject or sub-subject that is related to the concept, skill or ability of another subject or sub-subject in one field of study [12],[13].

Based on the results of observations of the science learning process at MTsN 10 Padang Pariaman on January 6, 2020. In the learning process carried out by the teacher, it has implemented a scientific approach to demand the active participation of students. However, the implementation has not run optimally, especially in information-gathering activities. According to the teacher, this is due to the many learning resources that make it difficult for students to choose which material is in accordance with the learning objectives. Apart from that, students have different learning styles and methods. To overcome this problem, the teacher has tried to integrate various models and types of connectedness in science learning with the use of Student Worksheet.

Based on the results of the analysis of the Student Worksheet documents used by the teacher, the Student Worksheet in the school only includes a summary of material and practice questions in the form of multiple-choice question exercises, short entries, and descriptions, without any real discussion/practicum activities, so learning using student Worksheet is the same as using science reference book. Therefore the use of Student Worksheet in learning is still limited to only a few students who have the Student Worksheet, there is no teaching material (Student Worksheet) that is connected to a learning model such as the Problem Based Learning model and have not used an
integrated chart in the Student Worksheet. It shows that the student Worksheet is not yet integrated, it is still separated between biological, physical and chemical materials. So that the achievement of the quality of learning is still far from what is expected, the Integrated Science student worksheet used by students is still not optimal in facing the challenges of the 21st century. Based on this, researchers are interested in seeing the practicality of student worksheet assisted by the Problem Based Learning model with the theme of movement in life using type Connected integrated 21st-century learning.

2. Research Method
This type of research includes development research. The research resulted in an Integrated IPA Student Worksheet assisted with the Problem Based Learning model with the theme of movement in life using the Integrated Connected type of 21st-century learning using the Research and Development R&D model stage. This research was conducted in the Department of Physics, Faculty of Mathematics and Natural Sciences, UNP and MTsN 10 Padang Pariaman. The implementation time is June-August 2020. The resulting product is an Integrated Science Student Worksheet assisted with the Problem Based Learning model with the theme of motion in life using the integrated Connected type of 21st-century learning which has been tested on MTsN lecturers and teachers in the odd semester of the 2020/2021 academic year.

The subjects of this study were 3 UNP lecturers and 2 teachers and 9 students of MTsN 10 Padang Pariaman. The object of this research is the Integrated Science student worksheet questionnaire assisted with the Problem Based Learning model with the theme of movement in life using the Integrated Connected type of 21st-century learning. The integrated natural science Student Worksheet questionnaire was validated by one lecturer at the Department of Physics, FMIPA UNP, one lecturer in the Language Department of FBS UNP and two people. Natural science teacher at MTsN 10 Padang Pariaman and 9 students for Small Group Evaluation.

The research data came from validity and practicality questionnaires. The instruments used to collect data were validity and practicality questionnaires. The validity questionnaire relates to the evaluation of the student Worksheet that has been developed. Rahmi, et al (2018) explain the 4 components contained in the validity questionnaire, namely didactic, construct, technique, and language. Practicality questionnaire related to the use of Student Worksheet. The validity and practicality test questionnaire is arranged based on a Likert scale with 4 alternative answers as follows:

| Code | Category         | Value |
|------|------------------|-------|
| SS   | Strongly agree   | 4     |
| S    | Agree            | 3     |
| TS   | Disagree         | 2     |
| STS  | Strongly disagree| 1     |

The practicality category can be seen in Table 2.

| Interval (%)       | Category      |
|--------------------|---------------|
| 81 % - 100 %       | Very Practical|
| 61 % - 80 %        | Practical     |
| 40 % - 60 %        | Enough Practical|
| 20 % - 40 %        | Less Practical|
| 0 % - 20 %         | Not Practical |

source: modified from Riduwan

The development research uses the Plomp development model which consists of 3 stages, namely: 1) preliminary research (preliminary analysis) 2) prototyping phase (design stage) 3) assessment phase.
(Plomp, 2013). Given the limited time and costs, this research is only carried out until the development stage. The instruments used to collect data in this study include:

2.1. Preliminary Research Stage Instruments
At this stage, an instrument is needed to analyze the needs in the field. The instrument is in the form of SKL analysis sheets, assessments, learning activities, learning media and students. Meanwhile, the material analysis uses a material suitability analysis sheet.

2.2. Validation Stage Instruments
The validation sheet functions to obtain validity data from the Integrated Natural Sciences Student Worksheet. This validation sheet is given to two validators. The evaluation of the validators on the Integrated Natural Sciences Student Worksheet consists of 4 categories which are arranged based on Aiken's V.

2.3. Practicality Stage Instrument
The practicality instrument was used to determine the practicality level of the Integrated Natural Sciences Student Worksheet that was developed. To determine practicality, a practicality sheet was used in the form of teacher response questionnaires and student response questionnaires.

3. Result and Discussion
The description of the research results at each stage will be explained as follows:

3.1. Preliminary Research (Introduction Stage)
This stage is carried out to obtain information about problems and possible solutions through innovation. In addition, this stage is intended to obtain temporary characteristics of the product being developed. The preliminary analysis carried out at MTsN 10 Padang Pariaman consisted of SKL analysis in terms of the dimensions of attitudes, knowledge and skills.

   Analysis of learning activities is specialized in analyzing learning activities in Integrated Science subjects in class. Learning activities consist of preliminary activities, core activities and closing activities. Core activities are carried out to motivate students to be more active in learning and to repeat previous learning and to connect with further learning material. Core activities are carried out to convey information, discuss standard materials to form student competencies, and exchange experiences and opinions in discussing material or solving problems faced together. While closing activities are carried out to end learning activities including drawing conclusions or making summaries, feedback on the learning process and learning outcomes.

   Analysis of students can be seen through the characteristics of students consisting of several aspects including aspects of attitudes, aspects of knowledge, aspects of skills, initial abilities, learning styles and motivation. Attitude aspects include aspects of spiritual attitudes and social attitudes. Knowledge aspects include factual aspects, conceptual aspects, principal aspects and procedural aspects. Aspects of skills include aspects of trying, aspects of processing, aspects of presenting and aspects of reasoning.

   Analysis of learning media can be seen from several aspects including quality of content and objectives, quality of learning and technical quality. The quality of content and objectives include the accuracy of the media used, the balance of the media used and the suitability of students. The quality of learning includes providing learning assistance, providing an impact on students and motivating quality.

   Material analysis is carried out to obtain the scope of learning material that is in accordance with the established theme and type of integrated learning. Based on the analysis carried out, learning material is divided into facts, concepts, procedures, and metacognitive.

3.2. Prototyping Phase
The prototyping phase consists of three stages, namely design (design), develop (development), and formative (assessment). Due to limited time, this study has reached the assessment stage but until the
assessment of validity by experts and practicality of products by small group students. The assessment of the experts was carried out by three experts, namely Dr. Hamdi, M.Si, Mr. Dr. Ramli, M.Si and Mr. Dr. Abdurrahman, M.Pd. Before validating the Student Worksheet, an assessment of the validation instruments and practicality instruments of the Student Worksheet was carried out.

3.2.1. Prototype I

3.2.1.1. Assessment of validation instruments

The assessment of the validation instrument uses a validation sheet which includes the statement in the Integrated Natural Sciences Student Worksheet validation sheet according to the objectives to be achieved, the instructions for filling in the Integrated Natural Sciences Student Worksheet validation sheet used are written in clear sentences, the statement in the Integrated Natural Sciences Student Worksheet validation sheet is easy to understand in use and does not contain multiple meanings, The statements made on the Integrated Student Worksheet Natural Sciences validation sheet are in accordance with the assessment indicators, the Student Worksheet validation sheet is in accordance with the Problem Based Learning learning model with the integrated type of 21st century learning, the validation sheet asks the validity / truth that Integrated Natural Sciences Student Worksheet which is made in sheet form, the language used in each item of the statement on the Integrated Natural Sciences Student Worksheet validation sheet is in accordance with the rules of EYD in Indonesian which are good and correct, the size and type of writing on the Integrated Natural Sciences Student Worksheet validation sheet can be read clearly, and appear The validation sheet of the Integrated Natural Sciences Student Worksheet are arranged systematically.

3.2.1.2. Assessment of practicality instruments

Assessment of practical instruments (teacher responses and student responses) using a validation sheet. The results of the assessment of the practicality of the teacher's response from the two validators can be seen in Table 3.

| No | Validator  | Validation Value | Criteria |
|----|-----------|------------------|----------|
| 1  | Validator 1 | 0.93             | Valid    |
| 2  | Validator 2 |                  |          |
| 3  | Validator 3 |                  |          |

Based on Table 3, it can be stated that the practicality instrument for the teacher's response is valid because the validation value is in the range $0.61 \leq V <1$. The results of the assessment of the practicality of the students' responses from the two validators can be seen in Table 4 below:

| No | Validator  | Validation Value | Criteria |
|----|-----------|------------------|----------|
| 1  | Validator 1 | 0.87             | Valid    |
| 2  | Validator 2 |                  |          |
| 3  | Validator 3 |                  |          |

The practical instrument of student response is categorized as valid based on the assessment of the two validators as shown in Table 4. The value of the validation coefficient obtained is in the range $0.61 \leq V <1$.

3.2.1.3. Student Worksheet Validation Assessment

The evaluation of the validity of the Student Worksheet was carried out using a previously validated assessment instrument. Student Worksheet validation includes three components of assessment.
including the construction validation component divided into several aspects in it, namely (presentation feasibility aspects, and appearance feasibility aspects), content feasibility components, and language aspect components. In doing the validation, there were several inputs that were also given by the validator to improve the development of Integrated Student Worksheet Science with the help of the Problem Based Learning model with the theme of motion in life using the Integrated Connected type of 21st Century learners.

After a revision is made to the Student Worksheet, then an assessment is carried out on the Student Worksheet. The assessment carried out by 3 validators resulted in valid criteria for the four components

3.2.2. Prototype II
3.2.2.1 Evaluation One to One
Completion of prototype 2 was carried out by evaluating each person. This evaluation is in the form of input from students. Individuals were carried out on 3 student evaluations using practicality instruments. Student Worksheet is given to students of class VIII 2 MTsN 10 Padang Pariaman who have medium and low abilities. Students learn to read Integrated Science Student Worksheet assisted by Problem Based Learning model with the theme of learning in life using the integrated type of 21st Century learners without first by the teacher, students are given a questionnaire. Because in total Student Worksheet is easy to implement, attractive, efficient, and useful in its use, there is no revision of Student Worksheet.

3.2.2.2. Small Group Evaluation
Small group evaluations were carried out after the one to one evaluation was completed. Small group evaluation is carried out by practising a valid Student Worksheet on a group of students consisting of 9 people. Small group evaluation was carried out on students of class VIII 2 MTsN 10 Padang Pariaman who came from randomized abilities. The material being tested is straight motion. The evaluation was conducted in 2 meetings.

Student worksheet practicality test from the responses of small group students using student response questionnaires. The Student Worksheet practicality questionnaire consists of 4 indicators with 27 statements. These indicators include: 1) easy to understand, 2) attractive, 3) efficient in terms of time to understand Student Worksheet, and 4) useful in their use.

| Table 5. Results of the Practicality Assessment of Small Group Student Responses |
|-------------------------------|-----------------|
| No | Indicator      | Score (%) |
|----|----------------|-----------|
| 1  | Ease of Use    | 94.71     |
| 2  | Display Eligibility | 90.06 |
| 3  | Time efficiency | 94.45     |
| 4  | Benefit of use | 91.17     |
|    | Value          | 92.60     |
|    | Categori       | Very Practical |

The results of the practicality of students' responses to the Student Worksheet Science shown in Table 5 indicate that the Student Worksheet Science developed is very practical to be used in the Integrated Science learning process with a practicality value of 92.60%.

3.3. Assessment Phase
At the assessment stage, an assessment of the resulting product is carried out, both in terms of practicality and effectiveness. However, due to time constraints, the presenter has not yet reached this stage.
4. Conclusions
The development of Integrated Science student worksheet assisted with the Problem Based Learning model with the theme of movement in life using the Connected integrated type of 21st-century learning has valid criteria for construct, content feasibility, and language. Besides that, the Integrated IPA student worksheet also has practical criteria. This means that the Integrated IPA student worksheet which was developed successfully in its use is attractive, efficient and useful in its use.

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References
[1] Kemendikbud 2013 Permendikbud Number 81A of 2013 concerning the implementation of the curriculum. Jakarta. BSNP
[2] Rahima Syabrina Sarmi, Ratnawulan, Gusnedi 2019 Learning media analysis in the development of integrated science teacher book with theme the energy in the life using type integrated of 21st century learning. Journal of Physics: Conference Series 1185
[3] A Samra1, Ratnawulan, and Gusnedi 2019 Analysis of teachers need in developing integrated science text book IPA adaptation system human body to temperature change using integrated 21st century learning. Journal of Physics: Conf. Series 1185
[4] Syafri, Ratnawulan, Amali Putra, and Asrizal. 2019 The Effect of Integrated Science Textbooks in the Scientific Approach on the Learning Outcomes of Class VIII Students of SMPN 13 Padang. Pillar of Physics Education, vol. 12
[5] Asrizal 2015 Preliminary Study on Problems and Teachers' Readiness to Implement Integrated Science Learning in Exact Junior High School Students vol. 2
[6] Zaitul Hidayat, Rahima Syabrina Sarmi, Ratnawulan, and Desnita. 2017. Practicality of Science Student Books with the Theme of Energy in Life Based Integrated Local Materials Using Integrated Models for 21st Century Learning. International Journal of Progressive Sciences and Technologies (IJPSAT) , vol. 16
[7] Depdiknas 2008 Guidelines for Teaching Material Development Jakarta: Depdiknas.
[8] Lufri.2007. Learning Strategies for Biology Theory, Practice and Research UNP Press. Padang
[9] Lestari, L 2018 alidity and Practicality of Student Worksheets (LKPD) Kingdom Plantae Material Based on Scientific Approaches for Class X SMA / MA Students: Educational Exact Journal (JEP)
[10] Rahmi, Y. L., Novriyanti, E., Ardi, A., & Rifandi, R 2018 Developing Guided Inquiry-Based Student Lab Worksheet for Laboratory Knowledge Course. In IOP Conference Series: Materials Science and Engineering vol. 335, No. 1, p. 012082. IOP Publishing
[11] Legiman 2015 Use of Problem Based Learning (PBL) Models in Education and Training. Yogyakarta: LPMP D.I lecturer Yogyakarta.
[12] Fogarty, R 1991 Ten ways to integrate curriculum. Palatine Illinois: IRI / SkylightPublishing, Inc. (accessed 17 July 2018) Abidin, Yusuf 2014. Learning System Design in the Context of the 2013 Curriculum. Bandung: PT Refika Aditama.
[13] Gusnedi, Ratnawulan, and triana 2018 Application of student book Based on Connected Learning model of networked type with heart Electrical Activity Theme For junior High School. Padang : IOP Conf. Series : Materials Science and Engineering 335 (2018) 012132 doi : 10. 1088/1757-899X/335/1/012132
[14] R Helfira, Ratnawulan, and Gusnadi 2019 Analysis of integrated science teacher's book with blood fluids theme using connected to type integrated 21st century learning. Journal of Physics: Conf. Series 1185

[15] Ayu Melati, Ratnawulan and Gusnadi 2019 Needs analysis of integrated natural science teacher book with theme senses of sight and optical devices using connected model for integrated 21st century learning. Journal of Physics: Conf. Series 1185

[16] Joviana Marshel and Ratnawulan 2020 An Analysis Of LKPD Integrated Science With The Theme Of The Motion in Life Using Integrated Connected Type 21st Century Learning: A Case Study in SMP N 1 Lubuk Alung. Journal of Physics: Conf. Series 1185

[17] Directorate of Primary and Secondary Education 2017 Implementation of 21st Century Skills Development in Learning Implementation Planning (RPP) Jakarta: Ditjen

[18] Rahmi, L.Y., & Alberida, H. 2017 Improving Students’ Higher Order Thinking Skills through Portfolio Assessment on Biology Curriculum and Textbook Analysis Course Bioeducation Journal 1 (1), 22-33.

[19] Asrizal, A., Amran, A., Ananda, A., Festiyed, F. 2018. Effectiveness of Adaptive Contextual Learning Model of Integrated Science by Integrating Digital Age Literacy on Grade VIII Students. IOP Conf. Series: Materials Science and Engineering 335 (2018) 012067, 1-8

[20] Yurnetti, Asrizal, Murtiani. 2020. Need analysis to develop science learning material based on thematic teaching by integrating the new literacy. Padang: IOP Conf. Series: Journal of physics : Conf. Series 1481 (2020) 012122.