



Current Issues on Elementary Education Journal

Journal homepage: <https://ejournal.upi.edu/index.php/CIEE>



Development and validation of student worker worksheets based on the RADEC learning model for Natural and Social Sciences (IPAS) subjects in elementary schools

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ABSTRACT

This research aims to develop and test the validity of student worksheet based on the RADEC Learning Model (Read, Answer, Discuss, Explain and Create) in Natural and Social Sciences (IPAS) subjects at elementary school level. The RADEC model is used as a basis for designing worksheets that support an active, participatory learning process and stimulate an in-depth understanding of science concepts. This research uses a development research approach. The development stage includes needs analysis, worksheet design, and validation by experts. It is hoped that the results of this research will contribute to improving worksheets as a learning aid that can improve students' understanding of science material in elementary schools. Apart from that, this research can also provide guidance to educators and students in implementing the RADEC Learning Model to improve the quality of learning in the classroom.

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ARTICLE INFO

Article History:

Submitted/Received 03/10/2023

First Revised 03/11/2023

Accepted 28/11/2023

First Available online 30/11/2023

Publication Date 30/11/2023

Keyword:

LKPD

RADEC

How to cite: Fatonah, N., dkk. (2023). Development and validation of student worker worksheets based on the RADEC learning model for Natural and Social Sciences (IPAS) subjects in elementary schools. *Current Issues on Elementary Education Journal*, Vol 2 (2), 59-64.

1. INTRODUCTION

Changes in the curriculum in Indonesia require teachers to adapt the learning process to meet the demands of a curriculum that emphasizes developing student skills that are more responsive to current developments. In Indonesia, the implementation of the Independent Curriculum is a major milestone in bringing innovation to education. One important aspect in implementing the Independent Curriculum is teachers' mastery of various relevant and innovative learning tools. Learning tools are not just tools, but rather important foundations that enable teachers to provide education that is more relevant to students' needs and current developments. Teachers' mastery of learning tools is crucial in supporting the successful implementation of the Independent Curriculum which emphasizes skills-based learning, character development and in-depth understanding of content. The Merdeka Curriculum encourages a learning approach that emphasizes the development of various competencies such as critical thinking, creative, communication, collaboration and digital literacy skills. Teachers who are able to master learning tools will be able to create a learning environment that allows students to develop these skills better.

One of the learning tools needed to support independent curriculum learning is student worksheets or abbreviated as LKPD. According to Lee, (2014) LKPD can help implement a learning model. In this case, changes to the curriculum that combine science and social studies require LKPD whose activity stages are in accordance with the RADEC learning model and teach material content both natural sciences and social sciences. Learning that occurs in accordance with the stages of LKPD activities requires teaching scientific literacy (Kurniasih & Herlina, 2020) and social literacy, some aspects of which include communication and collaboration (Chalkiadaki, 2018) in addition to providing science and social studies knowledge.

LKPD can help students easily understand the material being studied, where LKPD has several functions, namely as practical teaching material to help students increase their knowledge of the concepts being studied (Novita, 2023). LKPD according to students' needs can increase students' interest and motivation in learning, which has a dual function in using LKPD as practical teaching materials that help students expand their knowledge about the concepts to be studied (Ariansyah, 2021). Gunawan et al. (2023) shows that worksheet-based learning does not guarantee that the teacher transmits the pedagogy as a whole, but what differentiates it from traditional learning is that worksheet-based learning does not involve instructional dialogues between teachers and students. On the other hand, teachers are one of the keys to educational success, because teachers play a central role in learning (Saadah et al., 2022). As indicated by Gage and Berliner in Kirom, (2017), the teacher's main role in learning is as a planner, organizer and evaluator. To be able to complete learning, teachers must of course have competence so that educational goals can be achieved optimally. Teacher professional development, on the other hand, is referred to as continuing professional development or formal professional learning, which refers to the various ways in which teachers can actively develop their skills during their working lives (Kennedy, 2016). It was further explained that the competencies in question are pedagogical competence, personality competence, social competence and professional competence. This pedagogical expertise also includes the development of teaching materials, one of which is Student Worksheets (LKPD).

The quality of teachers and teaching models is one of the causes of scientific success (Kurniasih & Herlina, 2020). Teachers need a learning model that can meet teachers' needs to capture the real level of student development. RADEC is considered to be a learning model

that meets these requirements. However, it was found that teachers still had difficulty developing RADEC-based LKPD for science and technology subjects. In line with the findings regarding the difficulties of these teachers, efforts are needed to develop LKPD to make it easier for teachers to implement the RADEC learning model in science subjects.

2. METHODS

This research uses development research methods. Referring to the research objectives that have been formulated, namely the development and validation of RADEC-based LKPD in science subjects, the research method used is the Design and Development method or also called Design and Development, Richey and Klein (J. Ellis & Levy, 2010) reveal that The Design and Development research method is a systematic study of the design, development and evaluation process which aims to build an empirical basis for creating instructional and non-instructional products.

The research procedures carried out in this study were based on the ADDIE Model (analysis, design, development, implementation, evaluation). This research was carried out in several UPI partner elementary schools in Bandung City, West Java. Participants in this research were experts in basic education and science and social studies, experienced teachers, and elementary school students in Bandung City. Data was taken through document analysis, observation and non-test questionnaires.


3. RESULTS AND DISCUSSION

3.1 Results

LKPD development is carried out based on the stages of the ADDIE model, LKPD development is carried out namely to develop LKPD to suit the RADEC learning model and the steps in the RADEC learning process. In detail the steps in the development process are explained as follows:

Table 1
LKPD Development Stages

Activity	Stages	Results
Analysis	Needs analysis and literature review. Researchers identified needs by analyzing the curriculum for Natural and Social Sciences (IPAS) subjects in elementary schools (SD). This is done to understand in depth the learning objectives and competencies that students are expected to achieve in science subjects.	Formulation of indicators in Natural and Social Sciences (IPAS) subjects in elementary schools

Activity	Stages	Results
Desain	<p>Analysis of the learning design in the form of lesson plans, LKPD, and pre-learning questions</p> <p>Researchers design product prototypes based on product specifications required by both students and lecturers. The design of student worksheets is adjusted to standards, the elements in LKPD include (1) title, (2) learning guide, (3) learning indicators, (4) supporting information, (5) work steps, and (6) evaluation.</p>	<p>RADEC-based LKPD prototype for IPAS subjects</p> 
Development	<p>Researchers validated education experts, curriculum experts and science and science experts</p>	Validated LKPD
Implementation	<p>The researcher conformed the LKPD for IPAS subjects to the RADEC Learning Model</p>	LKPD developed in accordance with the RADEC learning model
Evaluation	<p>Researchers evaluated the RADEC-based LKPD that had been developed</p>	LKPD based on the RADEC Learning Model in science subjects that are valid and tested according to needs

After the researchers developed the RADEC-based LKPD. So the next stage is the validation process. To increase student competency through the use of Student Worksheets (LKPD) in learning, it is necessary to develop quality LKPD. One critical aspect of the quality of LKPD is the level of validity. Validity, which is often defined as accuracy, correctness, validity and correctness, is an important indicator that LKPD can be used effectively to measure the aspects that should be measured. To determine the extent of a product, a validation process is carried out. Validation is the stage where the suitability of the product is matched to needs, so that the product can be considered suitable and suitable for use in the learning context. Therefore, developing LKPD that has a high level of validity is the main step in ensuring the effectiveness and success of the learning process (Desmiwati, 2017).

The next stage after the LKPD development process is LKPD validation. The validation process is carried out as follows:

Table 2
Validation Stage

Results	Stages
Validasi ahli pendidikan	<p>LKPD is suitable for use in elementary school</p> <p>This worksheet incorporates the principles of effective learning. They observed that these worksheets not only provide information, but also encourage active participation of students in the learning process. This is consistent with a constructivist approach that</p>

Results	Stages
	encourages students to build their own knowledge through active interaction with the material.
IPAS expert validation	LKPD is able to provide an in-depth understanding of IPAS subject matter. This worksheet details important concepts in a clear and relevant way, allowing students to understand them better. LKPD also stimulates students to think critically and carry out experiments, which are important components of effective science learning
Validation of curriculum experts	The LKPD created is meaningful and appropriate to the learning objectives LKPD is in accordance with the learning objectives set in the science and science subject curriculum at elementary school level. LKPD is also in line with the curriculum framework

Validation carried out on the three experts showed that this worksheet was able to combine the principles of effective learning with an in-depth understanding of the science material, in line with the learning objectives that had been set. With this strong validation, this worksheet has great potential to improve the quality of science learning and develop students' understanding. Furthermore, the validation results from the three experts also provide a positive picture regarding the suitability of the worksheet to the needs of students. With an emphasis on aspects such as active involvement through discussion, application of concepts through exploration, and reflection to deepen understanding, these worksheets are felt to be able to facilitate more comprehensive and interactive learning.

In addition, positive responses from experts provide further support for the ability of this worksheet to create a learning environment that is conducive to developing students' critical thinking and analytical skills. The success of this worksheet in integrating the RADEC learning model creates opportunities for students to explore IPAS concepts through an interesting and contextual approach.

Thus, these positive validation results become a strong basis for implementing worksheets in the science and science learning process in elementary schools. The resulting worksheet product contributes to improving the quality of learning and developing students' understanding, so that this worksheet can be considered an important instrument for educational practice at the elementary level.

The results of validation by experts show that the worksheet developed meets the positive assessment criteria. They acknowledged the significance of this worksheet in the context of science learning and its suitability to the learning objectives that had been previously set. Experts also stated that this instrument is suitable for use in elementary schools as a learning aid.

3.2 Discussion

In developing Student Worksheets (LKPD) based on the RADEC Model for Natural and Social Sciences (IPAS) subjects in Elementary Schools, this approach has proven its

effectiveness in preparing structured learning materials. The RADEC model provides a strong foundation in the LKPD development process. The RADEC model brings a holistic approach to the learning process. This stage allows students to not only receive information, but also understand, apply and create something based on their understanding of the material. Although this model provides a systematic approach, the emphasis on application and creation can present its own challenges in assessment and comprehensive understanding. However, active involvement of students in the learning process is an aspect that is highly emphasized in this model.

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