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Development of Portfolio Assessment Tools through A Scientific Approach for the Advancement of Education

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Abstract

Assessment is an important component in the implementation of education. Efforts to improve the quality of education can be pursued through improving the quality of learning and the quality of the assessment system. Assessment must include cognitive, affective, and psychomotor aspects. This study aims to produce a portfolio with a scientific approach that can assess three aspects, namely cognitive, affective, and psychomotor aspects. Advancement of education needs to be thoroughly designed from the planning, implementation, and evaluation stages of learning. Assessment methods that are carried out include research and development using the ADDIE model (Analysis, Design, Development, Implementation, Evaluation). Then, the product is validated by material expert lecturers, media experts, assessment experts, and teachers. The result of product feasibility testing in the form of portfolios are stated to be good and very good and it can be concluded that based on the expert validator's assessment, the product developed is stated to be suitable for use.

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Introduction

Assessment is an important component in the implementation of education. Efforts to improve the quality of education can be achieved through improving the quality of learning and the quality of the assessment system. Assessment must include cognitive, affective, and psychomotor aspects. In the assessment of learning outcomes not only seen from cognitive results but also observed from the affective, psychomotor, and collection of tasks.

Portfolio assessment helps students to reflect, to evaluate, and to determine their learning goals, so that portfolio assessments can assess students' overall learning both cognitive, affective, and psychomotor aspects. At the end of the lesson, the results of the work are collected and assessed by the teacher. Teachers and students themselves can assess the development of students' abilities and continue to make improvements. Thus, the portfolio can show the development of learners' progress through their work, so that it aims to have mastery of cognitive, affective, and psychomotor formed on students. In addition, the teacher must be able to design and carry out learning evaluation activities with various techniques, not just one technique, such as written tests that are commonly designed and used by the teacher. The aim is that learning evaluation covers all three domains, namely the cognitive, affective, and psychomotor domains. One of the assessment techniques that includes these three domains is authentic assessment.

Scientific approach is the emphasis on the learning process in observing, asking, trying, reasoning, and communicating. Thus the scientific approach is appropriately applied in science learning in the topics of temperature and expansion material because the scientific approach can be the initial basis in the development and development of students' attitudes, skills, and knowledge in the learning process according to applicable scientific rules.

This development was carried out with the aim of: (1) Produce portfolio assessment tools for development results through the development of a scientific approach, (2) Describe a portfolio assessment tool that is feasible to apply as a learning tool for seventh grade junior high school students on the topic Temperature and Its Change.

Methods

This research uses research and development (R&D) methods. It uses the ADDIE development model which includes five stages, namely Analysis, Design, Development, Implementation, and Evaluation phase. The test tool is in the form of a portfolio assessment tool on the topic of temperature and its changes. Questionnaire validation sheet assessed by two validators is analysed by using CVR (Content Validity Ratio) method. Next, calculate the CVI (Content Validity Index). CVI is the average of the CVR values of all validated questionnaires. The interval of the CVR and CVI values is $-1 < x < +1$. These numbers are categorised in Table 1 as follows.

Table 1: Category of CVR and CVI value.

Interval	Category
$0 < x < 1$	Very good
0	Good
$-1 < x < 0$	Not good

Results and Discussion

Based on the research and development carried out, the following results were obtained. (1) Analysis phase. The student needs analysis phase was carried out by observing the evaluation tools used in junior high school. Learning evaluations carried out in schools take the form of written tests at the end of each topic and at the end of the semester. (2) Design phase. The result of portfolio design was portfolio made with good portfolio criteria. It was designed to be attractive and clear. (3) Development phase. Portfolio produced at the development stage were preface, table of contents, core competencies and basic competencies, relationship of basic indicator and experimental competencies, instructions for using portfolios, material, work schedule, assessment format, portfolio comments, self-assessment, bibliography, and attachments. (4) Implementation phase. The portfolio was tested by experts namely media experts, material and evaluation experts, and two science teachers. Material experts tested the theoretical correctness used in portfolio. Media expert lecturers tested portfolio in terms of learning media. (5) Evaluation phase. The portfolio validation questionnaire used was a validation questionnaire from material experts, media experts, evaluation experts, and teachers. The result of the validation of material experts, media experts, evaluation experts, and teachers obtained the validator's suggestions and comments in Table 2.

Table 2: Portfolio validation score.

No	Validator	Score	Description
1	Validator 1	87.5%	Very good
2	Validator 2	87.5%	Very good
3	Validator 3	77.08%	Good
4	Validator 4	83.33%	Very good
5	Validator 5	80.55%	Good
6	Validator 6	83.33%	Very good
7	Teacher 1	81.25%	Very good
8	Teacher 2	80%	Good

The results of the product feasibility test in the form of portfolio was stated to be good and very good. For material experts obtained an average score of 87.5% with a very good category. For media experts, the average score was 80.20% with good category. Then, the evaluation experts obtained a score of 81.94% with a very good category. Last, for teacher designation a score of 80.62% was obtained in the good category. So that it can be concluded that based on the assessment of the expert validator and teacher's assessment, the developed portfolio was declared appropriate for use.

Conclusion

A portfolio has been developed on the topic of temperature and its changes. Based on the result of research and data analysis, expert validator assessment, and teacher assessment, the portfolio can be applied properly.