Development of subject specific pedagogy in integrated science learning in elementary school

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Abstract. The purpose of this research is to develop an integrated subject specific pedagogy (SSP), namely by packaging the subject matter into a set of comprehensive and educational learning. Subject specific pedagogy consists of five basic components namely syllabus, lesson plan, student book, worksheet, and assessment sheet. This research is a development research developed by Borg & Gall. The subjects of this study were fourth grade students of public elementary schools in Kuningan District. The main field trial was conducted for fourth grade students of Elementary School 5 Kuningan. Data collection was carried out with SSP device validation sheets, observation sheets, and tests. Data analysis techniques used are descriptive statistics and inferential statistics. Validation by Experts. Data obtained from the results of validation by experts on the development of science modules can be analyzed as follows: a) Module Quality, in this aspect the average percentage obtained is 91.67%, including valid criteria means that this module is good enough and suitable for use in learning b) Quality of RPP (Learning Implementation Plan), in this aspect obtains a percentage value of 87.50%, including in the valid category, meaning that the lesson plan is quite good and suitable for use in learning. c) Quality of test questions, in this aspect the percentage value obtained is 93.18%, which means that the test questions are valid and good enough to be used to evaluate learning outcomes. Of the three assessment criteria (Module quality, RPP and Test Questions), the average percentage of the overall validity test results by experts is 97.78%, including valid criteria, meaning that it is good and feasible to use.

1. Introduction

Success or failure of a learning process is very much determined by the personal educator and students. Schools as educational institutions help stimulate and develop the potential of students through the teaching and learning process. Facilities, infrastructure, media, sources, and education personnel are facilitators who help, encourage and guide students in the teaching and learning process in order to achieve success in learning.

Learning is always related to change, both of which include the overall behavior of individuals and which only occur in several aspects of individual personalities. According to Whiterington the notion of learning is "... a change in personality, manifesting itself as a new pattern of responses which may be a skill, an attitude, a habit, an ability, or an understanding" (Learning is a personality change in a person, as manifested in changes in mastery in response or new behaviors, namely changes in skills, attitudes, habits, abilities or understanding) [1]. While Winataputra states that, "Learning must enable changes in
individual behavior, change must be the fruit of experience, and that change occurs in individual behavior” [2].

The teaching and learning process is directed to a goal, the process of acting through an experience, seeing, observing and understanding something that is learned to obtain results determined through guidance, explanation, assistance and encouragement from educators in teaching. According to Wahab teaching is a thing that causes students to learn and obtain the expected knowledge, skills, and also good ways of living in society [3]. Teaching is not just conveying the subject matter, teaching is all activities and actions that the teacher strives for the learning process to occur in accordance with what has been formulated. For this reason, the teacher can facilitate the learning process. Teachers, students and subject matter as well as the media are the main elements directly involved in the learning process. In the interaction of learning, the teacher holds the main control for the success of achieving the goal. Therefore, teachers must have the ability and skills in teaching, managing learning, applying learning methods or models, using the media and utilizing time effectively. A good learning environment is an environment that stimulates and challenges students to learn. The use of media in learning that is presented creatively and attractively will create a pleasant learning atmosphere that gives rise to learning motivation in students.

Firman and Widodo stated, natural Science is the science that underlies the development of modern technology, has an important role in various disciplines and advances the power of human thought [4]. The rapid development in the field of information and communication technology today is based on the development of science to master and create technology in the future, strong mastery of natural science is needed. Science subjects need to be given to all students starting from elementary school to equip students with the ability to think logically, analytically, systematically, critically, and creatively as well as the ability to work together. Such competencies are needed so that students can have the ability to acquire, manage and utilize information to survive in an ever-changing, uncertain and competitive situation. Susilawati explain, one of the teacher's tasks in teaching is to help transfer knowledge in learning [5]. The purpose of transferring knowledge in learning is to be able to apply everything that has been learned in new situations, meaning that what has been learned is made general in nature. But teaching is not the same as teaching.

2. Research methodology

2.1. Research design

This study aims to develop the Subject Specific Pedagogy device. The results of the development of this device can be used to improve student learning outcomes. This study also aims to obtain effective steps in learning to improve student learning outcomes and to find out how much improvement in student competency after testing with developed devices. Based on the purpose of the study, this research is included in the research development. The research model used is the Research and Development (R & D) approach. The main purpose of this R & D is to develop and validate the devices used in schools to be more effective. Work procedures adopted in the implementation of development research. The development model in this study was adapted from the Borg and Gall development model. There are 10 development models: Preliminary, Conduct planning, developing types, conducting initial stage field trials, Revise the main product, conduct major field trials, Revise the operational product, conduct operational field tests, Revise the final product, Disseminate and implement products [6].

3. Content standard

The content standard contains the Competency Standards, Basic Competencies and the indicators that students must achieve after following the learning
3.1. Trial data

3.1.1. The results of validity by experts on the development of sustainable environmental modules and natural resources can be seen in the table 1:

Table 1. Module validity test results according to the expert.

| No. | Validation of Module | Indicator                                         | Score | Criteria       |
|-----|----------------------|---------------------------------------------------|-------|----------------|
| 1   | Suitability of Material with Basic Competency and Competency Standards | a. In accordance with competency standards | 4     |                |
|     |                      | b. Can achieve indicators of learning outcomes    | 4     |                |
|     |                      | c. Can train basic competencies                   | 4     |                |
| 2   | Sequence and Module Systematics | a. Logical and coherent                          | 3     |                |
|     |                      | b. Understandable                                 | 3     |                |
| 3   | Use of language in Modules | a. Using communicative language                   | 4     |                |
|     |                      | b. Simple language and easy to understand         | 4     |                |
|     |                      | c. Language according to students' level of thinking | 4     |                |
| 4   | Module Display       | a. Interesting                                    | 3     |                |

Total Score 33

Percentage 91.67
Valid

| No. | Validation of Module | Indicator                                         | Score | Criteria       |
|-----|----------------------|---------------------------------------------------|-------|----------------|
| 1   | Basic Competency Formulation and Indicator |                                                   | 3     |                |
| 2   | Organizing the contents of Learning Plan  |                                                   | 3     |                |
| 3   | Ability to determine learning steps       |                                                   | 4     |                |
| 4   | The accuracy of determining tools, media and learning resources | | 4     |                |
| 5   | The accuracy determines the procedure, type and assessment too | | 4     |                |
| 6   | The accuracy of allocating time in learning |                                                   | 3     |                |

Total Score 21

Percentage 87.50
Valid

| No. | Variable | Indicator                                         | Score | Criteria       |
|-----|----------|---------------------------------------------------|-------|----------------|
| 1   | Fill in the question | a. In accordance with competency standards | 4     |                |
|     |          | b. In accordance with indicator                   | 4     |                |
|     |          | c. Can measure competence                         | 4     |                |
|     |          | d. Can measure thinking skills                    | 4     |                |
| 2   | Understanding Question | a. The purpose of the question is clear | 4     |                |
|     |          | b. Clear questions                                | 4     |                |
|     |          | c. The terms used are clear and understood by students | 3     |                |
| 3   | Use of language in questions | a. Good sentence arrangement | 4     |                |
|     |          | b. Simple language and easy to understand         | 4     |                |
|     |          | c. Language according to students' level of thinking | 3     |                |
| 4   | Assessment Rubric | Right and exactly                               | 3     |                |

Total Score 41

Percentage 93.18
Valid

Overall Percentage 97.78
Valid
3.1.2. **Validity test data by the teacher.** The results of the validity test by the teacher on module product development can be seen in the table 2.

**Table 2. Module development validity test results by teacher.**

| A. Validation of module | No. | Aspect | Indicator | Score | Criteria |
|-------------------------|-----|--------|-----------|-------|----------|
| 1                       |     | Suitability of Material with Basic Competency and Competency Standards | a. In accordance with competency standards | 4     |          |
|                         |     |        | b. Can achieve indicators of learning outcomes | 3     |          |
|                         |     |        | c. Can train basic competencies | 3     |          |
| 2                       |     | Sequence and Module Systematics | a. Logical and coherent | 3     |          |
|                         |     |        | b. Understandable | 3     |          |
| 3                       |     | Use of language in Modules | a. Using communicative language | 4     |          |
|                         |     |        | b. Simple language and easy to understand | 4     |          |
|                         |     |        | c. Language according to students' level of thinking | 4     |          |
| 4                       |     | Module Display | a. Interesting | 3     |          |
|                         |     | Total Score | | 31 | 86.11 | Valid |

| B. Validation learning plan | No | Indicator | Score | Criteria |
|----------------------------|----|-----------|-------|----------|
| 1 | Basic Competency Formulation and Indicator | 4 |
| 2 | Organizing the contents of Learning Plan | 3 |
| 3 | Ability to determine learning steps | 4 |
| 4 | The accuracy of determining tools, media and learning resources | 4 |
| 5 | The accuracy determines the procedure, type and assessment too | 4 |
| 6 | The accuracy of allocating time in learning | 4 |
|   | Total Score | 23 |
|   | Percentage | 95.83 | Valid |

| C. Validation of test | No | Variable | Indicator | Score | Criteria |
|-----------------------|----|----------|-----------|-------|----------|
| 1                     |    | Fill in the question | a. In accordance with competency standards | 3     |          |
|                        |    |        | b. In accordance with indicator | 3     |          |
|                        |    |        | c. Can measure competence | 4     |          |
|                        |    |        | d. Can measure thinking skills | 4     |          |
| 2                     |    | Understanding Question | a. The purpose of the question is clear | 4     |          |
|                        |    |        | b. Clear questions | 4     |          |
|                        |    |        | c. The terms used are clear and understood by students | 3     |          |
| 3                     |    | Use of language in questions | a. Good sentence arrangement | 4     |          |
|                        |    |        | b. Simple language and easy to understand | 4     |          |
|                        |    |        | c. Language according to students' level of thinking | 3     |          |
| 4                     |    | Assessment Rubric | Right and exactly | 3     |          |
|                        |    | Total Score | | 39 |          |
|                        |    | Percentage | | 88.67 | Valid |
|                        |    | Overall Percentage | | 90.20 | Valid |
4. Discussion
Validation by Experts, Data obtained from the results of validation by experts on the development of the IPA module can be analyzed as follows:

- Quality of Modules, in this aspect the average percentage obtained is 91.67%, including valid criteria meaning that this module is good enough and suitable for use in learning.
- Quality of RPP (Learning Implementation Plan), in this aspect the percentage value is 87.50%, including the valid category meaning that the RPP is good enough and suitable for use in learning.
- Quality of test questions, in this aspect the value of the percentage obtained is 93.18%, which means that the test questions include valid and good enough and appropriate criteria to evaluate learning outcomes. Of the three assessment criteria (quality of Modules, RPP and Test questions) the average overall percentage of the results of the validity test by experts is 97.78%, including valid criteria meaning that it is good and worthy of use.
- Validation by the teacher, validation by the teacher on the development results module can be analyzed as: a) Quality of Modules, in this aspect the value of 86.11% including valid criteria means that this module is good and feasible to use. b) Quality of RPP (Learning Implementation Plan) in the aspect of validation results by the teacher obtaining a value of 95.83% means that the criteria are valid and good and feasible to be used in learning. c) Quality of test questions, from the assessment of this aspect, the value of 88.67% including the valid criteria means that it is good enough and feasible to be used as an evaluation tool after learning of the three criteria (quality of Modules, RPP and Test questions) the average score obtained is 90.20%, including valid criteria meaning that it is good and worthy of use.

The results of this study are consistent with the Pratama study that the SSP development process is seen from the quality of the model, the quality of the lesson plan, the question and test validation of the teacher all of which are feasible and can be used in learning because these elements can improve science learning outcomes [7].

5. Conclusion
Subject Specific Pedagogy (SSP) which is a packaging material for the field of study becomes a comprehensive and educational set of learning. The SSP consists of five basic components, namely the syllabus, Learning Implementation Plan (RPP), student books, Student Worksheets (LKS), and assessment sheets. According to Ulfah validation phase by experts and limited trials on respondents and declared feasible to be used in learning, based on the results of validation by expert module quality, RPP, test questions with an average score of 97.78 are included in the Valid criteria [8]. While the results of the module quality validation, RPP and test questions by the teacher with an average score of 90.20% are included in the Valid criteria, thus that the development of Subject Specific Pedagogy (SSP) is suitable for use in learning.

As the results of the research on Karisma and Maridi, the SSP that has been developed as an alternative learning tool has been carried out through the stages of development and expert validation, it is feasible to be used in learning [9].

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