Packaging science and local wisdom in digital devices for primary school students: Challenges and obstacles

D Nasrudin¹*, F S Irwansyah², H Sugilar³, M A Ramdhani⁴ and H Aulawi⁵

¹Department of Physics Education, UIN Sunan Gunung Djati Bandung, Jl. A.H. Nasution No. 105, Bandung 40614, Indonesia
²Department of Chemical Education, UIN Sunan Gunung Djati Bandung, Jl. A.H. Nasution No. 105, Bandung 40614, Indonesia
³Department of Mathematics Education, UIN Sunan Gunung Djati Bandung, Jl. A.H. Nasution No. 105, Bandung 40614, Indonesia
⁴Department of Informatics, UIN Sunan Gunung Djati Bandung, Jl. A.H. Nasution No. 105, Bandung 40614, Indonesia
⁵Department of Industrial Engineering, Sekolah Tinggi Teknologi Garut, Jl. Mayor Syamsu No. 1, Garut 44151, Indonesia

* dindin.nasrudin@uinsgd.ac.id

Abstract. Today the use of digital media in science learning has become a demand and necessity, not least in the elementary school level. However, the use of digital devices as a medium of instruction in primary schools should have positive impacts and surplus value, one of them reviving and maintaining local wisdom. This paper aims to present of outlining the challenges and obstacles to pack science learning and local wisdom in digital devices. The research method is qualitative descriptive through stages of elementary school curriculum analysis, local wisdom value analysis and Focus Group Discussion (FGD) to find the packaging formula both in science learning. The results show that local wisdom values of a region can integrate into relevant science learning. Appropriate techniques are required in packing the learning design in digital devices by considering the competence factor to be built, the adequacy of the content, the value of local wisdom and the ease of the media to be accessed.

1. Introduction
Education at all levels, including basic education, must contribute to the nation’s competitiveness [1]. Therefore, research and development of learning at the primary level continue to get attention. One of them is learning in the digital era and the integration of local wisdom of learning. It cannot be denied that the field of education is seen as slow to recognize the impact on the use of new learning tools and changes into the learning environment that is growing rapidly in the digital era [2]. Some consider that the use of digital media (smartphones) by elementary school children has a negative impact on their mental development. On the other hand, digital literacy is a survival skill and a strategy that is always used by students in today's digital environment [3].

Learning in the digital era has forced all teachers to continue to innovate in bringing learning, including science learning. In addition to facilitating the discovery of concepts and real experiences that are integrated and integrated with the environment and social culture [4], science learning must also be
built in order to fulfill the competencies that are suitable for the career that will be taken by students [5]. Even current learning must be adaptive to the world of very fast communication, rapid decision making, and intellectual skills to solve very complex problems [6].

In this digital era, students are required to be able to develop skills such as finding and filtering information to build solutions to the problems they face and evaluate their effectiveness [7]. Then, what about science learns for elementary school children in the digital age? This paper will outline some of the challenges and obstacles in packaging science learning that integrates local wisdom in digital devices. This paper will be presented in four main topics, namely, how are the science curriculum at the elementary school level? How should science be taught? How to integrate local wisdom of science learning? and What is the role of digital media in science learning?

2. Method
The research method used is descriptive qualitative. The first step taken is the analysis of the science curriculum for elementary school level. This step is needed to determine the example of science material that will be used in planning, implementing and assessing learning [8]. The curriculum chosen in this study is the Science Curriculum for grade 5 with the main material of Ecosystems and Food Webs.

The second step are determining the local wisdom that will be integrated into science learning. This step requires carefulness and caution. In-depth analysis is needed to determine the local wisdom that will be raised. Integrating local wisdom in context, content and all science learning tools has its own challenges. One way that can be pursued is through the transformation of authentic scientific practices into the context of learning [9].

The method used in determining the right type of local wisdom is through an in-depth study of science material that is linked to the study of local wisdom taken from a particular community habit that applies to a particular area. An appropriate integration model is needed in connecting science studies with cultural studies. One of the practical benefits of integrating science learning with the environment will foster understanding and awareness for students to interact with the community which in turn will form a community that can maintain the environment's sustainability [10].

The final step of this preliminary study is a Focus Group Discussion (FGD) of fellow researchers to determine the framework of preparing to learn plans and preparing digital science teaching materials that is integrated with local wisdom. Determination of learning plans and preparation of teaching materials will consider the demands of the curriculum and expected to learn outcomes. Logical framework of reliability analysis in this research, it is used: analytical, logical, conceptual, and operational verification by an expert [11].

3. Results and discussion

3.1. Science curriculum in primary schools
Science learning at all levels must be able to fulfill three scientific understandings and abilities: (1) students need to learn scientific principles and concepts; (2) students need to acquire reasoning and procedural skills from scientists; (3) students need to understand the nature of science as an effort special human [12]. In addition, natural science education in elementary schools is expected to be a vehicle for students to learn about themselves and the natural surroundings [13,14].
Table 1. Level V science syllabus for elementary school.

| Basic Competencies | Learning Materials | Learning Activities |
|--------------------|-------------------|---------------------|
| 3.5 Analyze the relationship between ecosystem components and food webs in the surrounding environment | Ecosystems and Food webs  
- Organizational level of life  
- Animal grouping based on the type of food | Observing directly/pictures of animals and plants with an ecosystem, for example; gardens, swamps, rivers, or forests.  
- Finding information about the level of organizational life ranging from individuals to the biosphere.  
- Grouping animal species based on the type of food and describing the food chain in the ecosystem in the surrounding environment.  
- Creating a food web scheme for a number of food chains observed in the surrounding environment.  
- Discuss the impact that will occur if the food web is disturbed or unbalanced.  
- Showing the work in the form of role-playing/poster/song about the concept of the food web in an ecosystem. |
| 4.5 Make work about the concept of food webs in an ecosystem | Food chain  
- Food webs | |

Learning science should be carried out in scientific inquiry to foster the ability to think, work and scientific and communicate it as an important aspect of life skills. In order for science learning to be on target, development of learning plans, implementation of learning, assessments used, learning media and teaching materials used must follow the demands of the curriculum.

Based on the revised 2013 curriculum, scope in science education at the elementary school level: (1) scientific work and work safety, (2) living things and living systems, (3) energy and change, (4) material and change, (5) earth and universe and (6) science, environment, technology and society. This basic material is spread in grades IV, V and VI. This paper will show one of the main materials in class 5 that are living things and living systems. Table 1 below shows the syllabus of science learning in grade V elementary schools in the subject matter of the Food Ecosystem and Nets. Table 1 is taken from the syllabus of science subjects for elementary school level of the ministry of education and culture in 2016. Table 1 contains basic competencies, learning materials and learning activities that must be carried out. Basic competence is a minimum competency that must be achieved by students after participating in certain learning activities.

3.2. How science should was taught?

Science essentially consists of products, processes, and attitudes [15]. Learning science, learning about science and doing science are mutually reinforcing and inseparable activities [16]. Learning science must be contextual in accordance with what is experienced by students in everyday life [17]. Learning science at the elementary school level must be able to bring students to know various scientific products, how science works and how they behave scientifically [18]. In order to achieve this goal, a curriculum, syllabus, science learning plan as well as an instrument to measure the effectiveness of learning are compiled.
| Bloom Taxonomy | The 21 Century Skill | Scientific Approach | Learning Activity |
|----------------|---------------------|---------------------|------------------|
| Remembering    | Observing           |                     | Students are asked to observe, remember, mention and tell about some living things and the food they find in their daily lives. |
| Understanding  | Asking              |                     | The teacher shows the process of a food chain picture and shows the position of living things as producers, first consumers, second consumers, and so on including decomposers. Students are given the opportunity to ask questions from the teacher and his friends. |
| Applying       | Trying              |                     | Students are asked to describe a food web in one place based on the existing food chain |
| Analyzing      | Reasoning           |                     | The teacher shows a complex food web. Students are asked to make as many food chains as possible. From the existing food chain, students are asked to write down the position of the living creature. The teacher prepares several analysis questions to be answered by students |

Critical thinking, problem solving, communicative and collaborative Reasoning Communicating The teacher tells of one local wisdom that farmers have. Their ancestors forbade killing insects with drugs or pesticides. Though the insects have eaten a lot of their farm produce. The teacher asks students to discuss the reasons.

Based on Table 2, column 1 shows the basic competencies that students must obtain. When looking at the editorial, the learning achievement of students on the cognitive aspect must arrive at the level of analysis (C4 Bloom taxonomy version). In practice in the field, students will not be able to reach C4 level without prior learning experience at the previous level, namely knowing and remembering concepts at the C1 level, understanding concepts at the C2 level and being able to apply concept understanding in one case at the C3 level. In short, students will not arrive at the ability to analyze if they do not experience the learning stages of the previous level. The perfect stages of achieving the cognitive level of students will appear in the product of the work of psychomotor abilities as expected by the formula for the basic competencies of psychomotor aspects 4.5 that is to make work on the concept of food webs in an ecosystem. The work of students based on good cognitive abilities will show good products.

In addition to mastering the cognitive aspects of Bloom's Taxonomy, science learning in the 4.0 industry revolution era must be able to facilitate the achievement of 21-st century skills. Therefore, besides mastering the concepts and their application, students must be facilitated to acquire technical, information management, communication, collaboration, creativity, critical skills. thinking and problem solving [19]. The process of getting those skills is facilitated through a scientific approach that is observing, asking, trying, reasoning and communicating. Table 2 below shows one example of science learning activities on the subject of food webs with a scientific approach and cognitive learning outcomes to the level of analysis (C4) and some 21-st century skills.

3.3. How is local wisdom integrated into science learning?

Good science learning is learning contextual science [20,21]. One of the contextualization’s of science learning is the learning of science based on local wisdom. In previous research, there were several scientific knowledge that could be integrated into scientific learning [22]. That is, there is a certain culture or habit that is carried out from generation to generation and can be explained scientifically. A
relevant example of the subject matter in table 2 is the habits of the community that prohibit the use of pesticides in rice fields. The ban is very strict and must not be violated. This wisdom is maintained until now. Scientifically, this habit is easily explained to students because the use of pesticides will disrupt the life process in one ecosystem. There are a number of chains or even food webs that are disturbed so that it will also affect the community's harvest.

Some local wisdom as mentioned above can easily be packaged in science learning. Therefore, according to previous research, there are three models that can be selected in integrating local wisdom in science learning, namely the adaptation model, addition model and correction model [23]. Examples of learning plans that integrate local wisdom of science learning have been given [24]. Learning activities that integrate local wisdom of science learning is shown in table 2 column 3 row five. These learning activities also facilitate habituation to practice high-level skills (21st-century skills) such as critical thinking, problem-solving, communicative and collaborative skills.

3.4. Where is the role of digital media?
In column 3 in table 1 about learning activities, there are six main activities that are expected to be experienced by students. In practice, and highly recommended by education experts, the best learning is learning through direct experience. When it is difficult to do, the role of media technology as a tool is expected. As an example of the first activity: Observe animals and plants with an ecosystem, for example; gardens, swamps, rivers or forests. This activity can be carried out by bringing students to the school environment to see directly what animals and plants are in the garden etc. In the Indonesian context, if students want to know the animals and plants at the poles, it will be very difficult for teachers to realize unless they go to the poles. The role of technology and digital media will greatly help make it happen. In this context, the role of digital media (multi-media) is needed to support the effectiveness of learning [25].

Multimedia is a digital product that presents and combines text, sound, images, animation, audio and video, implemented with tools and connection so that users can navigate, interact, work, and communicate [26]. In the world of education, multimedia is used as a teaching medium, either in classroom or self-learning [27]. In learning process, multimedia has proven to be able to create a fun learning atmosphere [28], enhance learning motivation [29], increase the effectiveness of learning [30], improve the level of understanding [31], create student-centred learning [32], and make efficient investment of learning means [33].

Digital media for learning at the elementary school level is limited to safe gadgets, set specifically for learning needs. Media used is limited to schools with teacher supervision or at home with parental supervision. This effort is carried out so that students can use digital media such as smartphones only for learning and communication tools, not to be used for other purposes. Digital science learning media can be packaged in various teaching material formats such as e-book, interactive learning, games etc. Efforts to develop digital teaching materials simply follow the process of needs analysis, curriculum analysis, initial to design, expert validation, limited trials, extensive trials, and evaluation.

4. Conclusion
In order for science learning to be more alive and meaningful, the learning package can be integrated with local values of the surrounding area. A suitable integration model is needed. To face the industrial revolution era 4.0, science learning must be more innovative and more contextual with the latest findings in technology. The Packaging teaching materials should have begun to be presented in digital forms that are more mobile and practical. The Packaging of science teaching materials in digital form must still consider curriculum bills, especially learning outcomes, local wisdom content that will be integrated and strengthening the achievement of 21st-century skills.

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