Developing biology learning tools based on character education integrated with sustainable local wisdom to enhance 21st-century attitude of students

M Irwansyah1*, F Ferawati1, E Suryani1, O Olahairullah1, A Ariyansyah1, N Nurfathurrahmah1, and I Rubianti1

1 Sekolah Tinggi Keguruan dan Ilmu Pendidikan (STKIP) Bima, Jl. Tandean Kel. Mande, Kota Bima 84119, Indonesia

* Corresponding author’s email: irwansyahmuh44@gmail.com

Abstract. The study aims to (1) to find out the stages of developing biology learning tools based on character education integrated with sustainable local wisdom, (2) to determine the validity, practicality, and effectiveness of biology learning tools based on character education integrated with sustainable local wisdom, and (3) to find out the effect of biology learning tools based on character education integrated with sustainable local wisdom. The trial of this research product was conducted to 11th-grade students of SMAN 2 Kota Bima in the school year 2018/2019. This research is developing research which is based on the Thiagarajan development model which consists of 4 stages are define, design, develop and disseminate. The instruments of this research are validation sheets, observation sheets, attitude assessment instruments, cognitive tests, and student response questionnaires. The results of this study indicate that developing biology learning tools based on character education integrated with sustainable local wisdom is valid, practical and effective to enhance the 21st-century attitude of students.

1. Introduction
In the future, the Indonesian people will face various challenges, especially those related to the advancement of science, technology, and art. The challenge must be faced by the Indonesian people so that they can survive in the 21st-century. Several skills must be possessed by human resources so that they can survive in the 21st-century namely creativity, critical, collaboration, communication, innovation, and culture. One sector to produce human resources that can survive in the 21st-century is through educational institutions. The national education system has the goal of producing devoted, intelligent, noble and cultured human resources.

In Indonesia, Education is currently faced with a big problem, namely the low quality of educational processes and outcomes which are characterized by the occurrence of moral degradation among Indonesian youth as a product of the educational process that has been implemented [1]. Based on the results of observations in Bima, West Nusa Tenggara, some students in Bima have been contaminated with external civilizations that are not by the local cultural values of Bima. For example, being undisciplined, saying harshly to parents and teachers, violating school rules, even up to the act of consuming liquor and drugs. These various problems must be resolved immediately because the fragility of character and culture in the life of the nation can bring a decline in the nation's civilization so that the aspiration to produce a golden generation is difficult to realize [2]. The component which has been
considered to greatly influence the education process is the teacher [3]. Educators must be able to apply character education-based learning integrated into sustainable local wisdom to produce students who have an attitude to survive in the 21st century. Character education is the process of giving guidance to students in learning that includes religion, honesty, tolerance, discipline, hard work, creative, independent, nationalism, and environmental care [4]. Based on the results of research by Machin [5] and Mannan [6] that the development and application of teaching materials based on character education and local wisdom in learning has a positive effect on improving students' knowledge and attitudes.

2. Method
This research is developing research that refers Thiagarajan development model which consists of define, design, develop, and disseminate or 4-D stages [7]. The developed learning tools were tested in 11th-grade students of SMAN 2 Kota Bima-West Nusa Tenggara in even semester of the 2018/2019 school year. The instruments of this research are validation sheets, observation sheets, attitude assessment instruments, cognitive tests, and student response questionnaires. The data analysis techniques are descriptive statistical data analysis techniques.

3. Result and Discussion
3.1 The Result of Developing Process
According to the definition stage, it informs that the learning tools used by the teacher are taken on the internet. The content of the learning tool is only limited to matter without being equipped with the planting of character education and values of local wisdom. In addition to presenting matter, teachers only use conventional learning methods. The habit of using conventional learning methods can cause students to be passive in learning and not independent so that their learning outcomes are low.

The lesson plan for implementing learning is designed based on 21st-century learning, which is based on character education and values of local wisdom. The lesson plan contains core competencies, basic competencies, indicators, learning objectives, learning materials, methods, approaches and learning models, media, tools, learning resources, learning steps, and assessment instruments. Based on the results of Lubana [8] research that the development of an implementation plan for character education-oriented learning can improve student learning outcomes both increase cognitive aspects and improve affective aspects.

The developed learning book is tailored to the needs of Bima-Indonesia city students. In learning, there is a strengthening of character education and values of local wisdom as a solution to various cases carried out by students in Bima. The developed book is expected to provide opportunities for students to construct their thoughts so that they affect students' attitudes. As the results of research conducted by Budimah [9] and Perkasa [10] that character-based learning books and local wisdom can influence students' attitudes and scientific literacy. The developed learning tools were validated by experts including; (1) lesson plan, and (2) learning book. The results of the validation of each instructional matter as a result of development can be seen in the following table 1.

| Table 1. The Result of Lesson Plans Validations |
|-----------------------------------------------|
| Aspect Assessed                  | 𝑥̅  | Category   |
| Objectives Achievement           | 3,75| Very valid |
| The matter                       | 3,75| Very valid |
| Model Selection & learning steps | 3,50| Very valid |
| Media Selection                  | 3,70| Very valid |
| Assessment Instrument            | 3,50| Very valid |
| Grammar                          | 3,70| Very valid |
| Benefits                         | 4,00| Very valid |
| Total                            | 3,70| Very valid |


Table 2. The Result of Developed Book Validations

| Aspect Assessed               | \( \bar{x} \) | Category   |
|-------------------------------|----------------|------------|
| Content construction          | 3.25           | Valid      |
| Display                       | 3.50           | Very valid |
| Completeness of matter        | 3.50           | Very valid |
| Compatibility with other components | 3.50      | Very valid |
| Grammar                       | 3.50           | Very valid |
| Benefits                      | 3.75           | Very valid |
| Total                         | 3.50           | Very valid |

Based on table 1 and 2 above, the assessment of two expert validators, the results showed that overall biology learning tools based on character education integrated with sustainable local wisdom were generally stated to be very valid \((M = 3.70)\), and learning books, in general, were declared very valid \((M = 3.50)\). Mustami [11] and Perkasa [12] stated that the developed learning tools could be said to be valid because the development process was based on strong theoretical rationality and had internal consistency so that teaching materials had high reliability and consistency to collect data.

3.2 The Result of Product Trial

The trial of this research product was conducted to 11th-grade students of SMAN 2 Kota Bima in the school year 2018/2019. In assessing attitude, the instrument used is an attitude assessment instrument. The attitudes assessed are religious, nationalism, integrity, and environmental awareness. The results of the measurement data are shown in the following table 3.

Table 3. The Result of Student’s Attitude Assessment

| Attitude Category | Frequences | Percentages (%) |
|-------------------|------------|-----------------|
| Very Good         | 7          | 23.33           |
| Good              | 23         | 76.67           |
| Enough            | 0          | 0               |
| Low               | 0          | 0               |

Based on table 3, the score of students' attitudes obtained from attitude assessments as many as 7 out of 30 students showed a very good attitude with a percentage of 23.33%. Meanwhile, 23 people out of 30 students showed a good attitude with a percentage of 76.67%. This shows that during learning using character education based biology learning tools integrated sustainable local wisdom students' attitudes are in the very good and good category. The attitude of the students is influenced by many factors, including the student's surroundings. For environmental awareness owned by the students not only because it is taught through learning in the class but more influenced by the culture and habits that exist in the school environment [13].

3.3 The Result of Dissemination Stage

The final stage of this research is the deployment stage. The distribution of teaching materials is carried out in a limited way through the forum of Biology subject teachers of SMAN 2 Kota Bima. The data on teacher response results can be seen in the table 4.
Table 4. The Result of Teachers Responses

| Respons Category | Lesson Plan (%) | Developed Book (%) |
|------------------|-----------------|--------------------|
| Very Positive    | 33, 33          | 66,67              |
| Positive         | 66, 67          | 33, 33             |
| Negative         | 0               | 0                  |

The teacher's response to the implementation of learning by using biology learning tools based on character education integrated with sustainable local wisdom in positive and very positive categories. The teacher who attended the meeting in addition to assessing learning tools as a result of the development also provided suggestions for future improvement of learning tools. For example, five-character education religious, integrity, nationalism, collaboration and independence appear in learning tools and developed book must include media literacy from accurate sources.

4. Conclusion
Based on the steps that have been done, it can be concluded that the developed biology learning tools based on character education integrated with sustainable local wisdom valid, practical and effective 21st-century attitude of students.

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