



Strengthening Student Character Education Through Biology Learning in High School

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Abstract: Strengthening character education through biology learning is a form of educator action that integrates character education values in planning, implementing, and evaluating biology learning which is carried out intentionally and continuously to strengthen the character values of students. This study aims to develop a character education-oriented biology learning tool and test its effectiveness on understanding character values and mastery of biology concepts for high school students in West Lombok Regency. The method used is a mixed research method, namely development research methods to develop character education-oriented biology learning tools, and experimental methods to test the effectiveness of applying learning tools to understanding character values and mastering biology concepts for high school students. The research sample amounted to 270 students who were determined by purposive random sampling technique. Data collection used research instruments in the form of expert validation sheets, feasibility assessment sheets, tests for understanding the values of character education, and tests for understanding student concepts. The results showed that the character education-oriented biology learning tools were very valid and suitable for use in biology learning in high school. The results of the different concept mastery test are the mean score of the experimental class 69.78; and the mean score of the control class is 65.66 with a mean difference of 2.66. The results of the different test with the t test showed that there was no significant difference between the two mean scores. The results of the different test of understanding the values of students' character education using the t-test obtained a mean experimental class score of 72.76; and the mean score of the control class is 70.10; means difference 2.66. Based on the t value, it was obtained that the mean scores of the experimental class and the mean scores of the control class were not significantly different.

Keywords: Biology learning; Strengthening character education; Mastering biological concepts

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Introduction

Strengthening Character Education is an educational program in schools to strengthen the character of students through harmonization of heart, intention, thought, and sports with the support of public involvement and collaboration between schools, families, and communities which are part of the National Movement for Mental Revolution (Kemendikbud, 2020). Strengthening Character

Education is an effort to cultivate character education in schools (Setyaningrum & Husamah, 2011). The Character Education Strengthening Program will be implemented in stages and as needed. The Character Education Strengthening Program aims to encourage quality and moral education that is evenly distributed throughout the nation (Putri, D.P. 2018). The purpose of Strengthening Character Education is to build and equip students as the golden generation of Indonesia in 2045 with the spirit of Pancasila and good character

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education to face the dynamics of change in the future; Develop a national education platform that puts character education as the main soul in providing education for students with the support of public involvement through formal, non-formal and informal education by taking into account the diversity of Indonesian culture. Revitalize and strengthen the potential and competence of educators, education staff, students, communities, and the family environment in implementing Strengthening Character Education (Hasanah, 2013).

Strengthening character education for school-age children at all levels of education to strengthen the moral values, character, and personality of students by strengthening character education that is integrated into subjects. The urgency of Strengthening Character Education is related to the development of Human Resources which is the foundation of nation building; 21st century skills students need to realize the competitive advantage of the 2045 Golden Generation; and the tendency of conditions for the degradation of morality, ethics, and character (Kemendikbud, 2020). For this reason, strengthening character education is absolutely necessary not only at school, but at home and in the social environment. Even now, the participants in character education are no longer young children to teenagers, but also adults. Character education is a system of naming character values which includes components of knowledge, awareness or willingness, and actions to implement these values, both towards God Almighty, oneself, others, the environment, and nationality. Education towards the formation of the nation's character of students is the responsibility of all teachers. Therefore, the coaching must also be by the teacher. Thus, it is not correct to say that educating students to have national character is only entrusted to teachers of certain subjects, such as Civic Education teachers or Islamic Religious Education teachers (Omeri, 2015).

According to Irawan, (2016), character education is one of the priority programs in the National Policy for National Character Development. These policies are jointly prepared by various ministries, non-ministerial institutions, and related non-governmental institutions. The implementation of the character education policy is carried out in several stages. The first and priority phases in 2010-2014, which are the consolidation and implementation phase, the second and priority phases for 2015-2019, are the strategy stabilization and implementation phase, and the third and priority phases 2020-2025, which are the phase of continuous development of the results achieved in this phase. I and II.

Islam, (2017) states that strengthening student character aims to form individuals as citizens who have

global competitiveness in accordance with the demands of the development of science and technology and the dynamics of society in the era of the industrial revolution 4.0. Strengthening character education in the implementation of the 2013 curriculum can be done through a process of integrating learning outcomes, synergizing the roles of educational institutions, teachers showing themselves as competent and exemplary teachers. Latifa, (2014) stated that the integration of character education in learning can be done by loading character values in all subjects taught in schools and in the implementation of learning activities. For this reason, teachers must prepare character education from planning, implementation, to evaluation. The implementation of character education in schools needs to be supported by the example of teachers and parents as well as a culture of character.

Educational institutions are a strategic tool for the formation of national character because they have structures, systems and devices that are spread throughout Indonesia from the regions to the center. The formation of this nation's character wants to be carried out massively and systematically through the Strengthening Character Education program which is integrated into the entire education system, school culture and in collaboration with the community. The Character Education Strengthening Program is expected to foster a spirit of learning and make students happy at school as a friendly home to grow and develop (Kemendikbud, 2017).

Character education is related to value education, character education, moral education, and character education which aims to develop the ability of all school members to make good and bad decisions, be exemplary, maintain what is good and realize that goodness in everyday life wholeheartedly (Puji et al., 2016). Strengthening character is the main key to prepare a generation that is ready to face the challenges of the 21st century era (Sari et al., 2013). These values must be embedded in the community, especially in the education unit environment. Permendikbud Number 82 of 2015 concerning the prevention and control of acts of violence is one of the instruments for strengthening character education in education units, which since 2010 has become a National Movement.

In learning biology, students can practice the value of responsibility, concern for the environment and conservation efforts (Sudarisman, 2015). Based on this rationale, the teacher must facilitate the formation of student character through planning and implementing character learning oriented to biology education (Latifah, 2014; Lepiyanto, 2011). However, various obstacles experienced by teachers in implementing character education include not understanding the concepts, character education policies, and learning

models that have the potential to strengthen students' character. One solution to assist teachers in designing, implementing, and evaluating the strengthening of student character education is by developing a character education-oriented biology learning model.

To facilitate biology teachers in implementing the Character Education Strengthening Program through learning, Jamaluddin et al, (2020), have developed an online biology learning model based on character education. The learning model for strengthening character education that has been developed is based on information processing theory. Strengthening student character education through learning activities must be carried out in a sustainable and integrated manner in every subject in the school. For this reason, through this research, a biology learning tool oriented towards strengthening character education will be developed. The learning tools in question were developed by referring to the Character Education Learning Model (Jamaluddin et al., 2020). In general, the purpose of this research is to develop a character education-oriented biology learning tool and test its effectiveness on understanding character values and mastery of biology concepts for high school students in West Lombok Regency.

Method

This research method is a mixed research or Mixed Method (Creswell, 2009) namely development research, and experimental research. The development research method is used to develop biology learning tools oriented towards strengthening character education. Experimental research methods are used to test the effectiveness of the learning tools that have been developed. This research was conducted in the odd semester and even semester of the 2020/2021 academic year. The research sample was determined by purposive sampling technique by considering the number of students and the location of SMA on the geographical map of the West Lombok Region. Based on this, it was determined that the students who became the research sample were students from SMAN 1 Sheet, SMAN 1 Gerung, SMAN 1 Labuapi, SMAN 1 Narmada, and SMAN 1 Gunungsari. The number of research samples was 270 class X students. This research was carried out in two stages. Each stage is described as follows.

Learning Device Development Stage

The development model used is the ADDIE model, with the stages of analysis, design, development, implementation and evaluation (Mulianingsih, 2013). The stages of developing biology

learning tools oriented towards strengthening character education are as follows:

1) *Analysis stage*

Pre-planning: thinking about new products (biology learning tools) being developed. Identify products that are in accordance with student goals, learning objectives, identify learning content/materials, identify learning environments, and delivery strategies in learning. The product developed is a character education-oriented biology learning device.

2) *Design stage*

At this stage, a draft learning device is designed. The design is written for each component of the learning device. The research product in the form of learning tools is then validated by biology learning experts, and assessed for feasibility by biology teachers at SMAN in West Lombok.

3) *Development Stage*

Develop learning tools needed in development. Oriented to the results of product design, at this stage the product begins to be made in accordance with the structure of the learning device. Making instruments to determine the validity and feasibility of learning devices.

4) *Implementation Stage*

Starting to use learning tools in a real environment. Reviewing product development goals, interaction between students, and asking for feedback.

5) *Evaluation Stage*

Revisit the impact of learning in a critical way. Measuring the achievement of learning device development goals. Measuring what students have been able to achieve. Looking for any information that can make students achieve their learning outcomes well.

Learning Device Trial Phase

The experimental method is used to test the effectiveness of the learning device using the Posttest Only Control Group Design experimental design. This experimental model is described as in Figure 1.

R	X	O ₁
R	-	O ₂

Figure 1. Experimental design Posttest Only Control Group Design

- R : Pretest in the experimental and control groups
- O₁ : Posttest in the experimental group
- O₂ : Posttest in the control group
- X : Treatment of the application of learning tools

Data collection

The data collection instrument used in this study consisted of a biology learning expert validation sheet, and a feasibility sheet for learning tools, a test for understanding the values of character education, and a test for student biology learning outcomes.

1) *Biology Learning Expert Validation Sheet*

This Validation Sheet aims to assess the validity of the learning tools assessed by biology learning experts from FKIP Unram. From the results of this expert assessment, it will be known the level of validity of the learning tools academically. Through this validation sheet, learning experts can provide suggestions for improving learning devices. These suggestions are very useful for the improvement or revision of certain parts of the components of the learning device.

2) *Learning Device Feasibility Assessment Sheet.*

The questionnaire for assessing the feasibility of learning equipment aims to obtain data on the feasibility of the equipment whose values by biology learning practitioners in this case are high school biology teachers from class X, XI and class XII. From the results of the feasibility assessment by the biology teacher, it can be seen the level of feasibility of the model to be applied in biology learning in high school. Through the teacher's response based on the feasibility questionnaire, suggestions can also be obtained for improving learning tools so that they can be applied in planning, implementing, and evaluating biology learning in high school.

3) *Biology Learning Outcome Test*

Biology learning outcomes test is used to measure students' mastery of biology concepts. The test in question was developed in the form of a multiple-choice test with reference to the biology learning material in class X SMA. The results of the biology concept mastery test are used to determine the effectiveness of character education-oriented learning tools.

Test of Understanding Character Education Values

The test of understanding the values of character education is used to measure students' understanding of the values of character education. The test in question was developed in the form of a multiple choice test with reference to the values of character education from the Ministry of Education and Culture (2017). The results of the understanding test of Character Education Values are used to determine the effectiveness of learning tools oriented towards strengthening character education.

Data analysis

Data analysis was performed using descriptive statistical techniques and inferential statistics. The stages of data analysis of research results are: (1) Analysis of expert validation data on learning tools; (2) data analysis of the results of the feasibility assessment of learning devices by high school biology teachers. The device design was validated by 3 biology learning experts and assessed for feasibility by 4 high school biology teachers in West Lombok, namely from SMAN 1 Gerung, SMAN 1 Labuapi, SMAN 1 Narmada, and SMAN 1 Gunung Sari. The results of the validation of the biology teacher and the results of the feasibility assessment by the biology teacher using the criteria as in Tables 1 and 2.

Table 1. Criteria for Assessment of Learning Expert Validation Results

Criteria Interval (%)	Criteria
75.01 - 100	Valid
50.01 - 75	Quite Valid
25.01 - 50	Invalid

Table 2. Criteria for Eligibility Level of Learning Devices

Criteria Interval (%)	Criteria
86 - 100	Very Worthy
76 - 85	Worthy
65 - 75	Decent enough
55 - 59	less worthy
< 54	Not feasible

To determine the effect of the application of learning tools on the mastery of biological concepts and understanding of student character education values, the t-test for different variants (unequal variance) was used using the Separated Variance formula. Data analysis using SPSS 20 program.

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}} \dots\dots\dots (1)$$

Result and Discussion

Data Analysis of Preliminary Study Results

To obtain information on the implementation of biology learning at SMAN in West Lombok Regency, a preliminary study has been carried out using the method of document analysis of learning tools, and interviews with biology teachers. The research results obtained are: the results of document analysis of biology learning tools; and the results of interviews

with biology teachers for high school biology subjects in West Lombok Regency. The research results are described sequentially as follows.

Results of Analysis of High School Biology Learning Devices

The components of the learning tools analyzed consisted of the Syllabus and the High School Biology Learning Plan. The syllabus that has been developed is a three-column syllabus model consisting of a Basic Competency column, a learning material column, and a learning activity column. The syllabus is prepared referring to the Regulation of the Minister of Education and Culture of the Republic of Indonesia No. 37 of 2018. The learning program plan model compiled is a one-page learning program plan model. The structure of the learning program plan consists of Subject Identity, Basic Competencies, Learning Objectives, Learning Activities, Learning Assessments, and Learning Resources. The learning activities consist of Initial activities, Core activities, and Closing activities. The structure of the learning program plan seems very simple and practical. However, in the learning program plan, it is not clear what learning model is used to achieve the formulated learning objectives.

Results of Interviews with High School Biology Teachers

Interviews were conducted with high school biology teachers in West Lombok Regency. The results of the interviews showed that the planning, implementation, and evaluation of online biology learning could be implemented. The main obstacle faced by teachers and students is the problem of internet signal which often experiences interference. Most students use cellphones to communicate in learning activities. Learning carried out through the WA group can be followed by more than 90% of students. When using google meet, google class room, many students can take part in learning due to limited communication tools (mobile phones), internet signal constraints, and packet pulse constraints. Therefore, biology teachers use WAG more in online high school biology learning activities.

Development of Biology Learning Devices Oriented to Strengthen Character Education.

The learning device development model used in this research is the ADDIE model. The stages of developing the model consist of the stages of analysis, design, development, implementation, and evaluation. Based on the ADDIE model development model, the stages of developing an integrated biology learning model for character education are as follows.

1) Analysis Stage

At this stage, what is analyzed is the readiness and ability of students to take biology lessons, document

analysis of biology learning tools, and the results of interviews with biology teachers about planning, implementing, and evaluating biology learning. The results of the analysis show that to implement biology learning requires a learning device oriented towards strengthening student character education in an integrated manner through biology learning activities. This is due to the learning tools used as a reference for learning so far have not been planned for strengthening student character education.

2) Design Stage

At this stage, a draft of a high school biology learning model is designed which is written for each component of the learning model. The learning tools developed consist of device orientation that provides an overview of the learning model referred to in the development of the device, and the components of the learning device. The character education-oriented learning tools consist of the Syllabus, Learning Program Plans, Student Worksheets, and Student Learning Journals.

3) Development Stage

Based on the results of the product design, at this stage a draft of character education-oriented biology learning tools began to be made. Then create an instrument to measure the validity and feasibility of the learning device. The draft of learning tools that have been developed can be described as follows.

Instructional Impact

The application of character education-oriented biology learning tools that have been developed in this study has the following instructional impacts.

1) Mastery of Biological Concepts.

Through reviewing information about learning materials written in their study journals, students can improve their understanding of important concepts related to biology learning materials. Besides that, in independent activities seeking information related to the subject matter being studied can train students in utilizing information technology. Thus, they can adapt to the rapid development of information technology.

2) Strengthening Character Education.

The Covid-19 pandemic has resulted in major changes in society, including the world of education. These changes include the daily lives of teachers and students, as well as activities in the school environment. Teachers as front figures in schools have an important role in anticipating these changes, including building strong characters so that they can lead students to avoid the dangers of Covid-19, as well

as guide them to develop their potential. In Presidential Regulation Number 87 of 2017 concerning Strengthening Character Education, it is an educational movement under the responsibility of the education unit to strengthen the character of students through harmonization of heart, taste, thought, and sports activities with involvement and cooperation between education units, families, and communities. as part of the National Movement for Mental Revolution.

Strengthening Character Education is an effort to grow and equip the next generation to have good character, high literacy skills, and have superior 21st century competencies, namely being able to think critically and analytically, creatively, communicatively, and collaboratively. The purpose of Strengthening Character Education is to build and equip students to become the golden generation of Indonesia in 2045 with the spirit of Pancasila and good character education to face the dynamics of change in the future.

3) *Independence.*

Individual learning tasks whose learning outcomes are written in learning journals can train students to become independent learners who are skilled in finding, processing and using information related to the problems they face in everyday life.

Impact of Accompanying the Implementation of Character Education Oriented Learning Tools

1) *Critical thinking.*

One of the 21st century skills is critical thinking, through analysis of learning materials in finding important concepts and writing them in learning journals can train students' thinking skills.

2) *Komunikatif.*

Oral and written communication skills are very important to be trained on students because this skill is one of the 21st century skills needed by students in interacting with other people in their environment.

3) *Metacognitive Awareness.*

Metacognitive awareness is essential for successful learning because it allows individuals to manage their cognitive skills and to determine their perceived weaknesses by building new cognitive skills. Metacognitive awareness enables individuals to plan, select and monitor their learning in ways that directly improve their performance. There are two metacognitive components, namely knowledge cognition and regulatory cognition. The three types of metacognitive knowledge are: declarative, procedural, and conditional. The three metacognitive regulatory abilities are: planning, monitoring, and evaluation. The results of several studies on metacognitive abilities affect thinking skills, personality and academic motivation in student learning so that they can improve academic learning achievement.

4) *21st Century Skills.*

According to Prayitno (2013) in the 21st century learning process, information and communication technology is a tool in an effort to achieve a learning process that prioritizes 21st century abilities, skills and skills that must be possessed by students. There are many technological devices or information technology-oriented applications that support student activities in the learning process to achieve 21st century skills such as creativity, innovation, communication, collaboration, information and media literacy skills, and so on.

The research product in the form of character education-oriented biology learning tools has been validated by biology learning experts, and has been assessed for feasibility by high school biology teachers in West Lombok. The instrument used to validate and assess the feasibility uses an expert validation sheet, and a questionnaire on the feasibility of learning tools. The results of the validation and assessment of the feasibility of character education-oriented biology learning tools are as follows.

Table 3. Results of Assessment of Learning Model Validity by Biology Learning Experts

Validator	I	II	III	Average	%	Validity
The background for the development of the Educational Learning Toolkit is clearly explained	4	4	4	4.00	100	Very valid
The purpose of developing Pendikar learning tools according to the needs of teachers and students	4	4	4	4.00	100	Very valid
Supporting Theory Pendikar learning tools according to the learning syntax	3	3	3	3.00	75	valid
The learning model (Biotics) used as a reference for the development of the Educational Learning tool supports the development of student character.	4	4	3	3.67	91	Very valid
The stages/steps of activities in the systematic and logical lesson plan for the Pendikar learning device can be implemented in high school biology learning in the implementation of the 2013 Curriculum.	3	3	3	3.00	75	Valid
The social system in the Pendikar learning device involves active interaction between teachers and students, students with students, and students with other learning resources.	4	3	3	3.33	83	Very valid

Validator	I	II	III	Average	%	Validity
The Educational Learning Device support system can support the practical and effective implementation of the Toolkit	4	3	3	3.33	83	Very valid
Instructional Impact in accordance with the objectives of the development of the Educator learning tool	4	4	3	3.67	91	Very valid
The impact of the accompaniment of implementing the Pendikar learning tool is relevant to efforts to strengthen character education in the implementation of the 2013 Curriculum	3	3	3	3.00	75	Valid
The impact of the application of the Pendikar learning tool is relevant to efforts to develop student competencies in accordance with the demands of 21st century skills	4	4	3	3.67	91	Very valid
The principle of reaction of Pendikar learning tools strengthens the role of teachers as facilitators and students as independent learners.	4	4	3	3.67	91	Very valid
The stages of learning activities in RPP can be carried out with an offline and/or online system in Character Education-oriented learning (Pendikar)	3	3	4	3.33	83	Very valid
Average score and Validity	44	42	39	41.67	86.81	Very valid

Based on the validation results of three biology the learning tools oriented towards strengthening learning experts, the results of the analysis show that character education are declared to be very valid.

Table 4. Summary of Validator Suggestions and Corrections on Learning Device Components

Validator	Correction From Validator
I	Instruments for knowledge should refer to Basic Competencies 3 levels of analysis, do not measure too much supporting IP. There was no assessment instrument for skills, there should be because the three aspects of the goal to be online should not be abandoned. Please use an online platform that has a minimum standard of Google Classroom, if WhatAppl Group does not include standard online learning, including social media oriented.
II	It is necessary to explain the form of group work if it is done online
III	The test of students' understanding of what character education values should not be integrated with activities as written in the Learning Program Plan. It is possible that the test is carried out in the form of giving a questionnaire that describes the students' disagreements with the characters when students carry out the learning process. For example, Seeing the structure of the virus body that seems simple but is actually complex, made me realize how omnipotent God is as the creator of everything (strongly agree, agree, disagree and strongly disagree). So that in the learning process it will be seen the characters that can be raised by students according to the Learning Program Plan (religious).

Table 5. Results of the Feasibility Assessment of Learning Devices by High School Biology Teachers

Statement	Education				Average	%	Feasibility Test
	I	II	III	IV			
Character education learning tools have met the standards of learning activities in the implementation of the 2013 curriculum.	4	3	4	4	3.75	93.75	Very Feasibility
Character education learning tool has a clear syntax for learning activities at each stage.	4	3	4	4	3.75	93.75	Very Feasibility
Character education learning tool has placed the teacher as a facilitator in the learning process	4	4	4	4	4.00	100.00	Very Feasibility
Learning activities in lesson plan can be carried out in online and/or offline learning.	4	3	4	4	3.75	93.75	Very Feasibility
Character education learning tools have maximized the use of technology and learning resources both online and offline.	4	3	4	4	3.75	93.75	Very Feasibility
Character education learning tools make learning effective.	3	3	4	4	3.50	87.50	Very Feasibility
Character education learning tool trains students to learn independently.	4	4	4	4	4.00	100.00	Very Feasibility
Character education learning tools are flexible for online and/or offline learning conditions.	3	3	4	4	3.50	87.50	Very Feasibility
Character education learning tools have the potential to strengthen students' character values	3	3	4	4	3,50	87.50	Very Feasibility
Character education learning tools have the potential to develop students' ICT skills	4	3	4	4	3.75	93.75	Very Feasibility
Percentage of Total Score and Eligibility of Learning Devices	37	32	40	40	3.72	93.12	Very Feasibility

Based on the results of the feasibility analysis by high school biology teachers, it can be stated that character education-oriented learning tools are very suitable to be

used as an alternative high school biology learning device in West Lombok Regency.

Table 6. Biology Teacher Suggestions/Revisions on Biology Learning Models

Teacher	Suggestion for revision / Feasibility Correction of the Model By Biology Teacher
I	Thank God the device in our opinion is appropriate. But because the learning time is currently reduced, so it doesn't match the schedule. If possible, reduce the PPT in all sessions/materials because not all get a presentation.
II	Agree to be implemented in high school biology learning
III	Character education-oriented learning tools need to be socialized to biology teachers in high schools throughout West Lombok Regency

Revision of Learning Tools

Based on suggestions for device revisions submitted by biology learning experts and high school biology teachers, it is necessary to revise the learning tools. The revision in question is at the learning stage that needs to be adjusted to the student's study time in abnormal conditions (the Covid-19 pandemic period). The suggestion for the next revision is that in learning activities it is necessary to emphasize the activities of teachers and students by using sentences that are easy to understand. The next suggestion at each learning stage should be to include a character strengthening column as the instructional impact of each learning process that students go through. This is considered very important, because the main purpose of implementing learning tools is to strengthen student character education.

The next suggestion is that the instrument for knowledge should refer to Basic Competence 3 levels of analysis, do not measure too much supporting science. There is no assessment instrument for skills, there should be because the three aspects of the goal should not be abandoned. To go online, use an online platform that has a minimum standard of Google Classroom, if WAG does not include standard online learning, including social media oriented.

The test of students' understanding of the values of character education should not be integrated with activities as written in the Learning Program Plan. It is possible that the test is carried out in the form of

giving a questionnaire that describes the students' disagreements with the characters when students carry out the learning process. For example, seeing the structure of the virus body that seems simple but is actually complex, made me realize how omnipotent God is as the creator of everything (strongly agree, agree disagree strongly disagree). So that in the learning process it will be seen the characters that can be raised by students according to the Learning Program Plan (religious). On the basis of suggestions and revisions from the validator and the results of the feasibility assessment of the biology teachers, improvements have been made to the learning tools.

Analysis of Test Results of Biology Learning Devices Oriented to Strengthening Character Education

To determine the effect of implementing character education-oriented learning tools on the mastery of biological concepts and understanding the values of character education for high school students in West Lombok, the t-test (Independent Samples Test) was used. Data analysis using SPSS 20 program. The results of data analysis are in Table 7.

Table 7. Results of the Analysis of Mastery of Biological Concepts t-test mastery of biological concepts

Code	N	Mean	Std. Deviation	Std. Error Mean
VAR	1.00	135	69.7852	20.42803
	2.00	135	65.6667	20.13759

Table 8. Results of Analysis of Mastery of Biological Concepts t-test of mastery of biological concepts

		Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
VAR	Equal variances assumed	0.086	0.769	1.668	268	0.096	4.11852	2.46881	-0.74221	8.97924
	Equal variances not assumed			1.668	267,945	0.096	4.11852	2.46881	-0.74221	8.97925

The results of the different test of mastery of concepts in the application of learning tools obtained the mean score of the experimental class 69.78; and the mean score of the control class is 65.66 with a mean difference of 2.66. The results of the different test with the t test showed that there was no significant difference between the two mean scores. The results of the different test of understanding the values of students' character education using the t-test obtained a mean experimental class score of 72.76; and the mean score of the control class is 70.10; means difference 2.66. Based on the t value, it was obtained that the mean

scores of the experimental class and the mean scores of the control class were not significantly different.

Results of Analysis of Understanding Character Education Values

Table 9. T-Test Understanding of Student Character Education Values

KODE	N	Mean	Std. Deviation	Std. Error Mean
VAR 1.00	135	72.7647	20.56399	1.76335
2.00	135	70.1029	22.49157	1.92864

Table 10. T-Test Understanding of Student Character Education Values

		Levene's Test for Equality of Variances		t-test for Equality of Means							
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference		
										Lower	Upper
VAR	Equal variances assumed	0.381	0.537	1.019	270	0.309	2.66176	2.61324	-2.48316	7.80669	
	Equal variances not assumed			1.019	267.861	0.309	2.66176	2.61324	-2.48334	7.80687	

The results of the different test of understanding the values of students' character education using the t-test obtained a mean score of the experimental class 72.76, and the mean score of the control class was 70.10, the mean difference was 2.66. Based on the t-value obtained, the mean scores of the experimental class and the mean scores of the control class are not significantly different. Based on the results of validation, assessment of the feasibility of learning tools, and the results of field trials on a large scale, it can be stated that character education-oriented biology learning tools are quite effective in being used as one of the innovative learning tools oriented towards strengthening students' character and mastering biological concepts in high school students.

Conclusion

Based on the results and discussion of the research that has been carried out, it can be concluded that the character education-oriented biology learning tool that has been developed in this study based on the assessment of biology learning experts and high school biology teachers is very valid and suitable for use in high school biology learning. The results of trials on a large scale cannot take place effectively due to the ongoing Covid 19 outbreak which causes learning activities to not be carried out optimally. This condition causes the results of the large-scale trial not to show its effectiveness, with the results of the different test of

mastery of the experimental class concepts obtained a mean score of 69.78, and the mean score of the control class is 65.67 with a mean difference of 2.66. The results of the different test with the t test showed that there was no significant difference between the two mean scores. The results of the different test of understanding the values of students' character education using the t-test obtained a mean score of the experimental class 72.76, and the mean score of the control class was 70.10, the mean difference was 2.66. Based on the t value, it was obtained that the mean scores of the experimental class and the mean scores of the control class were not significantly different.

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