RESEARCH ARTICLE

Developing of Canva-based learning media to increase student creativity and learning outcomes

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Abstract: The availability of teaching materials at school are still not enough to motivate students to learn because of lack interest, so integration of technology is needed stimulate their motivation. This research aims to develop teaching materials that can be used by teachers and students both within the school and outside the school by developing one of the Canva applications as a media for innovation in a fun learning process. The type of research used is research and development (R&D). The samples in this study were biology teachers and students of State Senior High School 1 of Long Ikis and State Senior High School 2 of Long Ikis. The data analysis technique used to measure the level of creative thinking ability through tests as well as the feasibility, practicality and effectiveness of learning media. The instruments used in this research have been tested for validity and reliability. The results of expert validation of the resulting teaching materials were very good with an average score from 3 validators of 91.15% in the (very valid) category. The teacher's assessment of the practicality of teaching materials showed a result of 91.66% (very practical), while the assessment from students received a score of 93.12% (very practical). The effectiveness of the resulting teaching materials is able to provide an increase in cognitive learning outcomes with a gain score index of 0.74 (high) and learning motivation of 0.75 (high). The results of the effectiveness test using the paired sample t-test show that there is an influence of using Canva media-based teaching materials in improving the biology learning outcomes of students at State Senior High School 1 and 2 of Long Ikis on plant tissue material.

Keywords: Biology teaching module; Kurikulum Merdeka; problem-based learning; problem-solving

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Introduction

The massive development of technology has shifting almost all life activities to become easier (Margerison & Ravenscroft, 2020; Sharma & Singhal, 2019). It shows that the technology is currently developing and continuing to innovate in line with various aspects of human life (Capece & Campisi, 2013; Pitt et al., 2019). Aspi and Syahrani (2022); Septikasari and Frasandy (2018) stated that technology plays a very important role in everyday life. The very rapid development in the current era of globalization cannot be separated from the influence of the world of education (Caño De Las Heras et al., 2021; Yllana-Prieto et al., 2021). Current global demands require the world of education to always adapt to technological developments in order to improve the quality of education (Amra, 2016; Nugroho et al., 2019). In the future, improving educational performance requires information systems and information technology that not only function as supporting facilities, but as the main devices to support the success of the world of education so that it is able to compete in the global world (Budiman, 2017).

Improving the quality of education will not be separated from the quality of the learning process (Ouyang et al., 2022; Rajendra & Sudana, 2018). The biggest reason is that only with a quality learning process will it produce achievements that are in line with the goals that have been formulated previously (Abdulrahaman et al., 2020; Booton et al., 2023). Efforts to improve the quality and quality of learning can be done by innovating in learning such as updating the curriculum, providing teaching materials, developing learning methods, procuring laboratory equipment, developing learning media and

improving teacher quality (Monoarfa & Haling, 2021; Nurhadi, 2018; Rohayati et al., 2023; Sulastri et al., 2020). Innovation in learning media is one way to attract attention and increase student motivation in the learning process at school (Smith et al., 2022).

Increasing learning innovation is manifested through a series of preparations that are inherently the responsibility of an educator (Magaji, 2021; Shernoff et al., 2017). Educators must be able to present material and relate the concept to students' daily lives so that it is easier for them to understand the concept (Mutakinati et al., 2018; Sasmita et al., 2021). It requires learning resources organizing into a comprehensive teaching material. Moreover, the educators do not depend on textbooks or existing teaching materials (Hamid et al., 2019; Holyoak & Morrison, 2012; Kristanti et al., 2018; Rofieq et al., 2021). The development of teaching materials independently by teachers is also based on efforts to meet the different learning needs of students (Irwan et al., 2019; Nisa et al., 2022). It can facilitate students to be more comprehensive in understanding and even in implementing the concepts obtained in their daily lives (Cetin-Dindar & Geban, 2017).

The preparation of teaching materials will be more interesting if it is collaborated with the use of technology (Droessiger & Vdovinskiene, 2020; Suprianti, 2020). The use of technology is very necessary for delivering material, especially using visualization (Yakob et al., 2023). One type of media that can be used is Canva (Monoarfa & Haling, 2021; Wulandari & Mudinillah, 2022). Canva is an online design application that provides various tools such as presentations, resumes, posters, pamphlets, brochures, graphics, infographics and so on provided in the Canva application (Adrian et al., 2022; Analicia & Yogica, 2021; Masitoh, 2023). The advantages of the Canva application include having a variety of very attractive designs; so that it can stimulate the creativity of teachers and students. In addition, the use of Canva is also more practical, both in terms of design choices and easy access. This application can not only be accessed using a laptop but also using a gadget (Criollo-C & Luján-Mora, 2019).

Research using the Canva application is generally widely used in the development of teaching materials, especially used in schools with more advanced characteristics in terms of technological access. While its use in schools with limited access to technology is still not widely used. In this study, the Canva application is used in the innovation of teaching materials to be developed in schools that are relatively far from technology. With the innovation of learning using the Canva application, students' interest in learning will increase because they will get something new that they will learn and can develop the quality of students. From the background above, the researcher is interested in conducting research on efforts to increase creativity and learning outcomes of students at senior high school by developing and using learning media based on the Canva application in plant tissue biology.

Method

The R&D research steps are based on the Borg and Gall development procedures as seen in the Figure 1 (Gall et al., 2003). The development research design is produces certain products by testing the effectiveness of the product. The results of the research produced a product that was tested in the field by applying it to Biology learning with plant tissue material in class XI of State Senior High School (SSHS) 1 of Long Ikis and State Senior High School (SSHS) 2 of Long Ikis, Penajam Paser Utara Regency, East Borneo Province, Indonesia.

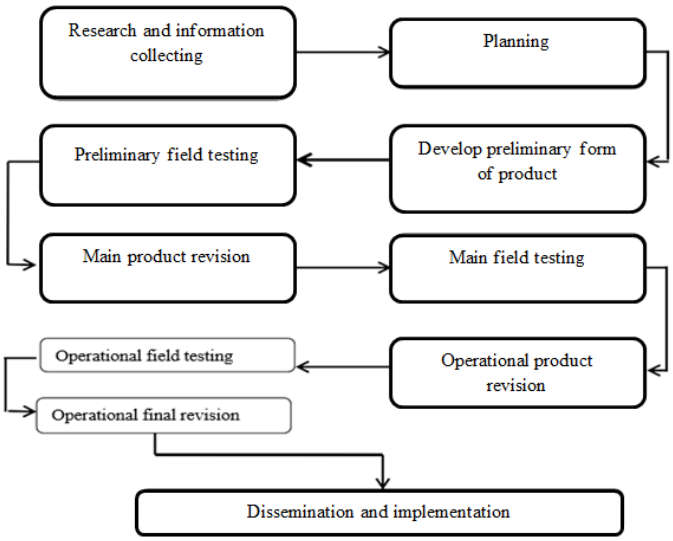

Figure 1. Research and development (R&D) steps

The data analysis technique used to measure the level of creative thinking ability through tests as well as the feasibility, practicality and effectiveness of learning media. The criteria of creative thinking skills refer to Table 1 was assess through the Formula 1.

$$\text{Creative} = \frac{\text{Total score obtained}}{\text{Maximum total score}} \times 100 \quad (1)$$

Table 1. Range and criteria for creative thinking ability

Range (%)	Criteria
80.01 – 100.00	Very Creative
70.01 – 80.00	Creative
60.01 – 70.00	Quite Creative
50.01 – 60.00	Less Creative
< 50	Not Creative

Feasibility analysis by the expert team was obtained from a validation questionnaire by the experts (Table 2). There are three experts i.e. learning media, material and learning equipment experts. All the experts assess the product using an assessment scale and consisting of five scales with a score range of 1-5 for each criterion obtained from Formula 2.

$$P = \frac{F}{N} \times 100\% \quad (2)$$

Description:
P = Percentage
F = Number of respondents' answers
N = Highest scores

Table 2. Range and qualitative criteria for feasibility test

Range (%)	Qualification	Criteria
80.01 - 100.00	Very decent	No revision
70.01 - 80.00	Decent	No revision
60.01 - 70.00	Decent enough	Revision
50.01 - 60.00	Less decent	Revision
<.50	Not feasible	Revision

The practicality of learning media is obtained from teacher review and student response questionnaires (Table 3) which consist of four scales, along with the scores used. Moreover, the calculation of questionnaire scores uses the Formula 3.

Table 3. Student response questionnaire score

Likert Scale	Score	
	Positive Statements	Negative Statements
SS (Strongly Agree)	5	1
S (Agree)	4	2
KS (Quite Agree)	3	3
TS (Disagree)	2	4
STS (Strongly Disagree)	1	5

$$P = \frac{F}{N} \times 100\% \quad (3)$$

Description:
P = Score percentage
F = Total score obtained
N = Maximum total score

Table 4. Percentage range and qualitative criteria for practical tests

Range (%)	Criteria
80.01 – 100.00	Very practical
70.01 - 80.00	Practical
60.01 - 70.00	Quite practical
50.01 - 60.00	Less practical
< 50	Not practical

The results of the questionnaire calculations are then classified according to the Table 4. An analysis of the effectiveness of learning media was developed using data obtained from the pretest and posttest scores by comparing the two scores by measuring students' creative thinking abilities in conceptual understanding using the Formula 4.

$$< g > = \frac{Spost - Spre}{Smaks - Spre} \quad (4)$$

The symbol <g> is the gain score value obtained by looking at the vulnerable categories in the Table 5.

Table 5. Gain category

Gain Score	Interpretation
0.00 < g < 0.30	Low
0.30 < g < 0.70	Medium
0.70 ≤ g ≤ 1.00	High

Results and Discussion

The results of the development in this research are in the form of Canva-based teaching materials using a R&D design. The researcher tried to create an electronic learning media design using the Canva application in the Biology subject plant tissues in class judging from the general condition of the two high schools with excellent category. This teaching material will be applied using the problem-based learning model which is a combination of face-to-face and online methods (Alrajeh, 2021; Serevina et al., 2018). So, it can be concluded that media-based learning using Canva can be done at school or independently outside school. The following are the results of the final product display of Canva teaching materials on the subject of plant tissues for class XI SSHS.

Figure 2. a) Initial display of Canva-based teaching materials; b) menu display on Canva-based teaching materials

From the validation results from several experts, the appropriateness value for the quality of learning teaching materials for each media expert team was obtained, namely 90.00% by material experts, 85.00% by learning tools experts, and 85.00%. The total score for the feasibility of learning media from the entire expert team is 90.00% with the category very feasible. Details of the qualitative scores for each component of teaching material assessment can be seen in the Table 6.

Table 6. Details of qualitative scores for each component of teaching material assessment

Assessment Components	Percentage (%)	Criteria
Content	92.64	Very Decent
Quality of teaching materials (applications)	92.85	Very Decent
Integration of program packages	75.00	Decent
Presentation	100	Very Decent
Usefulness	100	Very Decent

The results of validation by a team of experts are used to assess the feasibility and quality of the learning media being developed. The validation results by a team of experts are the main determinant of assessing the suitability of this media. One of the requirements for determining the quality of the learning media used is that it has gone through several processes such as; validation from experts, validation data and responses from students and teachers in the form of quantitative data, then converted into qualitative data. Practicality is a very important point in developing learning media, especially plant tissue material. Practicality is an important assessment in the development process. Teaching materials can be said to be practical if the media can be used anywhere, and at any time without time or situation limits. Furthermore, these teaching materials are very easy for teachers and students to use in the learning process at school.

Learning teaching materials are said to be practical if the results of the teacher response questionnaire and student responses in the practicality test show good criteria and the results of the media practicality test can be used by teachers and students at school (Nabila et al., 2021). Apart from that, a media can be said to be practical if it can be applied and used easily by students during the learning process (Andrizal & Arif, 2017; Dwiranata et al., 2019; Zega et al., 2022). Practicality is measured from the assessment of two response questionnaires, namely the teacher response questionnaire and the student response questionnaire. The teacher response questionnaire consists of ten statements, comments and suggestions as responses, as well as conclusions. Meanwhile, the student response questionnaire consists of 15 statement items and three questions as student responses. The teacher response questionnaire was filled in by two biology teachers in science and mathematics (MIPA) class while the response questionnaire was filled in by 36 students. Details of the assessment results of each expert team and the practicality of aspects of teaching materials per component can be seen in the Table 7.

Table 7. Percentage of teacher responses to learning teaching materials

Schools	Test and Implement	Number of answers	Number of Items	Teacher Responses (%)
SSHS 1	Small Class Trial	46	12	95.83
	Large Class Trial	44	12	91.67
SSHS 2	Application	48	12	100.00
	Application	48	12	100.00

Based on the data in Table 7, it shows that the percentage of teacher responses to the feasibility test of Canva media-based teaching materials had a positive impact and was well received. This can be seen from the percentage of small or large class tests in the SSHS 1 and its application in the SSHS 2. The results of the practicality test on student responses can be seen in the Table 8.

Table 8. Results of practicality assessment

No	Development Stage	Student Response (%)	Student Responses for Each Item (%)							
			1	2	3	4	5	6	7	8
1	Small Class Trial SSHS 1	79.5	72.5	81.2	83.7	73.7	81.2	80.0	83.7	80.0
2	Large Class Trial SSHS 2	92.0	90.0	91.2	93.7	86.2	98.7	93.7	90.0	92.5
Total Score		**87.0**	**93.7**	**82.5**	**88.7**	**92.5**	**85.0**	**88.7**	**85.0**	**80.0**

From the results of student responses at the implementation stage, it can be concluded that the final product that has been developed is very practical and has very good quality, namely 87.0%. The following is a distribution diagram of the frequency of student assessments for aspects of material, presentation and usefulness.

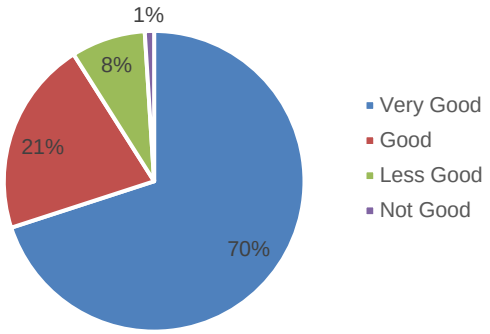

Figure 3. Student responses to material aspects

From the Figure 3, it can be seen that students gave a good assessment of the material in the resulting teaching material media, so it can be concluded that Canva-based teaching materials can attract students' interest in fostering curiosity about the plant tissue material. For the presentation aspect, the percentage distribution of student response frequencies in the presentation aspect can be seen in the Figure 4.

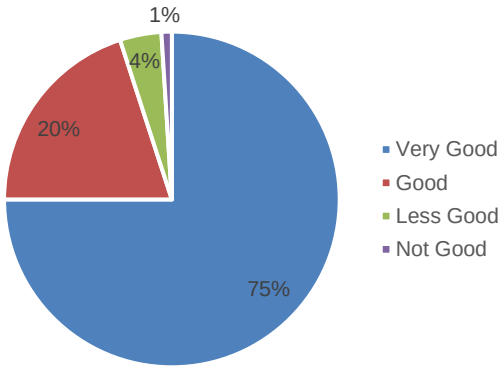

Figure 4. Student responses to presentation aspects

From the image above it can be concluded that the Canva teaching materials developed are able to meet the presentation aspect indicators, namely; The features presented can meet students' learning needs both in text form and in audio-visual form. The frequency distribution of student responses for the usefulness aspect can be seen in Figure 5.

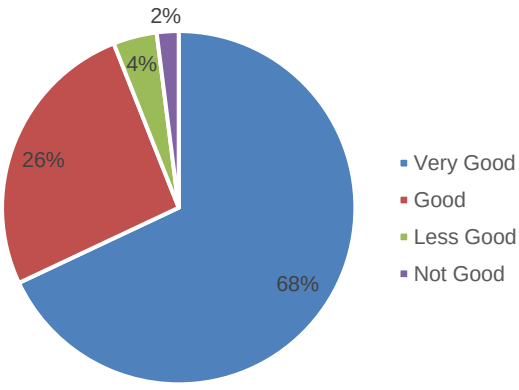

Figure 5. Student responses to benefit aspects

From the Figure 5, it can be concluded that the benefits of Canva media-based teaching materials can be used as a source of independent learning outside the school environment. Practicality tests for students were carried out in science classes. The average percentage of practicality tests for students can be seen in the Table 9.

Table 9. Results of student practicality tests

No	Class	Percentage (%)
1	SSHS 1	70.20
2	SSHS 2	94.80
	Average	82.50
	Category	Very Practical

The effectiveness test of Canva-based learning media was carried out to determine its effect on improving student learning outcomes by conducting a t-test on the pre-test and post-test results using the N-Gain test percentage results in the Table 10.

Table 10. N-Gain test results of large-scale trials

Class	N-Gain Test Results		Category
	SSHS 1 (%)	SSHS 2 (%)	
Experiment	79	83	High
Control	64	68	Medium

Data from students' N-Gain test results before carrying out the t-test requires prerequisite tests in the form of data homogeneity and normality tests. To measure the influence of Canva-based teaching materials on improving student learning outcomes, it can be shown by the results of the t-test (Table 11 and Table 12), namely the results of calculations using the SPSS application. Canva-based learning media has an influence on the effectiveness of learning in the experimental class as evidenced by the high N-Gain test scores (Table 13).

Table 11. Paired sample t-test results for Canva-based teaching materials

			t	df	Sig.(2-tailed)
Pair 1	pretest experiment-posttest experiment	SSHS 1	-33.895	35	.000
Pair 1	pretest experiment-posttest experiment	SSHS 2	-50.733	35	.000

Table 12. Independent sample t-test results for Canva-based teaching materials

			Levene's test for Equality of Variances		t-test for Equality of Means		
			F	Sig.	t	df	Sig. (2-tailed)
Cognitive	Equal variances assumed	SSHS 1	0.889	0.351	-2.407	40.00	0.021
	Equal variances not assumed				-2.407	39.16	0.021
Cognitive	Equal variances assumed	SSHS 2	9.793	0.003	4.337	70	0.000
	Equal variances not assumed				4.337	57.30	0.000

Table 13. N-gain test results for creative media thinking

Indicators	Small Scale Trial (%)	Category	1st Large Scale Trial (%)	Category	2nd Large Scale Trial (%)	Category
Fluency	48	Medium	60 %	Medium	72 %	High
Flexibility	33	Medium	54 %	Medium	71 %	High
Elaboration	39	Medium	45 %	Medium	39 %	Medium
Originality	35	Medium	34 %	Medium	36 %	Medium
Overall	38	Medium	48 %	Medium	55 %	Medium

The Canva application as a learning media innovation in the classroom or outside the classroom as a technology to support the development of learning media has been widely proven and has an influence

on the results of previous research and is certainly in line with expectations (Maryunani, 2021; Umilatifah & Faridi, 2024). Mahardika et al (2021) stated that the response from students and teachers in training in creating learning media using Canva for all evaluation components gave very good and positive responses. Based on the results of training in creating interesting learning media using Canva to optimize online learning for teachers at SSHS 8 of Banjarmasin, it can be concluded that this training can increase teachers' understanding and ability in developing online learning media using Canva with active involvement in listening to the presentation team's explanations (Umilatifah & Faridi, 2024), reading the material (Wulandari & Mudinillah, 2022), asking questions (Masitoh, 2023), expressing opinions (Mahardika et al., 2021), participating in creating online learning media during the activity (Monoarfa & Haling, 2021). Apart from that, Wulandari and Mudinillah (2022) stated that Canva is an application that can be developed in the process of creating science learning media which really needs media to introduce information from the content of abstract learning material. The Canva application provides various interesting features that can make it easier for teachers to create learning media, one of which is the availability of various templates that can be used in the process of designing learning media, one of which is science subjects (Monoarfa & Haling, 2021; Wulandari & Mudinillah, 2022).

By using the Canva application, teachers can teach knowledge, creativity and skills to students, so that this media can also be used in various domains of life (Maryunani, 2021; Pentury et al., 2020). Another research conducted by Purba and Harahap (2022) at junior high school shows that 87.5% of students were able to use the Canva application. However, the level of usefulness were 36 students (90%) stating that learning using the Canva application was very useful. This shows that learning by utilizing media in the form of the Canva application is very useful and there is an increase in abilities. Considering that 21st century learning must be integrated with technology, Canva-based learning media is expected to be one of the choices for teachers to create teaching materials that utilize technology and attract students' interest in learning.

Conclusion

Based on the description and discussion, it can be concluded that teaching materials were produced using Canva-based learning media on plant tissue material using the Research and Development (R&D) development model. The validity of the resulting teaching materials is very good with an average score from three validators of 91.15% in the category (very valid). The teacher's assessment of the practicality of teaching materials showed a result of 91.66% (very practical), while the assessment from students received a score of 93.12% (very practical). The effectiveness of the resulting teaching materials is able to provide an increase in cognitive learning outcomes with a gain score index of 0.74 (high) and learning motivation of 0.75 (high). So that this teaching material can be applied and used as a reference by teachers as a medium that supports the learning process at school, especially regarding plant tissue material.

Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

Author Contributions

P. Gurning: prepared the research flow, carried out research and processed data; **E. T. Maasawet** and **Y. Hudiyono:** provided suggestions in the data process; **L. Subagiyo, H. Herliani,** and **A. Akhmad** reviewing article

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