VALIDITY OF INFOGRAPHIC LEARNING MEDIA THEME OF GREEN GROWTH IN TRAINING CRITICAL THINKING SKILLS

Elfira Mawardani [1], Mudmainah Vitasari [2], dan Liska Berlian[3]

[1,2,3] **Program Studi Pendidikan IPA, Fakultas Keguruan dan Ilmu Pendidikan, Universitas Sultan Ageng Tirtayasa, Jl. Ciwaru Raya No.25, Cipare, Serang 42117, Banten, Indonesia**
26elfiramwrdn@gmail.com

ABSTRACT

Infographic learning media is one of the intermediaries in the learning process made with graphic design, namely canvas. This media infographic is used to give Canva learning materials to students to achieve a learning goal. This study aims to develop learning media infographics and determine the level of validity. The media used is research and development or Research and Development adapted from the Borg and Gall development model, consisting of three stages, namely Research and Information Collecting, Planning, and Preliminary Form of Product. The research instruments used in this study were interview sheets and validation sheets. This study indicates that the level of validity of the infographic learning media on the theme of the green growth in training critical thinking skills of seventh-grade students obtained an average value of 78.94% with a valid category so that infographic learning media can be used in the learning process.

Keywords: *Infographic Learning Media; Critical Thinking Skills; Green growth theme.*

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[1] Corresponding Author

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Introduction

The 2013 curriculum is a curriculum unit reference for learning in Indonesia today. The 2013 curriculum is designed and implemented to meet the competency needs of the 21st century. The basic competencies that students must master in the 21st century are attitudes, knowledge, and skills. The National Education Association (NEA) identifies four skills: critical thinking, collaboration, creativity, and communication.

One of the skills that can help students analyze and evaluate information and draw valid conclusions is critical thinking skills. According to Puspita et al. (2020), critical thinking is critical because automatically, someone will be able to solve a problem, both complex and straightforward. Solving a problem requires a process. Through the learning process, students must continue to be trained to develop their critical thinking skills.

Natural Sciences (IPA) is a subject that can train and improve students' critical thinking skills. The science learning process refers to students' scientific process because understanding science requires observation, problem formulation, hypothesis formulation, hypothesis testing, conclusions, and the discovery of concepts and theories (Jumadi et al., 2018). The green growth theme is a theme in science learning materials that uses a connected integration model that integrates several fields of science studies. This theme emphasizes how green plants can grow and develop. This theme is used because green plants are one of the living things that are very close to human life. However, some students still do not understand the theme of green growth because its nature is still very abstract and cannot be observed directly, making it difficult for students to understand it. This theme covers the material in the 2013 revised 2017 curriculum of the Junior High School syllabus. The Basic Competencies (BC) used are BC 3.5 on Energy in science learning materials for class VII, BC 3.9 on soil and life in science learning materials for class IX, and BC 3.1 on measurement in class VII.

According to Trends in International Mathematics and Science Study (TIMSS), students in Indonesia are ranked 40 out of 45 countries in science proficiency and only reached 406 of the highest average globally. It can be said that the scientific ability of students in Indonesia is still low and has not met expectations. This follows the problems in several junior high schools in Serang City. Low critical thinking skills make teachers need more effort to train their students in critical thinking. Usually, the teacher gives an initial problem and practice questions after delivering the learning material. It is done so that the teacher knows whether the students understand the learning material that has been delivered or not and can analyze, conclude, and express their opinions from the questions given by the teacher. Students understand the learning material delivered by the teacher, but only a few students can analyze and answer questions from the teacher. Rachmedita et al. (2017) stated that low critical thinking skills are not only caused by internal and external factors but also by the active role of students in learning activities.

The use of several learning media such as charts, worksheets, laboratory tools, learning videos, and PowerPoint have also been used to support the learning process. The teachers also think that students are indeed more motivated if learning media support the learning process, but this has not been able to lead students to develop critical thinking skills. The teachers also admitted that they had never tried other learning media because they had limited time and money to make appropriate learning media to help learning activities.

This problem can be overcome if the teacher chooses and uses effective and practical learning media to support the learning process. Using learning media can improve the learning process and learning outcomes. In addition, teaching aids and learning media in schools have also begun to adapt following the times. What must be observed is that teaching aids and learning media must be aligned with the provisions of the curriculum, materials, procedures, and the level of students' ability to achieve learning objectives.

One of the learning media that can support learning activities is infographics. Infographic learning media is one of the visual learning media currently being developed. An infographic is an image containing information and packaged data to make it easier for readers to understand (Pang et al., 2018). Infographics can attract students' interest because they can display complex information into more superficial information to be easily understood by students quickly and clearly. It can be seen that infographic learning media is a visual learning media. That is used to convey complex information into more uncomplicated information that contains data and designs and visual elements so that it is easier for readers to understand in achieving learning objectives.

Davidson (2014) says that infographic media can make it easier for students to identify, analyze, and conclude a problem and present problem-

solving results. Leggette (2020) also said that infographic media could build students' understanding of the information they get through critical thinking activities. Dyjur & Li (2015) also said that infographic media could improve the ability to analyze visual information critically.

Based on these problems, the formulation of the problem in this study is 1) How to develop infographic learning media with the Green Growth theme in training the critical thinking skills of class VII students? Moreover, 2) How is the level of validity of the infographic learning media for the Green Growth Theme in training the critical thinking skills of grade VII students.

Research Methods

This research uses research and development methods or R&D (Research and Development), which refers to the research design of Borg and Gall (1983). This research design is used because it can address real and urgent needs, produce products with high validation values, and be a liaison between theoretical research and those in the field.

This research was conducted in the odd semester of the 2021/2022 academic year. The research stages in this study only consisted of three stages: research and information gathering, planning, and developing the initial product format since field conditions have not made it possible to conduct small-scale or large-scale trials due to the Covid-19 pandemic.

Research and Information Gathering Stage

The research and information gathering phase was conducted by interviewing science teachers in three schools and conducting a literature study. Interviews were conducted to find out the initial problems and the needs analysis and curriculum analysis (see table 1) in three schools in Serang City. In contrast, the literature study was conducted to find initial information, research findings, and other information related to the planned product development.

Table 1. Curriculum Analysis

| Core Competencies	Basic competencies	Indicator
1. Knowledge (factual, conceptual, and procedural) is based on his curiosity about science, technology, art, and culture related to visible phenomena and events.	3.5 Analyzing the concept of energy, various energy sources, and changes in the form of energy in daily life, including photosynthesis.	3.5.1 Explain the meaning of photosynthesis. 3.5.2 Determine the place where photosynthesis occurs. 3.5.3 Analyzing the process of photosynthesis.
	3.9 Connecting the physical and chemical properties of soil, organisms that live in the soil, and the importance of soil for the sustainability of life.	3.9.1 Explain the role of land. 3.9.2 Relate the role of organisms in the soil with the process of photosynthesis.
	3.1 Applying the concept of measuring various quantities using standard (standard) units.	3.1.1 Explaining the meaning of measurement. 3.1.2 Applying the concept of measurement to green plants.

Planning Stage

The planning stage includes three activities: determining product outlines, product design, and making expert validation instruments. In making a product outline and product design (see Figure 1), a rough sketch of the product design will be made to remind the layout of the illustrations and text to be presented. In addition, at this stage, selecting a graphic design platform for making infographic media is also carried out, and collecting materials such as illustrations or images related to the theme of the green growth. The expert validation sheet was adapted from the National Education Standards Agency, which was used to validate the product.

Initial Product Format Development Stage

At this stage, there are three activities, namely product creation, product validation, and product revision. The product made is in the form of infographic learning media. This infographic learning media was created using the Canva application. The size used for infographic learning media is A3 size. The type of font used in the content of the infographic learning media material is open sans with a font size of 10 pt and a space of 1.4. Validation was assessed by a material expert lecturer, a media expert lecturer, and three science teachers using an expert validation questionnaire sheet. The results of the expert validation will later be used as improvements for product revisions that have been developed.

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Figure 1. Initial product design
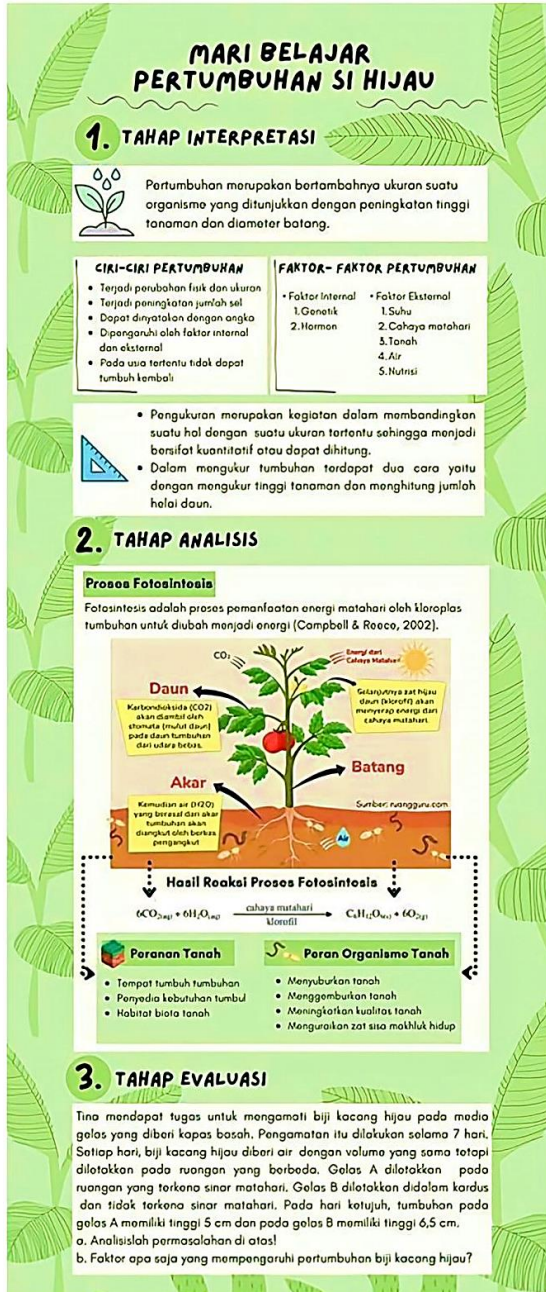
Analysis of research data used is descriptive statistical analysis and descriptive qualitative analysis. Descriptive statistical analysis is used to process data based on expert judgment. In contrast, qualitative descriptive analysis is used to sort out qualitative information such as suggestions for improvement from experts for product improvement. The assessment in this study uses a Likert scale with four alternative answers (see table 2).

Table 2. Rating Scale

Category	Score
Very Good	4
Good	3
Low	2
Very Low	1

(Sugiyono, 2017)

Furthermore, the acquisition of a questionnaire score or expert validation sheet will be calculated and processed using the following formula:

$$NP = \frac{R}{SM} \times 100\%$$

(Purwanto, 2013)

Information:
NP   : Expected percent value
R   : Value obtained
SM   : Maximum value
100% : Fixed number

Determining the validity of the number of scores calculated can be determined by looking at the classification of the assessment in table 3.

Table 3. Classification of Aspects of Validity Assessment

Category	Score
Very Valid	85% - 100%
Valid	70% - 85%
Not Valid	50% - 70%
Invalid	10% - 50%

(Purwanto, 2013)

Result and Discussion

This research was conducted to produce infographic learning media with the theme of green growth in training the critical thinking skills of grade VII students. This research was developed according to the stages of Borg and Gall (1983). This stage consists of 10 stages: research and information gathering, planning, initial product format development, initial field trials, revision of test results, main product field tests, product revisions, large-scale field trials, final product revisions, dissemination, and implementation. However, this study only used three stages: research and information gathering, planning, and developing the initial product format.

The research and information gathering stage aims to find out what is needed in research on learning media development. In this stage, curriculum analysis and needs analysis were carried out through interviews and literature studies to find initial information, research findings, and information related to infographic learning media. The planning stage is the second stage of this

research. This stage consists of three activities: determining product outline and product design (storyboard) and making expert validation instruments.

The initial product format development stage includes three activities, namely product creation, product validation, and product revision. The product made is in the form of infographic learning media. After creating the infographic learning media is complete, product validation is then carried out. Product validation was carried out by material expert lecturers and media expert lecturers at FKIP UNTIRTA and three science teachers at Serang City Junior High School. The validation results will later be used for product improvement. The results of the average validity level assessment by a team of experts are shown in Figure 2.
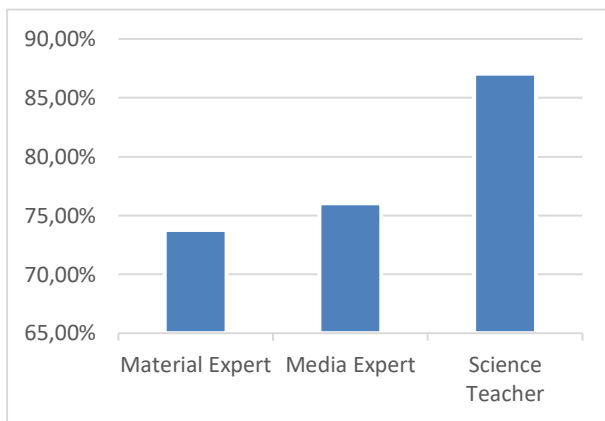

Figure 2. The Average Results of the Validity Level Assessment by the Expert Team

Based on Figure 2, it can be seen that the developed infographic learning media received a positive response from the expert team. The results of the average validity level assessment carried out by material experts get an average result of 73.75%, with the validity criteria being valid. The assessment results of media experts get an average result of 76.04%, with the validity criteria being valid. In comparison, the results of the science teacher expert assessments get a score of 87.05%, with the validity criteria being valid. Based on these results, it can be stated that the developed infographic learning media can convey material and other aspects quite well, can support learning activities in the classroom, and can train students' critical thinking skills. The media developed aligns with Sari et al. (2018), which state that interesting infographics can increase students' interest in participating in learning activities and develop students' self-competence.

Material Expert Validation

Material validation is an activity to assess products carried out by material experts related to learning materials contained in learning media. The assessment refers to the aspects and indicators contained in the material expert validation sheet grid. The validator in this assessment is a lecturer at the Faculty of Teacher Training and Education, University of Sultan Ageng Tirtayasa, who has a master's degree qualification and has studied and mastered the material in the natural sciences. This validation is carried out with two assessments because several things need to be improved. The results of the assessment of the level of validity carried out by material experts are in Figure 3.
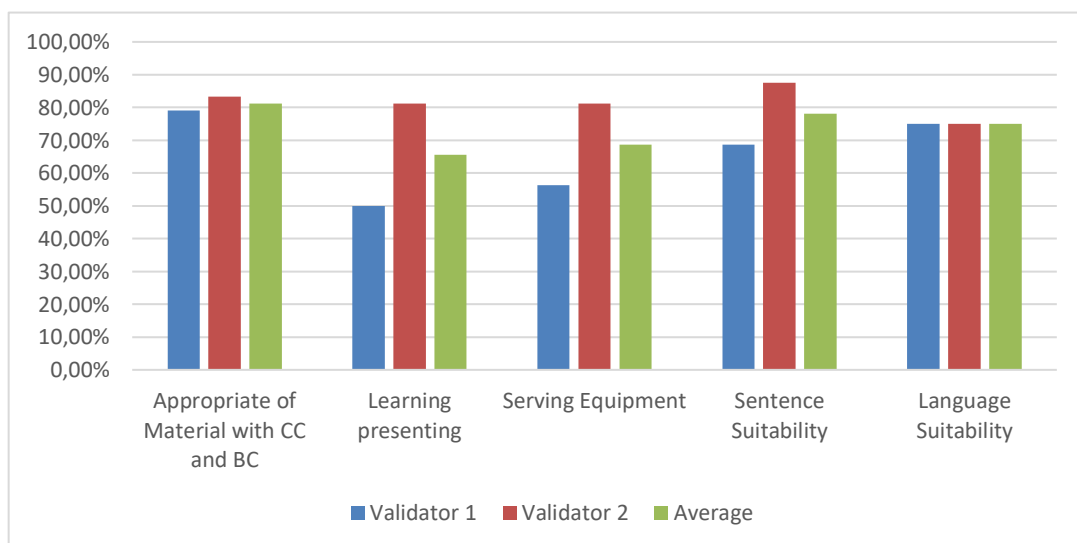

Figure 3. Results of the Validity Level Assessment by Material Experts

Based on the results of the assessment of the level of validity by material experts in Figure 3, several indicators are contained in the assessment aspect. The aspects of the assessment are aspects of the suitability of the content/material, aspects of presentation, and aspects of language. Aspects of

content/material conformity contain indicators of conformity assessment of content/material with KI and KD. The average value is 81.25%, with the validity criteria valid in this aspect. According to Wulandari et al. (2020), compiling the concept of material by adjusting the KI and KD used is very important because it can make students master the expected competencies.

The presentation aspect contains indicators of learning presentation and completeness of presentation. The learning presentation indicator obtained an average result of 65.63%, with the validity criterion being less valid. The presentation of the learning delivered has not been able to stimulate students in critical thinking, especially at the interpretation stage. Therefore, initial problems are made to stimulate students in critical thinking. Solikhin (2021) states that interpretation is a skill in understanding and expressing the meaning of a problem. Astuti et al. (2020) stated that it could be done by giving problem-solving questions to train students' interpretation skills.

The indicator of completeness of presentation obtained an average of 68.75%, with the criterion of validity being less valid. It is necessary to add explanations, illustrations, and icons or symbols.

Soedarso (2014) states that illustrations need to be adapted to the subject discussed so that students can more easily understand the material and not make mistakes.

The language aspect contains indicators of sentence suitability and language suitability. The sentence suitability indicator obtained an average of 78.1%, with the validity criterion being valid. The indicator of language suitability obtained an average of 75%, with the criterion of validity being valid. According to Darmayanti et al. (2016), good language and following the context can make it easier to convey learning material.

Media Expert Validation

Media validation is an activity to assess products carried out by media experts related to the developed learning media. This assessment refers to the aspects and indicators in the media expert validation sheets grid. The validator in this study was a lecturer at the Faculty of Teacher Training and Education, Sultan Ageng Tirtayasa University, who has competence in the multimedia field. The results of the assessment of the level of validity carried out by media experts are in Figure 4.
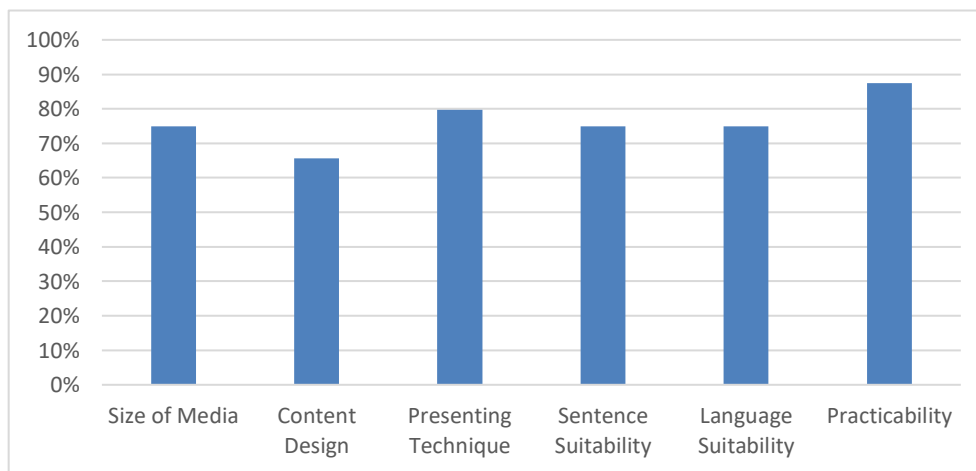

Figure 4. Results of Validity Level Assessment by Media Experts

Based on the results of the assessment of the level of validity carried out by media experts in Figure 4 regarding the infographic learning media developed, several indicators are contained in the assessment aspect. The aspects of the assessment are the visual aspect, the presentation aspect, the language aspect, and the implementation aspect. The visual aspect contains indicators of media size and content design. In the presentation aspect, it contains indicators of presentation techniques. The language aspect contains sentence suitability and language suitability indicators, while the implementation aspect contains indicators of effectiveness and practicality.

The visual aspect contains indicators of media size and content design. The media size indicator obtained 75% results with the validity criteria valid. On the content design indicator, the result is 65.53%, with the validity criteria being less valid. The proportions of the text, font size, and spacing are not appropriate. Ramadhani & Mahardika (2015) stated that the size of the letters and the spacing of each word need to be adjusted so as not to interfere with the reading process.

The presentation aspect contains indicators of presentation techniques. This presentation technique indicator produces a value of 79.17%,

with the validity criteria valid. Based on these results, it can be seen that the presentation presented in the infographic learning media follows the green growth theme material.

The language aspect contains indicators of sentence suitability and language suitability. In the sentence suitability indicator, the score is 75%, with the validity criteria being valid. Likewise, the indicator of language suitability that gets a value of 75% with the criterion of validity is valid. Then it can be seen that the sentence suitability indicator and the language suitability indicator have met the KBBI and PUEBI rules so that students easily understand them.

The implementation aspect contains indicators of effectiveness and practicality. The effectiveness indicator gets a value of 75% with the validity criteria being valid, while the practicality indicator gets a value of 87.5% with the validity criteria being very valid. The infographic learning media developed is practical to use and effectively makes students understand the theme of green growth and trains students to think critically.

Validation of Science Teacher

The validation of science teacher experts is an activity to assess products carried out by science teachers related to learning materials and media developed. The assessment refers to the aspects and indicators contained in the science teacher expert validation sheets grid. The aspects of the assessment are aspects of the suitability of the content/material, aspects of presentation, aspects of language, and aspects of implementation. The conformity of content/material contains indicators of conformity of content/material with CC and BC and composition of content/material. The presentation aspect contains indicators of the size and completeness of the presentation. The language aspect contains sentence suitability and language suitability indicators, while the implementation aspect contains indicators of effectiveness and practicality. The validators in this study were three science subject teachers in class VII at Serang City Junior High School. The results of the average validity level assessment carried out by science teachers are shown in Figure 5.
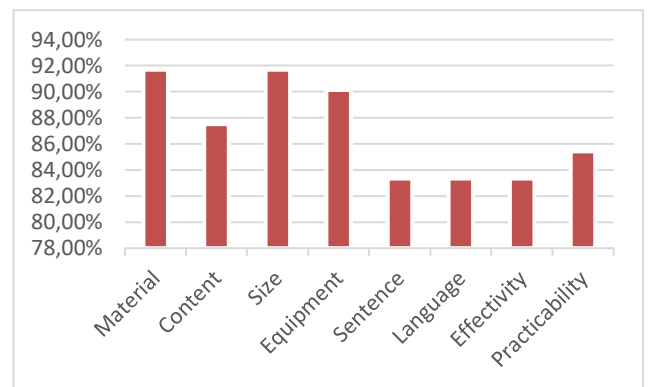

Figure 5. Results of the Average Validity Level Assessment by Science Teachers

The aspect of content/material contains indicators of conformity of content/material conformity with CC and BC and composition of content/material. The indicator of conformity of content/material with CC and BC obtained an average of 91.67% with very valid criteria. In the indicator of the composition of the content/materials, an average of 87.5% is obtained with very valid criteria. The presentation aspect contains indicators of the size and completeness of the presentation. The size indicator obtained an average of 91.67%, with the validity criterion being very valid. The indicator of completeness of presentation obtained an average of 90.15%, with the criterion of validity being very valid.

The language aspect contains indicators of sentence suitability and language suitability. The sentence suitability indicator obtained 83.33% results, with the validity criteria valid. The language suitability indicator obtained 83.33% results with the validity criteria valid. Daryanto (2013) revealed that the grammar used must be simple and straightforward so that students can understand the information or material presented more quickly.

The implementation aspect contains indicators of effectiveness and practicality. The effectiveness indicator obtained 83.33% results with the validity criteria being valid. Mufti (2016) stated that infographics are the most effective form of delivering learning materials in today's digital era. The result is 85.41% on the practicality indicator, with the validity criteria being very valid; this means that infographic learning media is easy to share and can be used repeatedly.

Based on the validity value obtained, it shows that infographic learning media on the theme of the growth of the green in training the critical thinking skills of grade VII students can be a support for learning activities, make it easier for teachers to deliver learning materials, especially on the theme of green growth, and be able to summarize learning materials by integrating competencies. The basis

has been selected to produce a theme that can be learned following indicators of learning achievement and everyday life. In addition, the developed infographic learning media is also supported by the presentation of illustrations, symbols, icons, learning materials, and indicators of critical thinking skills. Indicators of critical thinking skills used are interpretation, analysis, and evaluation. Through these three indicators, students can practice their ability to understand, identify, and draw conclusions from a problem that has been studied.

Conclusion

After carrying out a series of research activities above and then getting the results and data, the conclusion is that the development of infographic learning media on the theme of the green growth in training the critical thinking skills of grade VII students is carried out based on the Borg and Gall development model which includes ten stages. However, only three stages were carried out in this development research, namely research and information gathering, planning, and developing the initial product format. The validity of the infographic learning media on the theme of the green growth in training the critical thinking skills of class VII students is 78.94%, with the validity criteria valid. These results were obtained from the results of the assessment of material experts 73.75%, media experts 76.04%, and science teacher experts 87.05%, then the developed infographic learning media could be tested on science learning for class VII.

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