



The Validity of Digestive System Teaching Material Supplements Based on the Glycemic Index Study of Corn Milk.

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Abstract

This study aims to determine the level of validity of teaching material supplements on the subject of the digestive system. This type of research is research *and development* (R&D) using the ADDIE model but modified only to the development stage. The results showed that the results of the validation of teaching material supplements, content validation, were included in the very valid category with a percentage of 90% and the results of construct validation showed that teaching material supplements were also included in the very valid category, with a percentage of 94%. Thus the teaching material supplements are included in the very valid category and are suitable for use in learning..

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INTRODUCTION

Diabetes mellitus (DM) is a chronic disease with an increasing incidence. Based on this, we need a solution to deal with these problems. Food with low sugar content can be an alternative food to minimize the increase in blood sugar in the body which can trigger diabetes mellitus.

Corn is a plant with a low glycemic index that can be an alternative food that can be consumed by the public in order to minimize the increase in blood sugar levels. Apart from consuming anti-diabetic food, one of the efforts that can be made to prevent and minimize this disease early is to provide education or understanding to students by associating the disease with learning materials in schools. At the junior high school level (SMA) in class teaching materials (XI), there is material that discusses this disease precisely in the material of the human digestive system KD 3.7 namely, analyzing the relationship between the structure of the organ-composing tissue in the digestive system and its relation to nutrition, bioprocess and dysfunction that can occur in the human digestive system.

Teaching materials are all materials consisting of information, tools, and text, which are structured and there are things that will be achieved by students which will certainly be used in learning with the aim of planning and studying the implementation of learning (Prastowo, 2012). Before being used in the teaching and learning process, teaching materials must have been tested for feasibility or validity in order to avoid misconceptions or other errors. Teaching material supplements are validated in order to determine the feasibility of these teaching material supplements before being implemented. Widyaningsih in Sistyarini (2017: 583) states, due diligence is very important to do so that it can be ascertained whether the teaching materials are appropriate or not implemented in the teaching and learning process. This research was inspired by several previous studies. Datau Wilinda's research (2022), with the title "Development of teaching material supplements for the digestive system through the use of messenger plants as anti-diabetic food". The similarity of this research with Datau Wilinda's research (2022), is to discuss supplementary teaching material on the digestive system and anti-diabetic food, using the same research model, namely the ADDIE model, but with differences in food sources. In this study, corn was used as an anti-diabetic food, while in Datau Wilinda's research, it was used as an anti-diabetic food. Nuha W. Ida's research (2017), with "Development of a Biology Supplement Book Based on Local Wisdom of Pati Regency as a Support for Biodiversity Material for Class X SMA/MA". The similarity of this research with the research of Nuha W. Ida (2017), both of them made biology supplement books but based on local wisdom. Paputungan Dea (2021), with the title "Nutritional Content and Glycemic Index Value of Corn (*Zea Mays*, L.) Momala Gorontalo Variety with Different Processing". The similarity of this research with Paputungan Dea's research (2021), discusses the glycemic index of corn but different ways of processing. In this study, corn was processed into milk and the results of the glycemic index study were poured into teaching material supplements, while in Paputungan Dea's study (2021), corn was processed into porridge.

Based on this, the researchers conducted research on the study of the glycemic index of corn milk and the results of the research were packaged into a supplement of teaching material on the subject of the digestive system.

RESEARCH METHOD

This type of research is research *and development* (R&D) using the ADDIE model. ADDIE stands for *Analysis*, *Design*, *Development or Production*, *Implementation or Delivery and Evaluation*. The reason the researcher chose this model is based on several considerations. Researchers consider that this model is very systematic, which consists of: *Analysis* (*Analyze*), *Design* (*Design*), *Development* (*Development*), *Implementation* (*Implementation*), and *Evaluation* (*Evaluation*), but in this study it is limited only to the development stage (*Development*), this is done in accordance with the needs of researchers to determine the level of validity of supplemental teaching material products that will result from the study. for the next two stages, namely *implementation and evaluation*, the researcher expects further research related to the implementation and evaluation of the teaching material supplements.

1. Data Collection Instruments

The research instrument used in this research is validation. Validation is used to measure several aspects including the quality of content presentation, the correctness and breadth of concepts, as well as aspects of language.

2. Data Analysis Techniques

The data that has been obtained at the data collection stage is then analyzed using a Likert scale device validation scoring with a score range of 1-4.

Table 1. Likert Scale Table

Assessment	Value/score
Very Valid	5
Valid	4
Valid Enough	3
Invalid	2
Invalid	1

Source; Yazid, (2016)

The data that has been previously obtained is then analyzed using the validation formula.

$$\text{Learning Device Validation} = \frac{\text{jumlah skor tota setiap aspek}}{\Sigma \text{skor tertinggi}} \times 100\%$$

The percentage of validity results can be seen in the following table.

Table 2. Validity Criteria

No.	Validity Criteria	Validity Level
1.	90.00%- 100.00%	Very Valid, can be used without revising.
2.	76.00%- 89.00%	Valid, and usable with minor revisions.
3.	65.00%- 74.00%	Valid enough, can be used with many revisions.
4.	40.00%- 64.00%	Less valid, and it is recommended not to use it because it requires a lot of revisions.
5.	00.00%- 39.00%	Invalid and unusable.

Source: Mustafa et al, (2021)

RESULTS AND DISCUSSION

1. Results

The following is an analysis of the results of the validation of teaching material supplements that have been validated by 2 validators (content validator and construct validator).

a. Content Validation

analysis for each aspect (aspects of the quality of presentation of material, aspects of correctness and breadth of concepts and aspects of appropriateness of language) is presented in the bar chart below.

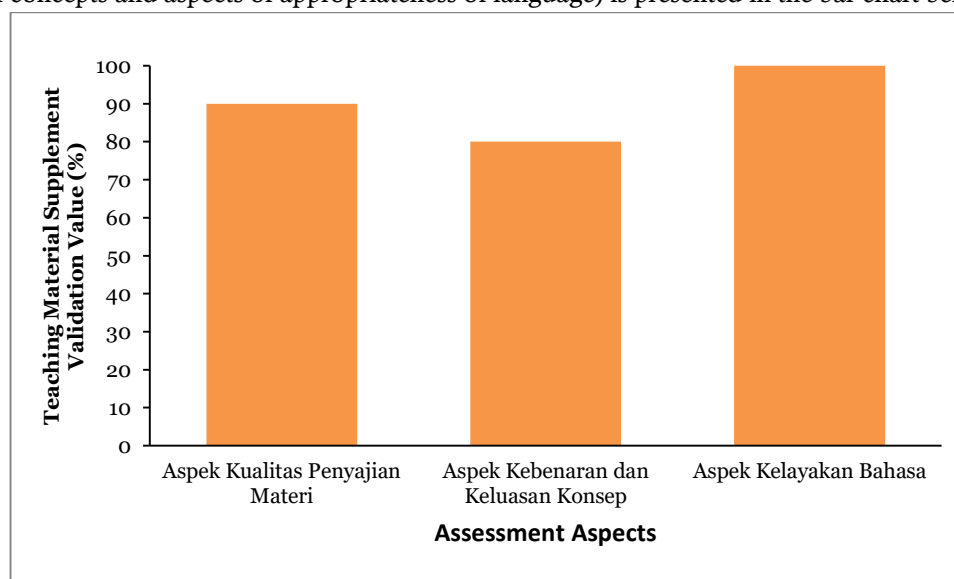


Figure 4.1 Results of the Content Validation Assessment

The diagram above shows content validation (aspects of the quality of presentation of material, aspects of correctness and breadth of concepts and aspects of language feasibility) are included in the very valid category with an average percentage of 90%.

b. Construct Validator

Construct validation was carried out to see the feasibility level of the supplement book in terms of appearance. The validation instrument for the construct validator consists of several assessment aspects, namely: book size, cover design quality, content design quality and language appropriateness. Percentage data from the calculation of each aspect of construct validation is presented in the bar chart below:

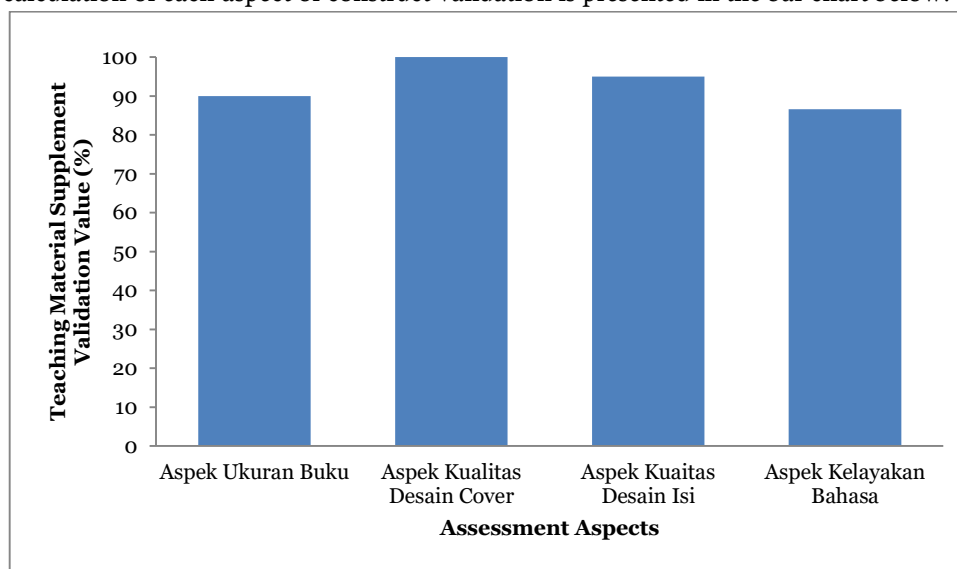


Figure 4.2 Construct Validation

The diagram above shows the validation of the analysis of the results of construct validation (book size aspect, cover design quality aspect, content design quality aspect and language feasibility aspect) included in the very valid category with an average percentage of 94%.

2. Discussion

Teaching material supplements are one type of teaching material that is useful as a support and complementary material in teaching and learning activities. Fathan in Arif (2020) supplementary books are supporting or supporting books that can be used by educators or students as complementary materials and enrichment materials in the teaching and learning process. This statement is in accordance with Arif's (2020) statement that the supplementary books used in the learning process act as a support for the main book and provide a detailed explanation of the material being taught.

As a type of teaching material, teaching material supplement books have the advantage of being a tool in the learning process. This statement is supported by Prastowo's statement (2013; 304), one of the advantages of teaching material supplement books is as a tool that can assist in learning activities that can be used anytime and anywhere.

Before being used in the teaching and learning process, teaching materials must have been tested for feasibility or validity in order to avoid misconceptions or other errors. Supplemental teaching material which is a part of the learning device must be validated or feasibility so that the level of validity of the learning device can be known. This statement is in accordance with Latjompoh's statement, (2018) A learning device is said to be valid if it is in accordance with the subject of science and all components in the device are related to one another. Teaching material supplements are validated in order to determine the feasibility of these teaching material supplements before being implemented. Widyaningsih in Sistryarini (2017: 583) states, due diligence is very important to do so that it can be ascertained whether the teaching materials are appropriate or not implemented in the teaching and learning process. Teaching material supplements in this study were validated by 2 validators, namely the content validator and the construct validator.

The validity component in this study corresponds to the validity component according to the Ministry of National Education (2018) regarding the general criteria for the development of teaching materials assessed by experts including aspects of material/content, presentation components, language, and graphics.

The validation instrument for the content validator in this study consisted of several assessment aspects, namely: aspects of the quality of presentation of the material, aspects of correctness and breadth of concepts and aspects of language feasibility. The component of the quality of presentation of the material includes six sub-aspects, namely: the suitability of the material with basic competencies, the suitability of the material

with achievement indicators, the suitability of the material with the needs of students, the completeness of the material, the coherence of the material and the ease of understanding the material. The components of the correctness and breadth of the concept consist of three sub-aspects, namely: the correctness of the concept on the digestive system material, the correctness of the concept of abnormalities in the digestive system, the correctness of the concept of studying the glycemic index of corn milk as an anti-diabetic food. In the linguistic aspect, there are three sub-aspects consisting of the clarity of language use, using standard Indonesian and communicative sentence formulation. The use of language is an important factor in developing teaching materials (Suswina, 2011).

The graphic component in this study includes book size, in the book size component there are two sub-aspects of assessment, namely: Book size supplementary teaching materials in accordance with ISO standards: A4 (210X 297 mm) or B5 (176x 250 mm), Size conformity with supplemental content material teaching materials. The next graphic component is the quality of the cover design. In this component, there are three sub-aspects of assessment: Book cover design for teaching material supplements in accordance with the content of the material, suitability of the layout of the pictures and writing on the front cover, suitability of the layout of the pictures and writing on the back cover. Quality of content design includes twelve sub-aspects of assessment: Accuracy in choosing font size, clarity of font size used, clarity of form/typeface, clarity of presented images, accuracy of image size, accuracy of image placement, accuracy of spacing: lines, paragraphs, and characters on the text or sentence, the consistency of words and terms used, the consistency of the size of the letters used, the attractiveness of the appearance of the page presented, the accuracy of the size of the columns/tables used, the accuracy of the placement of columns/tables in teaching material supplements. Language feasibility consisting of three sub-aspects of the assessment, namely: Clarity in language use, using standard Indonesian and communicative sentence formulation.

Based on the analysis of the results of validation of the contents of teaching material supplements on the aspect of quality of presentation of the material, there are 3 sub-aspects which are included in the very valid category with a percentage of 100%, namely sub-aspects 1, 2 and 3. Meanwhile, sub-aspects 4, 5 and 6 are included in the valid category with a percentage of 80%. . In sub-aspect 1 (appropriateness of material with basic competencies), it shows that the material in the textbook supplement is in accordance with KD. 3.7 (analyzing the relationship between the structure of the organ-composing tissue in the digestive system and its relation to nutrition, bioprocesses and functional disorders that occur in the human digestive system). Sub aspect 2 has a percentage of 100% with a very valid category, this shows that the material in the teaching material supplements is in accordance with the achievement indicators. Sub aspect 3 is included in the very valid category with a percentage of 100% which shows the material in the teaching material supplement book according to the needs of students. Overall, the three sub-aspects are very valid with a percentage of 100% because they are what they should be. This statement is supported by Harahap, *et al.*, (2020) The content eligibility aspect is said to be very valid if the contents of the *booklet* are in accordance with Core Competencies, Basic Competencies, Competency Achievement Indicators, and Learning Objectives. Ulandari & Syamsurizal (2021) in the Journal of Educational Research and Development also stated, a booklet is said to be very valid if all the elements in the booklet are correct and clear in accordance with Core Competencies, Basic Competencies, Competency Achievement Indicators, and also the contents contained in the booklet according to the needs of students. Wulandari, et al (2017) also stated that the material in supplementary teaching materials is very valid if the material presented is in accordance with Competency Standards (SK), Basic Competence (KD) and Learning Achievement Indicators. The material in a teaching material is said to be very valid if the material is in accordance with Competency Standards and Basic Competences (Sukmawati, 2015).

Sub aspect 4 (completeness of material) is included in the valid category with a percentage of 80%, this shows that the material in the teaching material supplement is quite complete as a teaching material supplement. The material presented in this supplementary book contains KD, examples and practice questions. Sub-aspect 5 (clutter of material) gets a percentage of 80% and is included in the valid category, this shows that the material in the textbook supplement has been presented in a coherent manner. Belawati in Suswina (2011) stated that teaching materials that have content coherence can make it easier for students to learn and can teach students to get used to thinking coherently. This statement is in accordance with the statement of Wulandari et al (2017), in the journal of innovative science education it is stated that the material in the teaching material supplement is presented in a coherent manner from basic concepts to complex concepts, so that students can easily understand the essence of the material.

Sub aspect 6 (ease of understanding the material), in this sub aspect a percentage of 80% is obtained with a valid category, this shows that the material listed in the teaching material supplement is fairly easy to

understand because it is explained coherently with simple sentences and there are examples of questions and supported by pictures that make it easier for students to understand the material. Wulandari, et al (2017) revealed that teaching material supplements which are coherently arranged from basic concepts to complex concepts can make it easier for students to understand the essence of the material.

The truth and breadth of the concept (aspect 2) has an average percentage value of 80% and is classified as a valid category. This percentage shows that the material contained in the teaching material supplement book contains the correct material and comes from a reliable source. The material contained in the teaching material supplement book consists of a description of the basic concept material regarding the digestive system to the results of research (findings) conducted by researchers (studies on the glycemic index of corn milk) in order to increase students' knowledge.

The use of good and correct language in a teaching material can make it easier for students to understand a concept. This is in accordance with Belawati in Suswina (2011), even though the content of teaching materials is good, uses a consistent format and is packaged in an attractive way, if the language used is difficult for students to understand, then the teaching material will not be meaningful. Widyawati & Lisa (2018) also revealed that compiling a textbook must use simple language and must be adapted to good and correct Indonesian rules so that the textbook can be easily understood by students. Based on the results of the validation by the content validator regarding the feasibility aspects of the supplementary teaching material language, it is classified as very valid with a percentage of 100%. This shows that all sub-aspects in the aspect of language feasibility have been fulfilled.

Based on the analysis of the results of construct validation, on the aspect of book size, a percentage of 90% was obtained with a very valid category. This is none other than because the size of the book used in the teaching material supplement is in accordance with the ISO standard: B5 (176 X 250 mm), and the size of the book is in accordance with the content of the supplementary teaching material. Prasetyo & Perwiraningtyas (2017) in preparing textbooks must pay attention to the physical size of the book. Biology textbook according to ISO standard: B5, namely (17.6 x 25 cm). This statement is in accordance with Ristekdikti (2017), a good textbook must meet the criteria according to the UNESCO format: 15.5 cm x 23 cm, ISO: A4 (21 cm x 297 cm), A5 (14.8 cm x 21 cm) B5 (18.2 cm x 25.7 cm) tolerance 5- 20 mm.

The quality aspect of the cover design in this study obtained a percentage value of 100% and was included in the very valid category. This percentage value indicates that all sub-aspects in the quality aspect of the cover design are in accordance with what they should be. The cover of the teaching material supplement book is designed according to the content of the material by presenting pictures related to the digestive system material both on the front cover and the back cover. The addition of pictures related to the digestive system on the cover of this supplement book aims to provide an illustration or description of the contents of the book and add to the beauty of the book's appearance. Ayuningtyas and Budiono (2016) the cover of a book must be attractive and in accordance with the contents of the book and not deviate from the book illustrations. The appearance of the cover of a book also affects reading interest. This is in accordance with Agustina's statement (2015) that a book with an attractive cover display and supplemented with pictures can create someone's reading interest to read. Magdalena, et al (2020) covers are generally the main attraction for students towards teaching materials, based on this the cover or covers are expected to display images, mixed colors and matched font sizes.

Analysis of the validation results on the quality aspect of the content design of teaching material supplement books obtained an average percentage of 95% with a very valid category. This shows that all the sub-aspects contained in this aspect of design quality are in accordance with what they should be. Good design in a book (colors, pictures, typeface) can be one of the factors that can attract the reader's attention and minimize reader boredom while reading the book. This statement is in accordance with Muqodas, et al (2015) A teaching material is deliberately displayed with lots of images with good quality brightness and sharpness so that the reader does not feel bored. A teaching material needs to pay attention to consistency when using fonts, spacing, and image layouts or table layouts. This is in line with the opinion of Magdalena, et al (2020) making teaching materials must pay attention to consistency in terms of the use of fonts, spacing and layout. The language feasibility aspect based on the results of the media validator's assessment obtained a percentage of 87% in the valid category. This shows that the language used in the textbook supplement is good and correct. The use of good and correct language in a teaching material can make it easier for students to understand a concept. This is in accordance with Widyawati & Lisa (2018) a textbook must use simple language and must be adapted to good and correct Indonesian rules so that the textbook can be easily understood by students.

CONCLUSION

Based on the results of the research and discussion, it shows that the results of the validity test by 2 validators are included in the very valid category and are suitable for use in learning.

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