



## Developing Carousel Content-Based Educational Media for Food Labeling Instruction to Teenagers

*Salsabila Shafa\*, Cica Yulia, Sri Subekti*

<sup>1</sup>Universitas Pendidikan Indonesia, Bandung

Correspondence: E-mail: [Salsabilashafa@upi.edu](mailto:Salsabilashafa@upi.edu)

### ABSTRACT

Nutritional issues among adolescents in Indonesia, such as obesity and stunting, are often triggered by unhealthy consumption patterns resulting from low literacy regarding food labels. Although students generally exhibit a positive attitude toward food labels, this has not yet been reflected in their actual behavior. This study aims to develop educational media based on carousel content on food labeling material for teenagers. This study employed a Design Based Research (DBR) approach, consisting of problem analysis, solution development, as well as testing and reflection. Product validation was conducted by material experts, media experts, and linguists using a Likert scale. The validation results indicated a very high level of feasibility: material experts (96%), media experts (94%), and linguists (93%). This carousel-based educational media is declared highly feasible and relevant to the needs of teenagers. It holds significant potential for implementation via social media platforms such as TikTok to encourage healthier consumption behavior changes.

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## 1. INTRODUCTION

The presence of instructional media assists teachers and students in conducting learning activities that are more engaging and easier to understand, particularly in addressing challenges related to difficulties in material comprehension. The development and utilization of media in accordance with their functions can facilitate the learning process and help teachers achieve learning objectives optimally (Mukarromah & Andriana, 2022). Along with the advancement of information and communication technology, innovations in education have continued to grow through the use of the internet, smartphones, and laptops as means of accessing learning materials. This development has made learning no longer limited to teachers and textbooks, thereby making the learning process more effective and efficient, provided that teachers select appropriate media (Zahwa & Syafi'i, 2022).

Social media enables students to obtain additional learning materials, broaden their knowledge, and share information with other users (Fitriani, 2021). One form of media utilization is educational content, defined as information presented in the form of text, images, audio, video, or a combination thereof, and distributed through various digital media (Rahmana et al., 2022).

Engaging and inspirational educational content has been proven to enhance learners' motivation and interest in learning, while also serving as a supporting resource for formal education (Gani & Hidayat, 2023; Uswatun Hasanah & Heni Pujiastuti, 2022). Students also perceive educational content as beneficial, particularly due to the clarity provided by visual presentations (Arun et al., 2025). In general, content can be categorized into various types such as written, visual, audio, video, and interactive content, with more specific subtypes within each category, including visual and design content such as static infographics, carousels, and product illustrations (Wulansari et al., 2022).

Carousel content is a social media format that allows multiple images or videos to be displayed within a single post and accessed via mobile devices by swiping the screen. Image-based visual media are capable of enhancing conceptual understanding, reasoning ability, imagination, and students' learning motivation, while encouraging the implementation of more innovative learning methods (Sunarya & Puspita, 2019). Carousel designs are also commonly referred to as microblogging content, which presents dense information concisely and visually across each slide, making it more appealing to audiences (Suminto & Setiyoko, 2022).

One relevant topic that can be packaged in carousel content is food labeling, which serves as a product information medium containing details in the form of text, images, or a combination of both, and plays an important role in product sustainability and consumer promotion (Imawati Eka Putri et al., 2024). This topic is particularly important given that adolescents are a group vulnerable to nutritional problems under the Triple Burden of Malnutrition, which includes undernutrition, overweight, and micronutrient deficiencies (Lestari & Iswahyudi, 2024). Data from Riskesdas indicate a high prevalence of stunting, thinness, overweight, obesity, and anemia among Indonesian adolescents (Badan Litbangkes, 2023; Waluyani et al., 2022).

These nutritional problems are consistent with adolescents' low level of understanding of food labels. Adolescents experience difficulties in accessing and comprehending nutritional information on food packaging, which influences less selective consumption patterns (Syahrul et al., 2025). In fact, reading food labels is an important component of the Balanced Nutrition Guidelines, although consumers tend to pay more attention to brand names, expiration dates, and halal logos than to nutritional information (Pratama & Mardiyati, 2024).

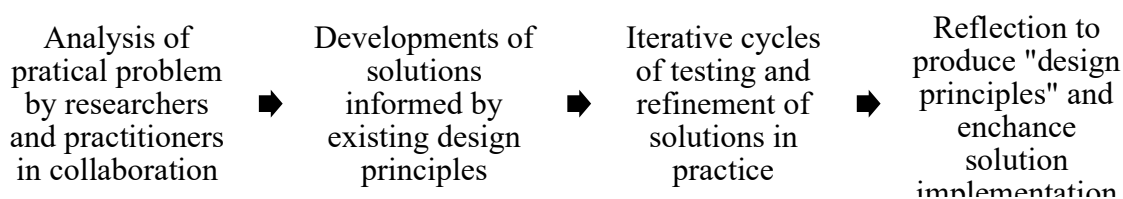
The high consumption of instant foods among adolescents aged 10–24 years, reaching 66.8%, further reinforces the low habit of reading food labels and nutritional information, with the majority of adolescents not reading labels at all (Ikrima et al., 2023; Putra et al., 2024). These findings are consistent with various studies conducted in Indonesia and other countries, which indicate low levels of food label knowledge among adolescents, contributing to unhealthy dietary patterns and an increased risk of obesity and degenerative diseases (Sari, 2021; Sinaga & Simanungkalit, 2022; Talagala & Arambepola, 2016; Wojcicki & Heyman, 2012).

Adolescence is a crucial phase in the formation of behavior, social roles, and future readiness; therefore, relevant and contextual educational approaches are required (Yusinta et al., 2019). Food label education delivered through digital carousel content has been considered effective because it presents information in a gradual, concise, and engaging manner (Bawono & Putro, 2023). The use of TikTok as an educational platform is supported by its ability to create a creative, interactive learning environment and to enhance learning motivation and comprehension among Generation Z (Davina Pebirimireni & Diena San Fauziya, 2024; Devi, 2022; Rahmana et al., 2022).

Thus, the development of educational media in the form of carousel content on the TikTok platform has the potential to improve adolescents' learning comprehension—particularly among those aged 12–16 years—regarding food labels in a more engaging, effective, and accessible manner.

## 2. METHODS

This study employs the Design-Based Research (DBR) method. The product developed through this design-based research is an educational approach intended to support students' knowledge in accordance with real field conditions. Design-based research is a flexible research method used to develop educational practices through in-depth analysis and the design of developmental concepts and implementation processes (Zulkarnain et al., 2023). According to (Reeves, 2006), Design-Based Research consists of several main stages.



### 2.1. Analysis Practical Problem

The problem identification and analysis stage was carried out through the analysis of questionnaire data derived from an umbrella research project led by Prof. Dr. Cica Yulia, S.Pd., M.Si., entitled *"Implementation of the 'Nutriflipped' Nutrition Education Model for Adolescents Toward Zero New Stunting."* The data were used to obtain an initial overview of relevant needs and problems as the basis for media development.

### 2.2. Developments of Solutions

The developed product subsequently underwent an expert validation stage involving subject matter experts, media experts, and language experts to assess the feasibility of the content, visual presentation, and linguistic aspects, as well as to obtain feedback as a basis for product improvement.

### 2.3. Testing and Refinement of Solutions

At this stage, the research participants consisted of subject matter experts, media experts, and linguist experts who served as expert validators to evaluate the feasibility of the media. The instrument used was a validation sheet containing a media feasibility assessment questionnaire. A questionnaire is a data collection technique conducted by presenting a set of questions to be answered by respondents (Sugiyono, 2013).

#### **2.4. Reflection and Implementation**

In the final stage of reflection and implementation based on the results of expert validation, the collected data were analyzed to evaluate the suitability of the developed carousel content. Product assessment was conducted by media, language, and subject matter experts using a 1–5 Likert scale, in which the highest score indicates “very good” and the lowest score indicates “very poor” (Hapsari & Zulherman, 2021). Furthermore, data from the validation sheets were qualitatively described to process comments and suggestions provided by subject matter experts, language experts, and media experts.

### **3. RESULTS AND DISCUSSION**

#### **3.1. Analysis Practical Problem**

The data indicate that students’ attitudes toward food labeling were in a fairly good or high category, with a mean score of 70.47. Overall, the majority of students (85.4%) demonstrated attitudes classified as good to very good, suggesting that they generally acknowledge the importance of reading food labels. However, this positive attitude was not consistently reflected in actual behavioral practices. The mean score for students’ behavior was only 58.75, which was notably lower than their attitude score. This finding is further supported by the large proportion of students whose behavior was categorized as moderate, accounting for 39.1% of the sample. This discrepancy indicates that students require educational media that are not only informative but also capable of promoting real behavioral change in daily life.

In terms of knowledge level, the majority of junior high school students were classified in the moderate category (46.8%), with a highly heterogeneous data distribution. The substantial variation in students’ knowledge scores is evidenced by a standard deviation of 19.21 and an extremely wide score range, from a minimum of 12.5 to a maximum of 100. Furthermore, the Shapiro–Wilk normality test revealed that the data were not normally distributed (Sig. < .001), confirming significant disparities in students’ understanding. This uneven distribution of knowledge further supports the need for developing educational media in the form of carousel content. The carousel format allows complex food labeling material to be segmented into smaller, well-structured, and visually engaging units, thereby facilitating comprehension among students with varying cognitive abilities.

#### **3.2. Developments of Solutions**

The development process began with script writing and storyboard preparation, which served as initial guidelines for structuring the content of each carousel slide according to the predetermined material. Subsequently, the visual design stage was conducted, encompassing the selection of colors, typography, icons, illustrations, and layout arrangements. Visual content was primarily created using Ibis Paint X for illustrations, packaging visuals, and typographic processing, while supporting elements such as mascots and backgrounds were

designed using Canva. The carousel content was designed in a 4:3 aspect ratio to suit distribution on social media platforms, particularly TikTok.



Figure 2. Typograph creation process.



Figure 3. Illustration Creation Process.

Following the design stage, content production was carried out by developing each slide based on the storyboard and visual concepts that had been established. Visual and textual adjustments were made to ensure coherence between slides and effective delivery of learning messages. The content development strategy referred to carousel content principles proposed by (Fachrezi, 2021); which emphasize attention-grabbing visuals on the opening slide, clear and structured message delivery, and the ability to encourage audience engagement. These principles were implemented through the use of contrasting titles, simple and age-appropriate language, structured material flow, and visual cues that guide users through the content, thereby supporting effective communication and encouraging users to interact with the carousel content.

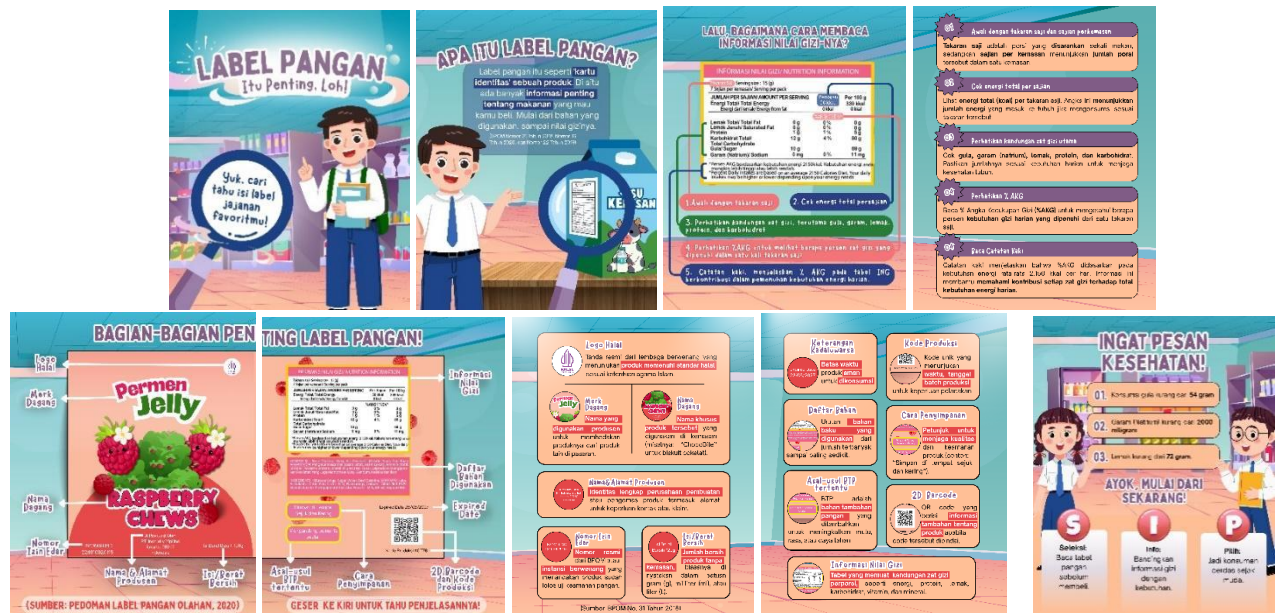


Figure 4. Content Media Production Process.

### 3.3. Testing and Refinement of Solutions

The developed food labeling educational media in the form of carousel content subsequently underwent expert evaluation to assess the feasibility of the instructional media. The assessment results from each expert validator are presented as follows.

#### 3.3.1 Media Validation

Based on the assessment of the media expert validators presented in the table above, the carousel-based educational media obtained a score of 52 out of 55, corresponding to a feasibility percentage of 94%, and was classified as highly feasible.

**Tabel 1.** Media expert assessment results.

| No.                                                                                              | Aspect                                                              | Item                                                                  | Expert Score | Remarks         |
|--------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|-----------------------------------------------------------------------|--------------|-----------------|
| 1                                                                                                | Media Appearance                                                    | The font size used is appropriate                                     | 5            | Very Good       |
|                                                                                                  |                                                                     | The font shape is readable and clear                                  | 5            | Very Good       |
|                                                                                                  |                                                                     | Text composition against the background used is easy to read          | 5            | Very Good       |
|                                                                                                  |                                                                     | Lighting and color design attract high school students' attention     | 5            | Very Good       |
|                                                                                                  |                                                                     | Interactive use of visual elements                                    | 3            | Fair            |
|                                                                                                  |                                                                     | The cover has visual appeal that attracts attention (grab attention). | 5            | Very Good       |
|                                                                                                  |                                                                     | Image clarity                                                         | 5            | Very Good       |
| Specifically for electronic-based development products, the following indicators may be applied. |                                                                     |                                                                       |              |                 |
| 2.                                                                                               | Specific to electronic-based product development (indicators below) | Maintainable (easy to manage)                                         | 4            | Good            |
| Usabilitas (ease of use)                                                                         |                                                                     | 5                                                                     | Very Good    |                 |
| Kompotabilitas (ease of operation across platforms)                                              |                                                                     | 5                                                                     | Very Good    |                 |
| Reusable (can be reused)                                                                         |                                                                     | 5                                                                     | Very Good    |                 |
| Total                                                                                            |                                                                     |                                                                       | 52           |                 |
| Percentage                                                                                       |                                                                     |                                                                       | 94%          | Highly Feasible |

### 3.3.2 Content Validation

The subject matter expert evaluation yielded a score of 29, corresponding to a feasibility percentage of 96%, and the media was classified as highly feasible and deemed appropriate by the content validator.

**Tabel 2.** Content expert assessment results.

| No. | Aspect           | Item                                                                                                                                                                                                                                                                            | Expert Score | Remarks   |
|-----|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|-----------|
| 1.  | Concept Accuracy | Definition of "food labeling" according to regulatory standards                                                                                                                                                                                                                 | 5            | Very Good |
|     |                  | Compliance of content with mandatory food label elements, including product name, manufacturer's name and address, halal logo, required production date and code, expiration date, net weight, country of origin, nutritional value information, and other required information | 5            | Very Good |
|     |                  | Accuracy in presenting labeling content (clarity, readability, not misleading, appropriate placement of labels)                                                                                                                                                                 | 5            | Very Good |

|            |                                                   |                                                                                                                    |     |                 |
|------------|---------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|-----|-----------------|
| 2.         | Nutritional Value Information                     | Information on nutrition labels and nutrition facts tables presented clearly and exemplified                       | 5   | Very Good       |
|            |                                                   |                                                                                                                    |     |                 |
| 3.         | Pedagogical Quality (Junior High School Students) | Suitability of the content for teenagers high school students in accordance with curriculum and learning materials | 4   | Good            |
|            |                                                   | Clarity of examples and illustrations relevant to students' daily habits                                           | 5   | Very Good       |
| Total      |                                                   |                                                                                                                    | 29  |                 |
| Percentage |                                                   |                                                                                                                    | 96% | Highly Feasible |

### 3.3.3 Linguist Validation

The Linguist expert validation yielded a score of 28, corresponding to a feasibility percentage of 93%, which falls into the highly feasible category, with minor revisions recommended by the language validator.

**Tabel 3.** Linguist assessment results.

| No.        | Aspect   | Item                                                                       | Expert Score | Remarks         |
|------------|----------|----------------------------------------------------------------------------|--------------|-----------------|
| 1.         | Linguist | The Linguist used is easy for teenagers high school students to understand | 5            | Very Good       |
|            |          | The Linguist used is simple and clear                                      | 4            | Good            |
|            |          | Sentence structure is appropriate and well-constructed                     | 5            | Very Good       |
|            |          | The Linguist used is effective                                             | 5            | Very Good       |
|            |          | The Linguist used is communicative                                         | 4            | Good            |
|            |          |                                                                            | 5            | Very Good       |
|            |          | The Linguist follows standard Indonesian grammar and spelling conventions  |              |                 |
| Total      |          |                                                                            | 28           |                 |
| Percentage |          |                                                                            | 93%          | Highly Feasible |

### 3.4. Reflection and Implementation

After the expert validation process was completed, the next stage involved revising the product based on the comments and suggestions provided by the experts. The revisions included:

**Tabel 4.** Reflection and revision.

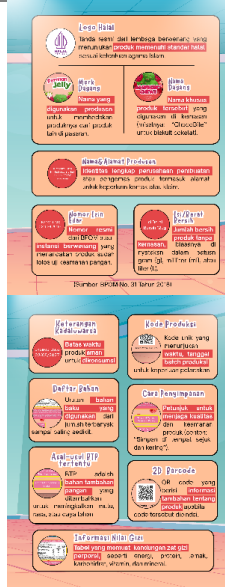
| Notes | Before Revision | After Revision |
|-------|-----------------|----------------|
|-------|-----------------|----------------|

On page 2, key information related to food labeling should be highlighted using bold text or color to improve content visibility.

Pages 7–9 should also emphasize essential points as the core information.

Additionally, left-aligned text is recommended on pages 7–8 to avoid uneven spacing

Punctuation usage at the end of sentences should be made consistent.



After revisions were made in accordance with the comments and suggestions from the experts and the media was declared feasible, it can be used as an instructional medium. In

this study, the implementation was carried out by uploading the media to the TikTok platform as an educational tool.

#### 4. CONCLUSION

Based on the analysis of the existing problems, the majority of students (85.4%) exhibit a good to very good attitude toward the importance of reading food labels. However, this is not aligned with their actual behavior, where the average behavior score is only 58.75. Meanwhile, students' knowledge falls into the moderate category (46.8%) with highly diverse (heterogeneous) data distribution. This gap in understanding underlines the urgent need for food labeling educational media.

Following the development of the solution, the media underwent validity testing and received scores of 96% (highly feasible) from material experts, 94% (highly feasible) from media experts, and 93% (highly feasible) from linguists. Thus, it can be concluded that carousel-based educational media is effectively developed as a learning tool for food labeling for teenagers high school students. This media is declared highly feasible by experts with high validation scores in material, media, and language aspects. This content is capable of bridging the gap between students' positive attitudes and their actual behavior by presenting nutritional information progressively and providing clear visualizations. Implementation through TikTok is considered highly relevant to the digital habits of today's adolescents to encourage healthier consumption awareness

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#### 6. AUTHORS' NOTE

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

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