

Development of Smart Box Learning Media on the Material of the Human Respiratory System

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ABSTRACT

The type of research carried out in this study is research and development (R&D). This research aims to develop *Smart Box* learning media that is validated by media expert validators, material experts, linguists, and practitioners. This research also aims to find out the attractiveness of *Smart Box learning media*. This research and development process uses the ADDIE model, which includes five stages: Analysis, Design, Development, Implementation, and Evaluation. The validation results resulted in 100% of media experts, 94% of material experts, 84% of linguists, and 97.1% of practitioners, all of whom were categorized as very deserving. The results of validation from media, material, language, and practitioner experts show that *Smart Box* learning media is very feasible to be used in the learning process. The results of the limited trial were 92.9%, while the field trial yielded 88.8%, both of which were categorized as very interesting. The results of the student response questionnaire conducted during the limited trial and field trial showed that students were very interested in *the Smart Box* learning media.



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A. INTRODUCTION

Science and technology have made rapid progress over time, thus driving improvements in several areas, including education. Technological and information advances in education have significantly improved the quality of learning. The development of Information and Communication Technology (ICT) has an effect on human life, one of which is in education. (Nasa'i & Sari, 2023)

Currently, the curriculum intended for the school level is regulated in the 'State Law' of the Republic of Indonesia No. 20 of 2003 related to the National Education system, precisely in article 1 paragraph 19, it is written that the curriculum is a plan and rules that have objectives, content, and subject matter that are often used in a guideline for learning activities to achieve goals in Education. According to, in the implementation of the 2013 curriculum that plays an important role and becomes a success in learning is influenced by teachers. (Agustina et al., 2023)

Teachers are educators and teachers for participants when at school, . A teacher plays a role and is responsible for educating and teaching his students. In the current era that is all digital, the learning system must follow it so that a teacher is expected to be able to develop information in order to create an active, interesting, and not boring learning atmosphere for students. (Maemunawati & Alif, 2020)

Based on the results of observations and conversations with educators and students at SD Negeri 031 Simpang Amal, it was found that problems in the learning process of students looked saturated when learning because of the learning that watched and the delivery of material that was too focused on teachers and package books, which had an impact on students becoming bored quickly and venting their boredom by playing alone, chatting with friends next to them and there were even some students who made noise During the learning taking place, so the teacher gives a warning to students to want to listen.

The problems that arise at SD Negeri 031 Simpang Amal show that the learning process is still very teacher-centered. Students are more likely to listen, read package books, or take notes of material without any learning stimuli that keep them active. This condition makes the classroom atmosphere quickly saturated. Small things like students chatting, playing alone, or making a real noise are signals that they are losing engagement in learning activities.

Classroom teachers have basically tried to manage the classroom, but without the support of the right methods and media, they are not enough to attract the attention of students. In this condition, it is important to present learning media that is actual, visual, and close to students' lives. Attractively designed media can be a bridge between abstract material and children's real experiences, so that students not only hear, but also see, try, and feel the learning process.

The urgency of this research lies in the real need in the field: how to help teachers create more lively learning and how to foster students' interest and activeness in learning, especially in human respiratory materials that have been considered abstract and difficult to imagine by elementary school students.

This is because the use of methods that are focused on teachers and the use of media that is not optimal so that students become unfocused, teachers are required to make interesting methods and the importance of using actual teaching media in order to build students' interest and interest in learning. This is in line with the results of observations carried out by where the problem of lack of student activity in the learning process was found, especially in human breathing material when answering or expressing opinions. According to classroom teachers, interesting learning media is needed and can help teachers in conveying material to students so that it makes it easier for students to understand the material and supports student activity. (Rhamdan, 2024)

A number of previous studies have shown that the use of engaging learning media, especially those that combine visual and interactive elements, can increase students' focus and activeness. Recent studies suggest that teachers should not only rely on package books, but also utilize actual media such as images of body organs, short videos, and interactive multimedia.

The results of observations in the previous study above, for example, found that the low activeness of students in answering questions or expressing opinions was due to the fact that the material presented was too abstract and not supported by media that facilitated understanding. The findings are in line with the views of education practitioners in elementary schools, who consider that children understand material more easily if it is presented in concrete visual form.

The development of educational technology also opens up new opportunities for teachers to create simple but effective media. Recent trends in science learning in primary schools show an increase in the use of interactive media and learning approaches that put students at the center of learning activities. Thus, this research is part of this development, which seeks fun, relevant, and student-centered learning.

Although a lot of research on learning media has been carried out, there are still some gaps that have not been answered, especially in the context of border schools or remote areas such as SD Negeri 031 Simpang Amal. Some of the gaps found include: First, there is no learning media that is truly adapted to the classroom conditions in the school. Most of the media used by teachers is still general and does not relate the material to children's daily learning experiences. Second, previous research has not specifically addressed students' needs for human respiratory materials, especially related to how media can help them understand organs that are not directly visible. Third, there have not been many studies that have examined the relationship between learning boredom and the way teachers present material using the dominant method of lectures. In fact, this boredom is what causes students to be inactive and easily distracted. Fourth, Lack of research documentation that shows the impact of actual media on changes in student learning behavior, such as increased focus, interest, and active participation in the classroom.

Therefore, this research is here to fill this gap by developing learning media that is actual, contextual, and easy to use by teachers, as well as testing how these media can increase student engagement and understanding of human respiratory materials.

The media has a very important function in the world of education. According to Nasution et al. (2023), learning media is an instrument that facilitates the delivery of messages from educators to students. The use of media in the educational process serves as a communication link between educators and learners, designed to increase learners' engagement in learning Zunidar (2020). Visual media in education has four main tasks that improve the learning process. The attention function aims to engage students by directing their focus to a topic with a visual display that enhances the substance of the lesson. Second, the emotive function, in which visual media can evoke feelings and influence students' views, is exemplified by the images that accompany the text. Third, cognitive function assists students in understanding and retaining knowledge gained from symbols or visuals provided. The compensation function aims to help students who have difficulty understanding the text by providing visual context to improve comprehension and retention. (Abdullah, 2017)

Interactive learning media has the advantage of being able to display a variety of animations, text, images, and audio. Overall, learning media plays a role in fostering interest in learning, motivating students, and providing a positive psychological impact, especially through these four visual functions. (Rhamdan & Kasih, 2025)

According to Polinda et al. (2023) *Smart Box*, it is an educational tool consisting of boxes containing images and text, which are used by educators to provide content in an interesting way. The use of *Smart Boxes* can improve student learning outcomes by creating a more engaging and dynamic learning environment. According to , this smart box has two sides: one side contains the content, while the other side presents questions. The use of Sukaryanti et al. (2023) *Smart Boxes* has been shown to be effective in improving student learning outcomes by creating a conducive environment and increasing concentration levels. This Zahra et al. (2024) *Smart Box* learning media certainly has many benefits for students who are in elementary school where in this media there are many cards that are given letters that have been designed as attractively as possible. The use of Solihah (2023) *Smart Box* media includes teaching resources and tools that improve students' understanding of educational content.

The respiratory system according to is the structure and function of the respiratory system, including organs such as the pharynx, larynx, trachea, bronchi, lungs, and alveolis. The respiratory system includes conceptual material, so a deep understanding of the concepts is necessary so that students can understand well. Hadi et al. (2020) According

to the respiratory system facilitates the exchange of gases between the body and the outside environment. This process includes many organs, including the nose, mouth, throat, larynx, trachea, bronchi, and alveoli. Inhaled air provides oxygen that is essential for metabolic processes, while carbon dioxide, a metabolic waste product, is excreted during respiration. (Dohona et al., 2024)

Based on the above explanation, the purpose of this study is to determine the feasibility of *Smart Box Learning Media* in human respiratory system materials in class V-A SDN 031 Simpang Amal reviewed through media validation, materials and language, as well as to find out the attractiveness of *Smart Box Learning Media* in human respiratory system materials in class V-A SDN 031 Simpang Amal.

B. METHODS

The type of research carried out is development research, in this case applying research and development methods (*Research and Development*) with the aim of producing products. The development process is carried out in stages, where each stage depends on the results of the previous stage. According to research and development, it is defined as a research methodology used to create a certain product as well as evaluate its efficacy. This procedure involves assessing the requirements for developing a product and implementing validation tests. This project creates a Smart Box-based educational media Sugiono (2015) using the ADDIE paradigm to build a decent learning product, namely *Smart Boxes* for human respiratory system materials in basic education. This development research applies the ADDIE model as a framework in its development process. The procedure is presented in the following image:

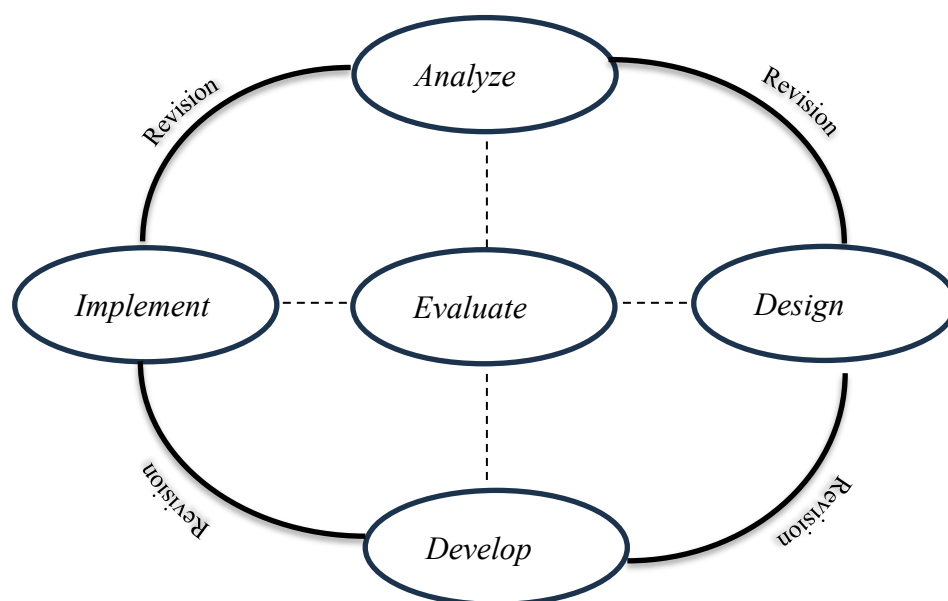


Figure 1. ADDIE Model Development Procedure Scheme

Source: (Branch, 2009)

The stages of developing Smart Box-based learning media in class V-A at SDN 031 Simpang Amal refer to the 5 steps of ADDIE, . The stages of development are as follows: (Rachma et al., 2023)

Analysis

In the early stages of product development, researchers conducted an investigation to collect initial data related to the learning system in the classroom. At this stage, the researcher conducts initial observations and provides interview sheets for teachers of class V-A SDN 031 Simpang Amal, then conducts observations in class V-A to find out the

challenges and needs of students and educators during the learning process. The observations made by the author found several problems during learning activities, namely the process of delivering material that is monotonous and the use of media that is not optimal so that students are often bored, bored quickly and vent their boredom by playing alone, chatting with friends next to them and there are even some students who make noise during learning. From these various problems, the use of Smart Box-based learning media Novitasari (2024) in learning is needed to support learning in the classroom to create a classroom atmosphere that is not boring for students, and students will also be more interested in the learning carried out by teachers.

Design

The design stages carried out by the researcher consist of selecting media and designing the design of Smart Box-based teaching media products. At this stage, the researcher also began to create learning media that had been designed, starting from creating templates to publishing the media that had been created. The display of this media is in the form of a box containing teaching materials that have been summarized in the media of a smart box or *Smart Box*.

Development

The product that has been designed is then ready for validation by the validator. The validation carried out is the validation of media experts, material experts, and linguists carried out by lecturer validators who are experts in the three fields. After expert validation was carried out, then a limited product trial was carried out in class V-B as many as 6 people using the technique Novitasari (2024) *Random Sampling* in class V-B up to *Smart Box* can be accepted by students with both high and low abilities, then provide a student response questionnaire. After that, the researcher needs to revise again if there are improvements from the validator or suggestions during the limited trial, until it is said to be feasible when fully tested.

Implementation

After the media created was declared feasible by the validator and through a trial limited to 6 students in class V-B, the researcher proceeded to the implementation stage through a field trial. The field trial involved all 25 students of class V-A, followed by the provision of a student attractiveness questionnaire.

Evaluation

As a concluding step in the ADDIE cycle, the evaluation stage aims to provide an assessment of the development of Smart Box-based learning media. In addition, this phase is also an opportunity to identify product shortcomings and make revisions to produce high-quality products.

Product trials in Smart Box-based media research and development on human respiratory system materials for elementary school students V-A and the material used is material in grade V Elementary School which includes Human Respiratory System material. In this study, the subject of the limited trial was 6 students from class V-B, and the field trial subject involved 25 students from class V-A. This study also uses qualitative and quantitative data. Qualitative data includes ideas and criticisms from media validators, materials, languages, practitioners, and student answers obtained through surveys. Quantitative data was obtained from evaluation assessments on expert validation sheets and student interest surveys. This research uses various tools to obtain the required data. The data collection tools in this study are: observation, interviews, validation sheets, student response questionnaires, and documentation. The data analysis approach used is qualitative descriptive and quantitative descriptive methods.

Data from media experts, material experts, linguists, and practitioners were further analyzed using the formula presented by. The results of the validation questionnaire are calculated using the following percentage formula: (Ningrum & Widodo, 2018)

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

Information:

NP = Expected percent value

R = Score obtained

BC = Maximum score

The results of the above formula are matched with the criteria in accordance with the following table.

Table 1. Eligibility Criteria for Media, Material, Language and Practitioner Experts

Presentase %	Criterion
81% – 100%	Highly Worth It
61% – 80%	Proper
41% – 60%	Quite feasible
21%– 40%	Less Worthy
0%– 20%	Not eligible

Modified Source of (Ningrum & Widodo, 2018)

The analysis of students' attractiveness responses obtained data from a formula that had been modified by . The average score of the questionnaire that students responded to from the following formula. (Ningrum & Widodo, 2018)

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

Information:

NP = Expected percent value

R = Score obtained

BC = Maximum score

The results of the above formula are matched with the criteria in accordance with the following table.

Table 2. Criteria for Attractiveness of Student Responses

Presentase %	Criterion
81% – 100%	Very Interesting
61% – 80%	Pull
41% – 60%	Quite Interesting
21%– 40%	Less Attractive
0%– 20%	Not Interesting

Source: Modification (Ningrum & Widodo, 2018)

C. RESULTS AND DISCUSSION

This development research was carried out to develop an educational product in the form of *Smart Box* Learning Media on Human Respiratory System Materials Class V-A SDN 031 Simpang Amal. The purpose is to determine the feasibility of *Smart Box media in the human* respiratory system material of class V-A SDN 031 Simpang Amal reviewed through the validation of media, materials, language and practitioners and

the attractiveness of *Smart Box media* in the human respiratory system material of class V-A SDN 031 Simpang Amal reviewed through a student interest questionnaire.

The ADDIE *development model* has five stages in its implementation, namely Analysis, Design, Development, Implementation, and Evaluation. The elaboration of the research results at each stage is described as follows:

Analysis

At this stage, the researcher adjusts the problems found in the field to the media to be created, where there are problems obtained during observation and interviews, namely: 1) The learning approach used is still teacher-centered; 2) The learning resources used are still limited to textbooks, whiteboards, master books, and monotonous methods; 3) The use of media is still not optimal due to the limited time of teachers in developing learning materials.

Smart Boxes are presented which function as additional learning resources for educators during learning, so as to create an interesting learning process and actively involve students. The researcher produced *Smart Box* learning media that focuses on the human respiratory system for students in class V-A SDN 031 Simpang Amal.

Design

At this stage, it is included in the design or planning stage of *Smart Box* media. At this stage through 3 steps, namely: 1) Mapping the basic competencies and learning objectives of *Smart Box* learning media, namely: a) recognizing the respiratory system in humans, b) understanding the meaning and function of human respiratory organs, identifying organs in the human respiratory system, practicing how the human respiratory system works through *Smart Box* learning media; 2) Making a *Smart Box learning media framework*, namely selecting materials, materials, questions, and posters, as well as selecting the placement of the order from the beginning to the end of the media; 3) Determination of the design appearance, *Smart Box* media. The *Smart Box* learning media on the human respiratory system has an attractive design which contains pictures, writing or materials, teaching aids, and practice questions or commonly called student worksheets which are packaged in a closed cardboard box that is wrapped to resemble a gift so that it looks attractive when viewed and is interested in learning or use.

The display of *Smart Box learning media* that has been developed by the researcher can be seen in more detail in figure 1. which provides a visual overview of the design and structure of the material presented in the *Smart Box*.



Lid display Box

Front side exterior view Box



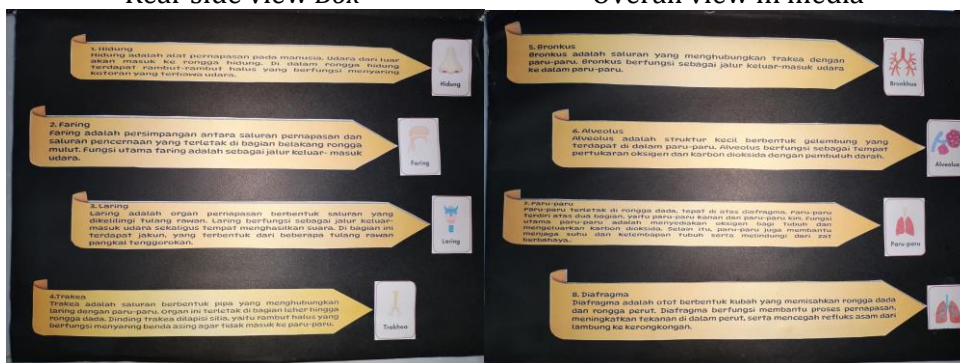
Right-hand side view Box

Left side view Box



Rear side view Box

Overall view in media



Material content display

Advanced content view



Health poster display

LKPD Display



Display of human respiratory system props
Figure 2. Smart Box Learning Media Display

Development

At this stage of development, where according to the development of learning media, it is necessary to pay attention to the material to be delivered, so that it can support the achievement of science learning goals. The activities carried out include validation by media experts, materials, languages, and practitioners of the items produced. The results of the validation test showed that Rhamdan (2025) *Smart Box learning media* is very feasible and interesting for the teaching and learning process, especially for learning the human respiratory system in class V-A, as evidenced by the validation of media, materials, language, practitioners, and student interest questionnaires. At this stage, the researcher makes learning media that has been designed beforehand, the researcher also validates and tests the products that have been developed. (Rhamdan, 2023)

According to , students are obliged to take advantage of learning to grow their potential. The learning process involves two parties, namely the student who receives the learning and the instructor who provides the resources. The results of the calculation from the media validation showed a media validity level of 100%. This percentage shows that learning media is considered valid and very feasible. The validation results are categorized as very feasible if they reach a percentage between 81% and 100%, so it shows that the media is very feasible to use. This is in line with the findings that the use of Umri et al. (2023) Sulaedah et al. (2022) *Smart Box media* is able to create a conducive learning environment, facilitate the absorption of material by students and help teachers.

After going through the media validation process. Furthermore, the researcher validated the material, the results obtained by the researcher on the validation from the subject matter expert showed a score of 94%. This percentage shows that the learning media is considered legitimate and very feasible, because it obtained a score of 94%, with a percentage of 81% to 100%, thus confirming its high feasibility. Entering the language validation obtained a score percentage of 84%. This percentage shows that the learning material is considered legitimate and classified as very feasible, if the percentage of the score reaches 81% to 100%, then it is included in the category of very feasible to use.

These two results are in line with the opinion of those who say that the development of learning media must be effective in attracting students' attention and must also be valid/authentic. The calculation on the results of the practitioner validation obtained a score of 97.1%, categorizing the figure as very practical. Practitioner validators point out that this Sanjaya (2016) *Smart Box learning material* is very feasible for field applications without modifications. Media findings that are

categorized as very feasible are achieved when the percentage results range from 81%-100%. stating that learning media is easy to understand and attracts more students' attention to the material presented. From the results and explanations above, it can be concluded that the percentage of media, materials, language, and practitioners is included in the very feasible category. (Magdalena et al., 2021)

Table 3. Recapitulation of Percentage of Scores of Eligibility Aspects

No	Validator	Percentage Score	Criterion
1	Media Member	100%	Highly Worth It
2	Material Expert	94%	Highly Worth It
3	Linguist	84%	Highly Worth It
4	Practitioners	97,1%	Highly Worth It
	Average	93,7%	Highly Worth It

Based on the quantitative and qualitative data above, for quantitative data with a percentage of 84%-100% where if described, the value from the lowest language validator obtained a score of 84%, followed by the material validator 94%, practitioners obtained a score of 97.1% and the highest score was obtained by the media validator with a score of 100%. While the qualitative data obtained is based on the recapitulation of the percentage of scores above, the information obtained is very feasible to use and very feasible in the trial, both limited trials and field trials. After the media is considered very suitable for use by the validator, the researcher then conducts a trial of *Smart Box* learning media to students. The media application has two trials: a limited trial and a field trial. The following is a description of limited trials and field trials of *Smart Box learning media*.

The first collection of data on students' interest in *Smart Box* learning media was carried out in a limited trial conducted in class V-B on 6 randomly selected students. During the application of media, students are asked to sit in a circle around the media to make it easier to see and reach. After using the media, the researcher distributed a questionnaire which was then filled out by students based on learning using *Smart Box* learning media. The findings of the limited trial results show that the examination of the student response questionnaire revealed a very positive reaction to *the Smart Box learning media*, as can be seen from the scores obtained from the student response questionnaire sheets that have been distributed, namely the overall score obtained which if presented is 92.9% and is included in the very interesting category because the percentage reaches 81% - 100%.

After conducting a limited trial, the researcher proceeded to the next stage, namely conducting a field trial. The field trial was carried out in class V-A with a total of 25 students. The collection of data on students' interest in *Smart Box* learning media was carried out by distributing questionnaires which were then filled out by students after using *Smart Box* learning media. Based on the results of student responses, a percentage score of 88.8% was obtained. This percentage shows that the category of student interest level assessed during the field experiment is in a very interesting range, reaching 81% to 100%. In conclusion, the findings from expert validation and student interest questionnaires show that *Smart Box learning media* about the human respiratory system is very feasible and interesting for the educational process. The following is a recapitulation at the time of the trial:

Table 4. Recapitulation of Student Response Score Percentage

No	Validator	Percentage Score	Criterion
1	Limited Trial	92,9%	Very interesting
2	Field Trials	88,8%	Very interesting
	Average	94,3%	Very interesting

Limited testing and field studies show that students show significant interest in *Smart Box* learning media on human respiratory system material. Feedback and recommendations on *Smart Box* learning media are positive and constructive. During the trial, it was observed that students showed great interest and enthusiasm in learning about the human respiratory system through *Smart Box* learning media. This is in accordance with research that shows that the use of Squirrels (2020) *Smart Box* media can accelerate information understanding, improve collaborative group work, increase responsiveness to questions, and cause joy because of games in the media. Likewise, the results of the research from Aminah & Yusnaldi (2024) the practical test show that *smart box* media is practically used in learning. And the test of teaching results that has been carried out for grade V students at MIS Rantau Panjang obtained a completeness of 95% of learning outcomes with the very effective category and a significant increase in the N-Gain analysis with an average of 0.85 with a high category. This condition explains that media in the form of smart boxes is effective if used for the teaching and learning process and can improve student learning outcomes. It Widiastika Asti et al. (2021) also emphasizes that students tend to choose attractive elements such as visual imagery, attractive colors, and captivating animations, which improve educational comprehension and achievement.

D. CONCLUSIONS AND SUGGESTIONS

Based on the results of the research, *Smart Box* learning media is considered very suitable for use in learning the human respiratory system in class V-A SDN 031 Simpang Amal. This can be seen from the results of the validation of experts, namely media experts who gave a score of 100%, material experts 94%, language experts 84%, and practitioners 97.1%, all of whom were in the very decent category. In addition, students' interest in the use of *Smart Boxes* is also very high. In the limited trial, the student interest rate reached 92.9%, while in the field trial it was 88.8%, which shows that this medium is able to attract attention and increase student engagement during learning.

From these findings, it is recommended that teachers use *Smart Box* media as a means to create more interesting and motivating science learning. For students, the existence of this media is expected to foster the spirit of learning and encourage them to be more active in participating in learning. Meanwhile, for future researchers, the development of *Smart Boxes* in other subject matter can be an opportunity to produce more innovative and relevant media for students' learning needs.

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