Enhancing Student Learning Through the Fashionopoly Board Game: A Teaching Aid for The Fashion Design Topic in Design and Technology Subject

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ABSTRACT - The integration of Design and Technology into the Malaysian Secondary School Standard Curriculum signifies a notable transformation in the education system. Existing research shows that many teachers demonstrate moderate level of readiness, particularly in terms of teaching aids, formal qualifications, and subject-specific knowledge. Many continue to rely heavily on textbooks and this restricts their instructional creativity and diminishes lesson effectiveness. In response to this challenge, this study proposes a teaching aid known as Fashionopoly Board Game, specifically designed for the Form 1 Fashion Design Topic in the Design and Technology curriculum. The development process, guided by the ADDIE model, consists of five stages, namely analysis, design, development, implementation, and evaluation. The process begins with needs analysis. Product development integrates the idea of board game with 3D printing technology. Purposive sampling is employed where data collection methods involve semi-structured interviews with three experienced experts from the background of education and fashion. Results reveal that Fashionopoly Board Game aligns with the curriculum of Fashion Design Topic. The teaching aid is attractive and it enhances student involvement. The visual design of Fashionopoly Board Game supports subject content mastery while contributes to more interactive classroom environment. Fashionopoly Board Game is a useful model with great potential to be further used for technical and vocational education. It can be improved by integrating graphics that are closely related to the topic.

INTRODUCTION

Technical and Vocational Education and Training (TVET) was first introduced by the Ministry of Education in 1964 in Malaysia. Focusing on preparing students with practical knowledge and hands-on abilities tailored for industrial sectors, TVET is hoped to contribute to national economic advancement. The transition from the Integrated Secondary School Curriculum to the Standard Secondary School Curriculum (KSSM) presents the initiatives to increase education quality and incorporate current technologies, especially within the Design and Technology (RBT) subject area. Game-based learning is increasingly embraced as a creative strategy to engage learners since it is proven to be effective in improving understanding, nurturing critical thinking and promoting problem-solving skills (Huber et al., 2024). Incorporating gamification during the content delivery provides students with interactive and meaningful learning experiences, which aligns with both national and international educational developments (Mohammed et al., 2024).

The Secondary School Standard Curriculum Document for Curriculum and Assessment (DSKP) was developed as instructional guidelines for educators to fulfill the specific objectives of each subject (Mahat et al., 2024; Harun & Yaacob, 2021). Introduced as a replacement for the previous subject, Integrated Living Skills, RBT Subject was officially implemented nationwide in 2017, which signifies a major reform in technical education. Compared with Integrated Living Skills Subject, RBT Subject aims to prepare students on both the theory knowledge and practical skills in design and problem-solving. The subject focuses on the daily application of technology, specifically through the implementation of RBT project work. Educators play an important role in the effective delivery of this curriculum. This requires proficiency in multiple areas such as pedagogy, subject content, technological tools, and the strategic use of teaching aids (Thelma et al., 2024).

In the realm of 21st-century education, traditional teaching practices such as the "chalk and talk" approach are gradually being replaced by innovative strategies like game-based learning. This modern approach aligns well with the preferences of the Alpha generation, who generally prefer interactive, conducive and playful learning environments over traditional ones. Game-based learning promotes student engagement during the learning process and has been shown to boost academic achievement. The integration of RBT Subject within the KSSM framework signifies a major shift in instructional practices. Nonetheless, these changes require teachers to develop new competencies for effective delivery. Despite this need, Sahaat & Nasri (2020) pointed out that some of the RBT Subject teachers exhibit only moderate preparedness in utilizing teaching aids, emphasizing the importance of using creative strategies to maintain student interest and attention during lessons.

Nonetheless, the implementation of RBT Subject encountered several challenges. Some RBT Subject teachers have insufficient professional training or formal qualifications in the field. They also have limited resources and technology when conducting the class and often depend heavily on textbooks. This overreliance restricts instructional creativity and diminishes the effectiveness of lessons (Pua & Mukhtar, 2024; Dahari et al., 2024). These practices often lead to inadequate preparation of teaching resources, especially for intricate topics like Fashion Design. Consequently, student understanding and engagement will decrease (Ismail e al., 2022). In addition, teachers without specific subject expertise may struggle in diversifying their teaching techniques. This can limit students' mastery of the content. To overcome these barriers, it is essential for educators to improve their pedagogical creativity, integrating supplementary materials, and design effective instructional tools to make sure that curriculum learning objectives are met.

Sub-Section Headings

Sub-section headings, however, should be in lower-case with their initials capitalised. They should be numbered as 1.1, 1.2, etc.

The author (s) should define all **abbreviations** used when the first time appeared in the text. A list of abbreviations may also be included at the end.

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METHODS AND MATERIALS

The objective of this study is to design and build a teaching aid called Fashionopoly Board Game by using the ADDIE Model (Adeoye et al. 2024). ADDIE Model offers a systematic approach in creating an engaging teaching aid. Fashionopoly Board Game is a board game designed to Fashion Design Topic more enjoyably. The product was developed bilingually, in English and Malay. The study employed semi-structured interviews in order to assess the usability of Fashionopoly Board Game in various aspects. These interviews contribute to refining and improving the board game based on experts' point of view. The experts' opinion is believed to be meaningful in providing in-depth insights on the subject content, delivery method, and structural organization of the teaching aid.

An interview protocol which underwent content validation by two experts was specifically developed in this study. The experts have more than 5 years of working experience in the related field where both come from a public university in Malaysia – one with a background in fashion and the other in education. The relevance, accuracy, and suitability of the instrument are validated before data collection. This process ensures the instrument meets the required academic and practical standards and thereby increasing the reliability of the study.

On the other hand, teaching aid validation involved three experts selected based on purposive sampling. They comprise a RBT Subject teacher and two public university lecturers with relevant experience in the field of fashion and education. Their specialized backgrounds in both education and the fashion field provided targeted feedback that was both practical and discipline-specific. Their evaluations offered valuable perspectives on the relevance, effectiveness, and classroom applicability of the Fashionopoly Board Game as an alternative teaching strategy for the Fashion Design Topic within the RBT curriculum. The development process based on ADDIE Model is elaborated in the following sections.

1. Analysis

Before initiating the design process, a thorough needs analysis was conducted to guide the development of the Fashionopoly Board Game. This initial phase is critical for ensuring that the product aligns with the learners' requirements and educational objectives. The analysis aimed to identify specific learning goals, relevant subject content, background of the target users, and the overall accessibility and feasibility of the teaching aid within various learning environments.

As teaching aid development often varies based on specific subject contents and educational settings, the process began by identifying the core and critical issues as well as learning gaps, particularly challenges related to the teaching of Fashion Design Topic. Data was collected through literature review, observations, and preliminary interviews.

2. Design

The design phase builds upon the findings from the analysis stage. This includes detailing the instructional structure, subject content organization, and delivery approaches of the Fashionopoly Board Game. This phase is essential in shaping the content delivery flow and further deciding how the teaching aid will fulfill its intended learning requirements. The learning experience was carefully planned to meet the needs of the primary users, i.e. the teachers and students engaging with the Fashion Design Topic.

The design phase focuses on several key elements. This includes outlining the game structure, developing questions and tasks which are aligned with DSKP, creating game mechanics, and preparing instructional materials. This phase makes sure that all components work cohesively to create a product that improves students' involvement during the teaching and learning process while promoting conceptual understanding.

Moreover, this design phase incorporated a structured validation plan. Field experts were carefully selected according to predetermined criteria such as working experience. They were invited to assess the preliminary versions of the materials. Their feedback was useful and informative in refining the subject content, ensuring it aligned with educational objectives, subject relevance, and remained accessible to users.

3. Development

The development phase is about constructing the actual teaching aid. This includes designing and developing the Fashionopoly Board Game, making sure that the content, layout, and instructional components align with the needs of the intended users – namely, teachers and students learning about Fashion Design Topic. Product development involves the use of 3D printing technology to get the customized main body of Fashionopoly Board Game.

4. Implementation

The implementation phase marks the point at which the developed teaching aid is introduced to its target audience within a real-world or simulated educational setting. As emphasized in ADDIE Model, effective implementation is contingent upon the successful execution of the preceding phases – namely, analysis, design, and development. These stages must be carefully planned, implemented and aligned so that the developed product meets its learning objectives.

5. Evaluation

The evaluation phase is aimed at evaluating the effectiveness and usability of the Fashionopoly Board Game. In this study, qualitative evaluation was performed through interviews with three experts in the fields of RBT Subject and fashion education. These interviews gathered feedback on relevance in subject content, instructional design, user-friendliness, and overall suitability of the teaching aid. Critiques and suggestions from the experts were then systematically analyzed and summarized for further improvement. Feedback from experts' professional experience served as a reference for refining and further improving Fashionopoly Board Game so that it aligns better with the curriculum goals and learner needs.

RESULTS AND DISCUSSION

This study employs the ADDIE Model as the framework for developing the Fashionopoly Board Game. ADDIE Model is widely used for research that emphasizes the creation and refinement of instructional tools due to its characteristic of structured and iterative model. It comprises of five main phases: analysis, design, development, implementation, and evaluation (Ismail et al., 2022). Findings for each phase in the ADDIE Model are discussed in the following sections:

1. Analysis

This phase involved gathering and analyzing information related to the product's goals, desired learning outcomes, curriculum alignment, and implementation strategies. DSKP serves as one of the main references in this phase. The insights obtained during the analysis phase become the foundation for developing an instructional product that is both pedagogically relevant and practically useful. Ultimately, the analysis made sure that Fashionopoly Board Game would be tailored to support the content delivery of Fashion Design Topic in a manner that is both engaging and contextually appropriate.

2. Design

At this stage, the design process began with the scratch, followed by the use of SketchUp Software to create the initial draft of the proposed product, as shown in Figure 1. Subsequently, Figure 2 presents the assembled version, showing how different components were integrated to form the end product.
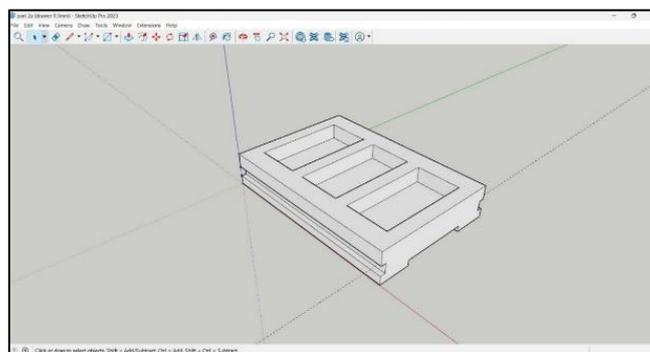
**Figure 1:** Initial design of the teaching aid using SketchUp Software.
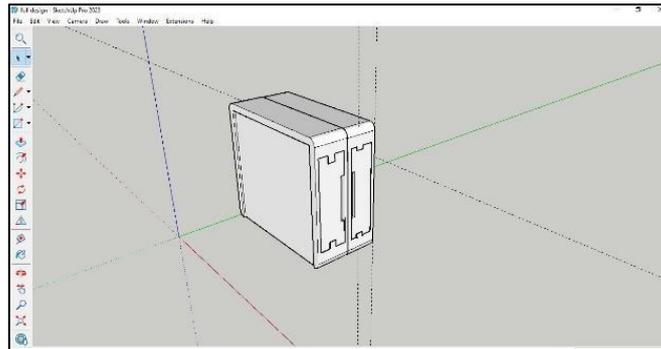
Figure 2: Assemble of various parts to form Fashionopoly Board Game.

Additionally, this design phase included a well-planned validation process. Relevant subject matter experts were carefully selected and invited to review the preliminary versions of the materials. Their input was important in refining the subject content, ensuring it aligned with educational objectives, maintained subject relevance, and remained accessible to users.

3. Development

The development phase focuses on the development of the teaching aid and its supporting materials. A key focus of this stage is the design and production of the Fashionopoly Board Game, which is tailored to meet the learning needs of both teachers and students. In this study, 3D printing technology was employed to develop customized but tangible board. Figure 3 demonstrates the printing layout. Apart from promoting tactile learning experience, this approach improves students' engagement during the learning process. Figure 4 presnts the 3D printed product, which is the main body of Fashionopoly Board Game.
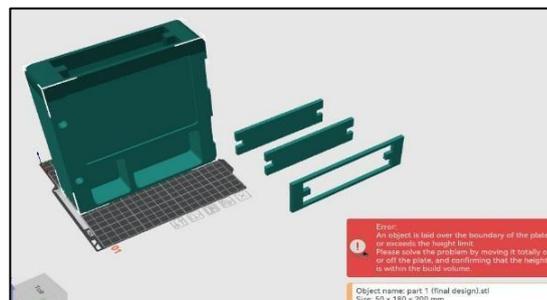
Figure 3: Printing layout of Fashionopoly Board Game.

Figure 4: Part of Fashionopoly Board Game produced from 3D printing technology.

4. Implementation

In this study, the Fashionopoly Board Game was initially planned to be implemented in the classroom. Nonetheless, due to unforeseen challenges and logistical constraints, the plan could not be implemented directly in a school environment within the available timeframe. An alternative approach was employed to replace classroom testing with expert-based testing.

This approach involved the participation of experts who interacted directly with Fashionopoly Board Game. They evaluate the teaching aid in terms of its usability, design, and subject content relevance such as alignment with educational goals as outlined in DSKP of RBT Subject. Even though Fashionopoly Board Game was not tested in a live classroom, useful ideas that contributed to refining and validating the teaching aid were given by the experts. This form of assessment provides valuable insights on Fashionopoly Board Game about its potential effectiveness. Experts also highlighted areas for improvement prior to future classroom integration. The end product for implementation is illustrated in Figure 5.

(a)   (b)

Figure 5 (a) Main part of the teaching aid: Fashionopoly Board Game; (b) QR code is provided for instruction and exercises on the Fashion Design Topic.

5. Evaluation

A qualitative evaluation was carried out through interviews with three subject matter experts in the areas of RBT Subject as well as fashion education. These interviews were designed to obtain in-depth feedback on various aspects of Fashionopoly Board Game, including content accuracy, instructional design clarity, and its potential to support meaningful teaching and learning.

Based on their professional insights, the experts provided constructive but actionable suggestions for improvement. Feedbacks were systematically analyzed to identify both strengths and areas for improvement. As a result, Fashionopoly Board Game was critically reviewed in terms of academic validity and classroom applicability, highlighting its value as an innovative and engaging teaching tool for Fashion Design Topic.

In a nutshell, the feedback was positive, particularly on the game's suitability for the students' age and curriculum level, the visual and graphic design and ease of use. Feedback revealed that the teaching aid has strong potential to enhance learning experiences. A more detailed discussion of the experts' feedback is presented in the following section.

DISCUSSION

This study aims to develop a teaching aid named Fashionopoly Board Game, built specifically for the Form 1 Fashion Design Topic under the curriculum of RBT Subject, utilizing the ADDIE Model. Based on insights gathered from interviews and the product development phase, several key issues warrant discussion.

1. Challenges Faced by Teachers when Delivering the Content of the Fashion Design Topic

Teachers encounter various challenges in teaching the Fashion Design Topic. The challenges include limited access to teaching resources, a lack of professional development opportunities, inadequate support of the institution, and issues in stimulating student interest in a subject. Some expert responses are as follows:

"… The lack of available resources makes it difficult for them to master the topic...." (R1)

"… The lack of student interest is one of the main challenges." (R2)

"…. The lack of teacher skills in mastering the topic and providing accurate explanations to students….." (R3)

First, lack of teaching resources poses a significant barrier to effective learning. Insufficient appropriate tools and learning aids hinders students' ability to explore and further comprehend complex concepts within Fashion Design Topic. Additionally, a lack of student engagement appears to be a major concern, as low interest levels can result in poor classroom engagement. Teachers' limited subject-matter expertise affects the clarity and quality of content delivery. When teachers struggle to convey technical knowledge, students are less likely to retain and apply what they learn.

These findings reveal that multiple obstacles must be addressed to ensure a smooth teaching and learning process. Hence, it is crucial for teachers to adopt innovative strategies or methods to prevent students from falling behind, particularly in topics that require both hands-on practice and theoretical understanding, such as Fashion Design Topic.

2. Appropriateness of Fashionopoly Board Game for the Curriculum and Student Age Group

This section explores the alignment of the content, particularly the quiz questions in the Fashionopoly Board Game with the Form 1 Design and Technology curriculum. Ensuring the content aligns with the students' cognitive level is crucial to prevent it from being either overly simplistic or excessively difficult. The alignment also helps in achieving curriculum learning outcomes. The experts reviewed the formulation of quiz questions in terms of the relevance to curriculum standards and student comprehension levels. Expert responses provide further insight:

"... each question, when referring to the DSKP (Curriculum Standard Document) and based on the textbook, usually remains aligned" (R1)

"considered appropriate for the curriculum level of Form 1 students, and meets several key criteria that align with their level of understanding and skills." (R2)

"... suitable for the Form 1 curriculum level, but it would be better if related images were included" (R3)

The findings pointed out the critical role of curriculum alignment in ensuring the educational value of the Fashionopoly Board Game as a teaching aid. The first respondent, R1 stresses that referencing both the DSKP and textbook ensures that the quiz content is consistent with learning objectives as outlined in the DSKP. The second respondent, R2 affirms that the quiz questions are well-structured and tailored for Form 1 students, reflecting their developmental stage and learning needs. The third respondent, R3 also agrees on the suitability of the questions but suggests including relevant images to improve student interest and understanding.

In summary, well-aligned questions, especially when supported by visual aids, can significantly improve the effectiveness of Fashionopoly Board Game as a teaching aid. Such alignment not only reinforces the curriculum but also fosters student engagement and comprehension in the learning process.

3. Visual Design Appropriateness of Fashionopoly Board Game

The effectiveness of a Fashionopoly Board Game is not only determined by its content but also by its visual presentation. Here, the visual design is significant in capturing and sustaining students' attention, especially among lower secondary students. Students at this age are generally more responsive to vibrant and stimulating visuals. A well-designed interface with cohesive themes, appealing colors, and

relevant imagery can significantly improve student involvement in the class as well as the learning experience. Expert responses on the visual design of Fashionopoly Board Game are as follows:

"... need more creativity. Adding images that show content-related visuals..." (R1)

"... Yes, this game appears appealing to students because it has effective visual designs, a cohesive theme, and is very appropriate for the students' age group..." (R2)

"... It would be more engaging if images related to the topic were included as question elements or stimuli. Generally, people's attention is more drawn to images, especially those that are colorful..." (R3)

According to the first respondent, R1, although the existing designs are functional, there is room for improvement in terms of creativity. The expert recommends incorporating images that directly represent the subject matter, for example illustrations of fashion items, tools, or design elements to further improve the contextual understanding and visual appeal of Fashionopoly Board Game. On the other hand, the second respondent, R2 thinks that the current design already resonates well with students, noting its age-appropriateness and thematic coherence. These characteristics helps in making Fashionopoly Board Game enjoyable and approachable for Form 1 students.

Furthermore, the respondent, R3 underscores the potential of using visual stimuli. By integrating images that are colorful and directly tied to the content, particularly within the quiz elements, the teaching aid serves not only serves as educational tool but also as a medium for visual learning. This suggestion is based on the view that nowadays visual learning preferences of many young adolescents are more focusing on colorful images. This further helps in knowledge retention, especially in subjects like Fashion Design that rely heavily on visual concepts.

In overall, while Fashionopoly Board Game currently has an engaging and appropriate graphic layout, its effectiveness could be further improved by integrating more creative and content-specific visual elements. Enhancing the visual component of the Fashionopoly Board Game is believed to contribute in improving comprehension, retention, and overall student motivation in the learning process.

4.   Effectiveness of Fashionopoly Board Game in Enhancing Student Understanding

The implementation of Fashionopoly Board Game as a teaching aid demonstrates great potential in improving students' understanding of the Fashion Design Topic. Through its interactive format, including the featuring quizzes, visual stimuli, and game-based learning elements, the product fosters active involvement, which is known to contribute significantly to better learning outcomes. When students are actively engaged in the learning process, they are more likely to retain knowledge, make meaningful connections, and apply what they have learned.

"... Teaching aids can enhance students' understanding, which is why they are now considered an essential educational resource in the teaching and learning process..." (R1).

"... They improve students' understanding of the Fashion Design Topic in a fun, interactive, and effective way..." (R2).

"... Fashionopoly can improve students' understanding by providing interactive, enjoyable, and experience-based learning..." (R3).

According to respondents R1 and R3, the integration of Fashionopoly Board Game interactive and enjoyable elements plays a significant role in modern pedagogy. These types of teaching aids move beyond traditional passive approaches by involving students in a more conducive, dynamic and experiential form of learning. Teaching of Fashion Design topics that require both conceptual understanding and creative thinking are particularly effective with the implementation of such teaching aids. The second respondent, R2 highlighted that Fashionopoly Board Game presents subject content in a fun and relatable format, therefore making complex topics more accessible to Form 1 students.

In conclusion, Fashionopoly Board Game offers high educational value in facilitating a deeper understanding of Fashion Design Topic among lower secondary students. By integrating interactive, visually engaging, and curriculum-aligned features, it provides a more meaningful and effective learning

experience. The positive feedback from experts further validates its role as a powerful instructional aid within the Fashion Design Topic in the RBT Subject.

5.   Overall Discussion and Summary

The development and implementation of Fashionopoly Board Game as a teaching aid for the Form 1 Fashion Design Topic in the Design and Technology curriculum has revealed several important insights. Field experts' feedback highlighted both the existing challenges in the teaching process and the potential of Fashionopoly Board Game to enhance learning outcomes. Nowadays, teachers encounter multiple challenges in delivering the Fashion Design Topic. This includes a lack of resources, low student motivation, and limited teaching proficiency. These problems can hinder the effectiveness of subject content delivery and further lead to unachievable education learning goals as outlined in DSKP. Therefore, this study proposed the idea of developing Fashionopoly Board Game to address these gaps by offering an engaging, student-friendly teaching aid.

Furthermore, the content of Fashionopoly Board Game was found to be well-aligned with the Form 1 curriculum and suitable for students' cognitive levels. Field experts affirmed that the quiz questions well align with the DSKP and textbook content, even though the inclusion of more visual elements was recommended to further enhance relevance and engagement. Visual design of Fashionopoly Board Game demonstrates an important role in attracting and sustaining student attention during the learning process. Although the current graphics of Fashionopoly Board Game are effective and age-appropriate, there is room for further creativity and contextual illustration to support visual learning and comprehension. Finally, the interactive nature of Fashionopoly Board Game, combining gameplay, visuals, and curriculum-aligned quizzes, was shown to significantly improve student understanding. Experts agreed that such active learning strategies support deeper engagement, better retention, and improved grasp of key concepts in Fashion Design Topic.

In summary, Fashionopoly Board Game appeared to be a promising teaching aid that addresses key teaching challenges while promoting a more interactive and effective learning environment. Continued refinement focusing on the visual content as well as institutional support can further increase its impact in the classroom.

CONCLUSIONS

In conclusion, Fashionopoly Board Game presents a promising solution to several challenges encountered by teachers teaching the Fashion Design Topic. Guided by ADDIE Model, the developed Fashionopoly Board Game is user-friendly and its content is aligned with the curriculum of RBT Subject. Improvements to Fashionopoly Board Game are essential to enhance its effectiveness during curriculum delivery. Experts suggested incorporating graphics that are closely related to the topic to make the learning experience more enjoyable and effective since this allows students to better visualize and understand fashion concepts. Ultimately, Fashionopoly Board Game is more than just a game. It is a meaningful teaching aid that supports curriculum goals while addressing key challenges in the teaching and learning process. By integrating interactivity, visual appeal, and curriculum relevance, Fashionopoly Board Game demonstrated strong potential to improve student outcomes, enhance their understanding of Fashion Design Topic, and thus make learning a more enjoyable and effective experience.

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CONFLICT OF INTEREST

The authors declare no conflicts of interest" should be included if there is no conflict of interest.

AUTHORS CONTRIBUTION

Muhammad Hafizzuddin Ab Jalil.: Writing- Original draft preparation, Early Product Development. **Jing Rui Tang.**: Methodology, Supervising. **Wan Nurlisa Wan Ahmad.**: Product testing. **Shir Li Wang.**: Product Validation. **Fardila Mohd Zaihidee.**: Finalized Product Development

AVAILABILITY OF DATA AND MATERIALS

Data available on request from the authors.

DECLARATION OF GENERATIVE AI

The authors declare that no generative AI was used in the writing of the manuscript.

ETHIC STATEMENTS

Not applicable

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