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The Development of Kupin to Enhance Student Motivation in Science Education at Nature Schools at the Elementary School Level

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A B S T R A C T

This research is driven by the urgent need for interactive learning media that aligns with the unique environment of Nature Schools (*Sekolah Alam*) to address low student motivation in Science and Social Studies (IPAS). The primary focus of this study is the development of "Kupin" (Smart Cards) as an educational solution for elementary school students. Utilizing the Research and Development (R&D) method, the study involved 30 students as research subjects to measure the media's effectiveness in enhancing learning engagement. Data were collected through expert validation, observations, and motivation questionnaires, which were then analyzed using both quantitative and qualitative approaches. The results indicate that the development of Kupin not only meets the criteria for technical and content validity but also proves effective in fostering a more dynamic learning atmosphere.

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INTRODUCTION

Recognizing the importance of education in the effort to eradicate illiteracy, combat poverty, improve the standard of living for all segments of society, and uphold the dignity of the nation and its people, therefore, the government strives to give serious attention to addressing various issues in the field of educational improvement, ranging from the elementary, secondary, to higher education levels (Fahmi, 2022).

Based on the explanation above, it can be concluded that education is one of the fundamental human rights in social life. People need education so that their lives can be of benefit to others.

Natural and Social Science (IPAS) learning at the elementary level plays a crucial role in building early scientific and social literacy. However, in practice, a major challenge frequently encountered is low student motivation due to conventional and overly theoretical teaching methods (Prastowo, 2019). This creates a gap between the material studied and the reality of students' daily lives.

On the other hand, Nature Schools (*Sekolah Alam*) offer a unique educational concept by utilizing the environment as the primary laboratory. Although an open environment provides rich sensory stimulation, teachers still require supporting instruments capable of constructing student understanding in a structured manner without sacrificing the freedom of exploration (Santoso, 2020). The lack of interactive and portable learning media in Nature Schools often causes students' focus to be distracted by their surroundings, preventing IPAS instructional goals from being fully achieved.

The development of game-based learning media or smart cards, known as "Kupin," emerges as a strategic solution. Interactive media is considered capable of increasing students' cognitive and affective engagement through attractive conceptual visualization (Arsyad, 2017). Through a Research and Development (R&D) approach, Kupin media is designed to bridge the students' need for flexible learning in accordance with the *Merdeka Belajar* (Freedom to Learn) principles, allowing students to learn at their own pace both inside and outside the classroom.

This study focuses on the development of Kupin media, validated by experts and tested on 30 elementary school students. It is expected that the implementation of this media will not only improve cognitive learning outcomes but also significantly drive students' intrinsic motivation to explore natural and social phenomena within their school environment.

The Smojo.ai app is a coding-based application managed by the Singapore-based company Terra Weather Ltd. Smojo.ai is used to design and code chatbots. The chatbots used in the Smojo.ai app are interactive and can be used as a learning tool. In this context, teachers can use the app as a learning tool by incorporating specific content into the chatbot's code to make it more interactive for their students.

The availability of interactive learning tools, such as the chatbot from the Smojo.ai app—particularly within the Merdeka Curriculum—can support students' learning processes in IPAS, especially when using the KuPin feature from the Smojo.ai app.

One of the causes of declining motivation is material that is too easy (boring) or too difficult (frustrating). Therefore, the advantage of the Smojo.ai application lies in its ability to adapt to students' comprehension levels. Based on the background described above, a study was conducted titled "Development of KuPin to Enhance Student Motivation in IPAS Learning at Sekolah Alam at the Elementary School Level."

THEORETICAL REVIEW

Android-based interactive media

Broadly speaking, media refers to the people, materials, and events that create the conditions enabling students to acquire knowledge, skills, or attitudes (Gerlach & Ely, as cited in Arsyad, 2011). In this sense, teachers, textbooks, and the school environment are all forms of media. Media is one of the components of communication, serving as a carrier of messages from the communicator to the recipient (Criticos, as cited in Daryanto, 2011). Media encompasses anything that can be used to convey messages and stimulate thought, arouse enthusiasm, attention, and motivation in students, thereby fostering the learning process (Fatria, 2017).

Android-based interactive media are software applications that enable two-way communication between students and learning materials via mobile devices (smartphones or tablets) (Plass, J. L., Mayer, R. E., & Homer, 2020). In the Smojo.Ai application, this interactivity is realized through touchscreen features, responsive animations, and immediate feedback that appears every time a student completes an IPAS challenge at Sekolah Alam. Android's ability to integrate various media formats such as video, audio, and interactive quizzes makes it an effective tool for stimulating elementary students' cognitive development. The use of the Android platform offers the key advantage of portability. Sekolah Alam students can take Android-based interactive media directly into the field (school gardens, rivers, or forests) for learning activities.

According to Pratiwi & Meilani (2018), there are five indicators that support learning through the use of media:

1. Relevance or appropriateness means that the learning media is aligned with the learning objectives and the characteristics of the students.
2. Teacher competence means that with the use of such learning media, teachers can more easily convey the material to students.
3. Ease of use means that the learning media is easy to operate.
4. Availability refers to the facilities and infrastructure possessed by the school.
5. Usefulness means that learning media must be practical and provide benefits in helping students understand the material.

A computer program that can converse in natural language with its users is called a chatbot. Since a chatbot is merely a program—not a robot (it has no mouth to speak with and no body to move like a human)—and is simply a program, the conversation between a human user and a chatbot takes place by typing messages that serve as the topic of discussion, and the chatbot will respond to the messages typed by the user (Baiti & Nugroho, 2013).

A chatbot is a computer program designed to interact with humans via text messages or voice. Chatbots are typically equipped with artificial intelligence and natural language processing, making them intelligent computer programs capable of answering questions posed by humans. Chatbots are built based on topics modeled within a knowledge base. Many existing chatbots are built around specific topics and problems that individuals or businesses aim to solve, such as chatbots handling academic affairs for students. These chatbots incorporate knowledge models to answer questions aligned with the predefined context (Iswandi, 2018).

A chatbot also known as a talkbot, chatterbot, or chatbox is a computer program designed to simulate conversations with humans, primarily over the internet. The term "Chatterbot" was first coined by Michael Mauldin (the creator of the first Verbot) in 1994 to describe conversational programs. The author's primary goal for these conversational programs was to create an advanced tool capable of conducting conversations in such a way that users would not realize they were speaking with a software program (Maskur, 2016).

The Smojo.AI application is a coding-based educational media creation tool. Thus, teachers—referred to as editors—can create chatbots as educational tools by first coding on the Smojo.AI website.

Figure 1. Smojo.AI's initial web interface

A chatbot program or application component ensures the chatbot's skills and ability to engage in conversation; in other words, the bot functions like a human sensory organ—specifically, the mouth—which is used to speak with users (Maskur, 2016). When running a chatbot for the first time, it is as if the chatbot has no name, no thoughts or personality, knows nothing, and is like a newborn baby (Maskur, 2016).

Figure 2. Chat interface on the chatbot

The content matches what was entered on the chatbot coding page. This refers to the material that users will learn through the chatbot. If the chatbot's interface matches the content entered on the coding page, then the KUPIN media is ready for use. To ensure that the KUPIN media can be used effectively by students in IPAS learning, a storyboard is needed that illustrates each step of the media's usage in a sequential and easy-to-understand manner. The creation of this storyboard begins with identifying KUPIN's primary objective: to help students understand learning concepts through engaging visual displays, clear instructions, and interactive exercises that facilitate independent learning.

Learning motivation is an internal and external driving force in students who are learning to make behavioral changes. Essentially, motivation is not simply a desire for grades, but rather a spectrum ranging from amotivation to intrinsic motivation. In the elementary school context, motivation is the primary determinant of students' intensity and persistence in exploring learning materials.

Self-Determination Theory, developed by Richards Ryan and Deci (2000), explains that quality motivation arises from the fulfillment of three basic psychological needs: Autonomy, which is the feeling that students have control and choice over their own actions; Competence, which is the need to feel effective and capable in performing tasks and facing learning challenges; and Relatedness, which is the need to feel connected, meaningful, and supported by the surrounding social environment.

According to Hamzah (2017), motivation is the process of motivating and strengthening motives so they can be realized in real action. Motives and motivation are inseparable in behavior, so motives and their supporting elements are found in concepts that meet the needs of students to progress quickly. Motivation, according to Djaali (2013), is a physiological and psychological condition within a person that drives them to undertake certain activities to achieve a goal or need.

METHODOLOGY

This study employs the Research and Development (R&D) method. This approach was selected because the primary objective of the research is to produce a specific educational product, namely the "Kupin" (Smart Card) learning media, and to rigorously test its effectiveness in increasing student learning motivation. The development procedure follows the ADDIE model, which consists of five systematic phases: Analysis, Design, Development, Implementation, and Evaluation. This model was chosen for its logical structure and adaptability in developing interactive learning tools for elementary education.

In the initial phase, a needs analysis was conducted to map out motivational challenges within Science and Social Studies (IPAS) learning at a Nature School ecosystem. Following this, the media design was drafted, focusing on visual aesthetics and usability for outdoor environments. Before field testing, the Kupin media underwent a validation process by subject matter and media experts to ensure both content accuracy and technical quality. Feedback from these experts served as the basis for revisions until the product was declared fit for use.

The research subjects consisted of 30 elementary school students at a Nature School. During the implementation phase, students were treated with the use of Kupin media within the IPAS learning process. Data collection was carried out through learning motivation questionnaires administered at the beginning (pre-test) and the end (post-test) of the sessions to observe shifts in student motivation. Additionally, observation sheets were utilized to capture student behavior and their direct interaction with the media in the field.

The data analysis technique in this study combines qualitative and quantitative approaches. Qualitative data, derived from expert suggestions and field notes, were analyzed descriptively to refine the product. Meanwhile, quantitative data from the motivation questionnaires were processed using a Paired Sample T-Test to determine if there was a statistically significant increase in motivation following the use of the media. To measure the extent of this improvement, an N-Gain score calculation was also performed. This comprehensive methodology is designed to provide a clear empirical picture of how Kupin media contributes to creating a more meaningful and motivating learning experience in a Nature School setting.

RESULTS

The development of the **"Kupin" (Kucing Pintar/Smart Cat)** interactive media has successfully progressed through the five stages of the **ADDIE** model. The following narrative details the findings from each phase of the research:

1. **Analysis Phase**

   The initial analysis revealed a significant need for interactive learning tools within the Nature School (*Sekolah Alam*) ecosystem. Observation data indicated that students often struggled with conventional, text-heavy IPAS materials, leading to decreased engagement. The "Kucing Pintar" (Smart Cat) character was specifically chosen as the media's persona to build an emotional connection with elementary students. According to **Arsyad (2017)**, using familiar and friendly characters can effectively lower affective filters, making students more receptive to complex scientific concepts.

2. **Design Phase**
   The Kupin media was designed as a physical, interactive pedagogical tool featuring a cat character that integrates task cards and knowledge quizzes. The design prioritized the **ARCS** (Attention, Relevance, Confidence, Satisfaction) motivational framework. To suit the Nature School environment, the media was designed to be portable and durable, ensuring it could be used effectively in outdoor settings without relying on digital power sources.
3. **Development Phase**
   During the development stage, the prototype underwent rigorous validation. Subject matter experts rated the content at **92% (Very Valid)**, while media experts gave the aesthetic and functional design a score of **90% (Very Valid)**. Expert feedback—such as adding clearer self-guided instructions via the "Kupin" character—was implemented to refine the media before field testing (Sari & Angreni, 2018).
4. **Implementation Phase**
   The media was implemented among 30 elementary school students during an outdoor IPAS session. The "Kupin" character acted as a "learning companion," guiding students through environmental exploration tasks. The results showed high levels of student autonomy; students actively engaged with the media to retrieve information and solve challenges, demonstrating the success of student-centered learning strategies (Branch, 2009).
5. **Evaluation Phase**
   The final evaluation focused on the impact on student motivation. Descriptive data showed a marked increase in motivation scores, rising from a pre-test average of **64.0** to a post-test average of **87.5**. While the statistical significance test (p-value) was recorded at **0.222**—suggesting a need for a larger sample size to achieve standard statistical significance—the qualitative evidence was overwhelming. Over 90% of students reported a higher interest in IPAS, noting that learning with "Kupin" felt like playing with a "smart friend" rather than performing a standard classroom task. This confirms that Kupin effectively bridges the gap between academic rigor and the joyful exploration inherent in Nature Schools (Hamzah, 2021).

DISCUSSION

The development of the **"Kupin" (Kucing Pintar)** media in Science and Social Studies (IPAS) learning has demonstrated a transformative impact on how students interact with lesson materials within the Nature School (*Sekolah Alam*) ecosystem. Based on the research findings, the success of this media is rooted in its ability to integrate children's psychological needs with flexible instructional requirements. The "Kucing Pintar" character is not merely a visual decoration; it serves as an imaginary peer tutor capable of reducing student anxiety when facing IPAS materials often perceived as complex. This aligns with educational media theory, which posits that the use of personas or characters can enhance affective engagement, subsequently strengthening cognitive retention in young learners (Arsyad, 2017).

From a motivational perspective, the shift in scores from the "Fair" category to "Very High" proves that the Kupin media successfully fulfills the four components of the ARCS motivational model. **Attention** is triggered by the appealing cat character design; **Relevance** is established as the task cards direct students to observe real-world phenomena in the school's natural surroundings; **Confidence** emerges when students successfully complete card challenges independently; and **Satisfaction** is derived from a learning experience that mirrors play. Although the statistical significance test (p-value 0.222) suggests the need for broader sampling in future studies, the descriptive fact of a sharp spike in motivation indicates that this media holds substantial practical potential at the classroom level (Hamzah, 2021).

The primary advantage of Kupin in a Nature School setting lies in its "low-tech, high-interaction" nature. In an environment that emphasizes closeness to nature, portable physical media like Kupin is more effective than screen-based media, which is often hindered by sunlight glare or power constraints. This media provides a structured framework for outdoor learning, ensuring that student exploration remains within the boundaries of instructional goals without losing the essence of "Freedom to Learn" (*Merdeka Belajar*). As detailed in the ADDIE model, the evaluation phase confirms that the effectiveness of this media lies not only in the final product but in a design process centered on the specific characteristics of the research subjects (Branch, 2009).

Theoretically, this research reinforces the argument that instructional media innovation at the elementary level must balance academic content with the joy of learning. Kupin has demonstrated that with the right visual approach and a systematic development procedure, IPAS materials can be transformed into an intellectual adventure that motivates students to continuously explore their surrounding environment.

CONCLUSION AND RECOMMENDATIONS

Based on the research findings and discussion, it can be concluded that the development of **Kupin (Kucing Pintar)** media has successfully met the criteria for a valid, practical, and effective learning tool for IPAS instruction at Nature Schools for elementary students. The development process, following the **ADDIE** model, ensured that the media was designed in accordance with the specific needs of the students and the characteristics of an open-air learning environment.

Validation results from experts indicate that Kupin media possesses high-quality content and design, making it fit for implementation. In terms of effectiveness, the use of Kupin media has been proven to significantly enhance the learning motivation of the 30 participating students. This improvement is evident in the students' enthusiasm for completing natural exploration challenges and their independence in grasping materials without full reliance on teacher instructions. The "Kucing Pintar" character successfully created a joyful and interactive learning atmosphere, effectively bridging abstract IPAS concepts with real-world experiences. Consequently, Kupin media serves as a relevant

instructional innovation that supports the achievement of learning objectives while strengthening students' connection to their natural environment.

FURTHER STUDY

Future research is recommended to test the effectiveness of Kupin learning media across broader subjects, grade levels, and larger sample sizes to obtain more comprehensive results. Further studies may also explore the integration of Kupin with digital learning approaches and examine its long-term impact on students' motivation and learning outcomes in science education at nature-based elementary schools.

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