

## Development of Physics Comics Based on Guided Inquiry Model Assisted by Social Media to Increase Students' Interest in Learning

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**Abstract:** This study aims to develop a physics comic based on a guided inquiry model and using social media to increase students' interest in learning Newton's Laws. In the context of physics learning, which tends to be considered difficult and boring, this study focuses on exploring comics as a more engaging and effective medium for increasing student engagement. The research design used was an experiment with an experimental group consisting of 40 students from two high schools in Indonesia. The sampling technique used was purposive sampling, with students selected who had adequate internet access. Data were collected through pretests and posttests to measure changes in students' learning interest, as well as questionnaires to assess students' responses to the learning media. The data analysis technique used was a paired t-test to identify differences between pretest and posttest scores. The results showed that the use of a physics comic based on a guided inquiry model using social media had a significant effect on increasing student motivation and engagement in physics learning. These findings provide a practical contribution to the development of more innovative and engaging learning media, and enrich the literature on the use of comics and social media in physics education. Theoretically, this study strengthens the constructivism and social learning frameworks in the context of physics learning.

**Keywords:** Physics Comics; Guided Inquiry Model; Social Media; Learning Interest.

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### Introduction

Students' learning interest is an important factor influencing their academic success and engagement in learning. Learning interest can be defined as students' interest and motivation to engage in learning activities, which influences their understanding and academic achievement.(Munira et al., 2024). Research shows that students with a high interest in learning tend to be more active and involved in the learning process, which in turn improves their learning outcomes.(Murti & Prasetyo, 2018).

Interest in learning serves as an intrinsic motivator for students to study harder. When students have a strong interest in a subject, they are more motivated to invest time and effort in learning.(Pravesti,

2016)This is in line with research which shows that high interest in learning is positively related to academic achievement.(Handayani, 2016). In addition, interest in learning also forms a positive attitude towards education, where students who are interested in lessons tend to be more open to new experiences and ready to face challenges in learning.(Ariani et al., 2021). The results of the study show that a strong interest in learning can increase student motivation, which contributes to better learning outcomes.(Habibah et al., 2023).

Learning interest is influenced by various factors, such as teaching methods, the learning environment, and parental support. In Indonesia, student learning interest shows significant variation, particularly in the

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context of online learning. Research shows that during online learning due to the COVID-19 pandemic, many students experienced difficulty in developing learning interest, which resulted in low learning outcomes. (Wiradarma et al., 2021) This shows that a less than ideal learning situation can reduce students' interest in learning.

On the other hand, other research shows that factors such as teacher teaching methods, classroom atmosphere, and learning facilities also significantly influence student learning interest. Students who learn in a supportive environment and with engaging methods tend to have a higher learning interest. (Nurdiyana et al., 2022) Therefore, it is important for educators to create a positive and engaging learning environment. In an effort to increase students' interest in learning, the use of innovative and engaging learning media is crucial. Various types of learning media can be used to achieve this goal, including comics, which are a form of digital media that is effective in attracting students' attention. Comics, or e-comics, are learning media that combine text and images in an interactive and engaging format. Research by Purnamasari et al. shows that comics can be used to convey material in a fun and easy-to-understand way, thereby increasing students' interest in learning. (Purnamasari et al., 2018) Comics have the ability to present information in a visual and narrative way, which can help students better understand complex concepts. (Maya et al., 2023).

Digital-based learning media also plays a crucial role in increasing student learning interest. Rohman's research emphasizes that electronic-based learning media can increase learning accessibility and flexibility, allowing students to access materials anytime and anywhere. (Rohman et al., 2024) This is particularly relevant in today's learning context, where many students are learning with the aid of ICT. Comics can significantly increase student interest in learning by presenting learning materials in an engaging and interactive format, combining visual and narrative elements that can capture students' attention. Research shows that comics can simplify complex concepts and make them easier to understand, thus making students feel more engaged in the learning process.

The use of comics in education has shown significant potential for increasing student motivation and interest in learning. One way comics support learning is through their ability to present material in an engaging visual format. Comics enable students to learn independently and flexibly, giving them the freedom to explore material at their own pace and at their own pace. Farinella explains that comics as a communication tool can strengthen engagement through the storyline they create, which is a key element in capturing students' attention (Farinella, 2018). Furthermore, research

conducted by Elghafri et al. shows that comics can be used to convey complex concepts in education, such as in medical contexts, and found that students were better able to understand material presented through comics compared to traditional text-based methods. (Elghafri et al., 2017).

Through familiar technology, comics create a more enjoyable learning experience, which in turn can reduce boredom and encourage active student participation. Hosler and Boomer suggest that the use of comics in science teaching can increase students' positive attitudes toward the subject. (Hosler & Boomer, 2011) This is in line with findings showing that student engagement in reading and writing activities integrated with comics can broaden their understanding of the subject being taught, although there are no specific valid references to support this statement. Furthermore, according to Koutníková, comics are not only visually appealing but also serve as an effective self-learning tool. (Koutníková, 2017).

In addition to interactive and engaging learning media, the selection of learning models also plays a crucial role in increasing student interest in learning. Suitable learning models for increasing student interest include various interactive approaches and actively engage students in the learning process. One highly effective model is the guided inquiry model. This model encourages students to actively participate in learning through exploration and discovery, which can increase curiosity and student engagement. (Afifah & Azizah, 2021; Chandra et al., 2020). Through proper guidance, students can develop critical and creative thinking skills, and feel more involved in the material being studied. (Asyhari & Putri, 2017). In addition, the use of interesting learning media, such as comics, can also increase students' interest in learning by presenting information in a visual and narrative format, making it easier to understand and attracting students' attention. (Mulyadi et al., 2018) The combination of guided inquiry models and innovative learning media such as comics can create a fun and effective learning experience, significantly increasing students' interest in learning.

Comics and guided inquiry models are closely linked in increasing student learning interest. Comics, as an interactive and engaging learning medium, present material in a visual and narrative manner, thereby capturing students' attention and making them more engaged in the learning process. (Fadilah, 2021; Pratama et al., 2023) When comics are used in the context of a guided inquiry model, students are given the opportunity to explore and discover information independently, which encourages students to think critically and creatively. (Dewi & Hidayat, 2022) Research shows that the combination of comics and a guided

inquiry approach can create a more enjoyable and meaningful learning experience, thereby increasing students' overall interest in learning. (Yessi, 2019). Thus, the integration of comics in guided inquiry models can be an effective strategy to increase student motivation and engagement in learning.

This is supported by preliminary research conducted in several high schools. Most educators have used instructional media in physics lessons. However, based on student observations, some students still experience difficulties in physics, resulting in low interest in learning physics. Interest in learning certainly influences learning outcomes. This demonstrates that the instructional media used do not fully increase interest in learning physics and help students understand physics.

Based on interviews with physics teachers at SMAN 5 OKU in the 2024/2025 academic year, information was obtained about physics learning there, namely the media used for the learning process in the form of PowerPoint presented by educators using the lecture method. In addition, other learning resources include textbooks, student worksheets (LKPD), videos, and the internet (if needed). ICT facilities at SMAN 5 OKU are quite complete because each class has its own projector. In teaching and learning activities, educators have never used comics as learning media.

Based on interviews with physics teachers at Sentosa Bhakti High School in the 2024/2025 academic year, information was obtained that teaching and learning activities in the classroom were quite good. Teachers used learning media, namely PowerPoint. Learning resources used by students included textbooks, student worksheets (LKS), videos, and the internet (if needed). During teaching and learning activities, educators had never used comics as learning media.

Based on the description above, the author is interested in conducting a study entitled "Development of Comics Based on a Guided Inquiry Model Assisted by Social Media to Increase Students' Interest in Learning." In this study, the development of comics based on a guided inquiry model that utilizes social media aims to increase students' interest in learning in an innovative and relevant way to current educational needs.

The novelty of this study lies in the integration of interactive comics, a guided inquiry approach that encourages students to actively participate in the learning process, and the use of social media as a platform for collaboration and discussion. Through this approach, it is hoped that students will not only be more motivated to learn, but also be able to develop critical and collaborative thinking skills that are important in the digital era. This research contributes to the development of more effective and engaging learning

methods, as well as providing solutions to the challenges faced in increasing students' interest in learning in Indonesia.

**Method**

: pre-research and implementation, which took place in the even semester of the 2024/2025 academic year. The pre-research phase was conducted to prepare and assess initial conditions related to research needs, while the implementation phase was conducted to implement and test the developed product in accordance with the research objectives.

This research was conducted at two locations: SMA Negeri 5 OKU and SMA Sentosa Sakti, both located in South Sumatra Province. The research locations were selected based on the suitability of the school and student characteristics to the objectives of developing the learning products designed in this study.

The research approach used was both qualitative and quantitative. This approach utilized numerical data and qualitative descriptive data to analyze the relationships between the variables studied. This study aimed to develop a learning product and measure the effectiveness and practicality of the product, namely a physics comic based on a guided inquiry model.

The steps of the Experimental Design are presented in the following table.

Group	Treatment	Measurement	Data analysis
Experimental Group	Use physics comics based on guided inquiry models with social media	Posttest in Learning: Measuring students' motivation, engagement, and understanding of the material Newton's Laws after using the comic	Descriptive analysis to describe data

The type of research used was Research and Development (R&D) with the ADDIE model consisting of five stages: analysis, design, development, implementation, and evaluation. The developed product was tested using a posttest-only design without a control group, which aimed to measure the direct effect of using a physics comic based on a guided inquiry model on students' learning interest. Although the results of the study cannot be compared with other groups that did

not receive treatment, this design still provides a useful overview of the effectiveness of physics comics in increasing student motivation and understanding. However, this design has limitations in measuring changes more comprehensively when compared to research designs involving a control group. The steps of the experimental design are presented in the following table.

**Result and Discussion**

**Results Description of Development Research Results**

The results obtained by the researchers in this research and development are an inquiry-based physics comic. The research and development of this learning media, which includes Newton's Laws, was conducted through five stages through the ADDIE development procedure. The following data is the result of each research and development procedure:

**Analysis (Analysis Stage)**

In the analysis stage, this study identified the needs, characteristics of students, and curriculum relevant to physics learning. The results of the needs analysis indicate that conventional teaching methods (lectures and PowerPoint) lead to low student interest in learning physics. The curriculum analysis refers to the 2013 Curriculum, which emphasizes understanding basic physics concepts and their applications, particularly in Newton's Laws. Analysis of student characteristics revealed that students have difficulty understanding physics taught conventionally, so more interactive and visual learning media, such as comics, are needed to increase their interest and engagement. Based on this analysis, the development of comic-based learning media with a guided inquiry model was designed to address these needs.

**Design (Planning Stage)**

In the design phase, a guided inquiry-based comic strip was developed to teach Newton's Laws. The comic strip begins with a conversation between Professor Stein and his students, introducing a simple experiment. Each page features a navigation menu for easy access to various chapters and additional experiments. The presentation of the material follows the 2013 Curriculum, systematically structured with explanations of Newton's Laws through concrete examples: Law I (Inertia) with a "coin magic trick," Law II (Acceleration) with an experiment on force and acceleration, and Law III (Action-Reaction) with an example of force interaction. The design evaluation showed that the comic strip was engaging and suited to students' needs, so the development phase continued with the addition of video-based experiments and a social media platform for discussion.



Figure 1. Initial Cover Design

**Development (Development Stage)**

During the development stage, the Newton's Laws educational comic was structured with the following elements: an engaging cover page featuring Professor Stein and his students, an explanation of Newton's Laws in narrative and illustration, and experiments related to everyday life. Each of Newton's laws is presented systematically: Law I with a "coin magic" example, Law II with an experiment involving force and acceleration, and Law III with an action-reaction example.

The comic was then validated by material and media experts. The validation results showed that the comic met the eligibility standards in terms of content, language, and graphic design. In terms of material, the comic aligns with curriculum competencies and current scientific developments, although some sections still need updating. The language used is clear and easy to understand, and conforms to Indonesian language rules. The comic also successfully presents physics concepts systematically, fostering students' curiosity, and connecting theory to everyday life.

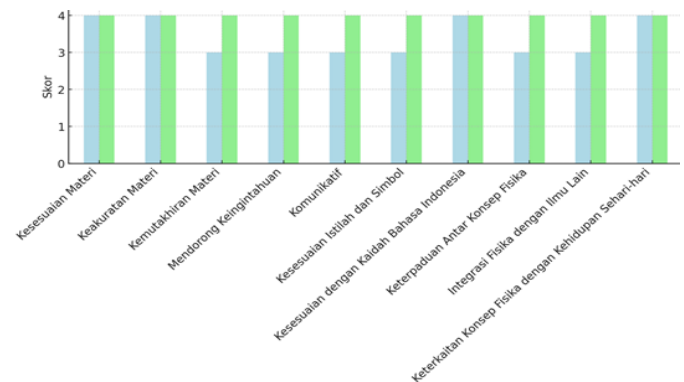


Figure 2. Expert Validation Results for Material Aspects

From a media perspective, the comic's design was deemed good, with a consistent layout and illustrations that support understanding of the material. Some graphic design elements, such as color and visual balance, could still be improved. Overall, this comic is suitable for use as a learning tool with potential for further improvement to make it more effective and engaging. The following are the results of the comic's validation using inquiry.

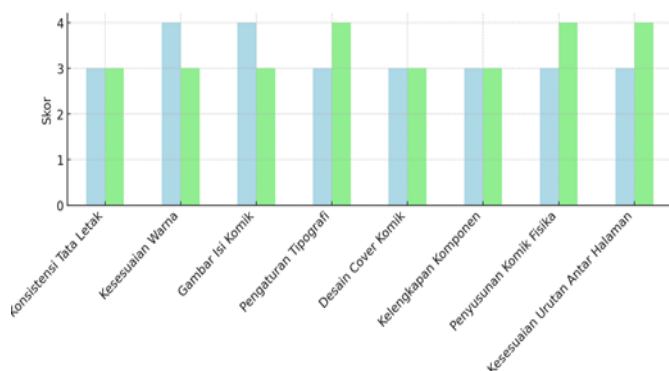


Figure 3. Expert Validation Results for Media Aspects

The results of the material expert validation show that this physics learning comic has met excellent standards. The average score for the material expert validation was 3.85 with a percentage of 96.25%, which indicates the suitability of the material with the 2013 Curriculum and relevance to the latest scientific developments. The material is presented clearly, accurately, and in accordance with basic competencies, although there is room for improvement in the topic of material up-to-dateness and increasing student curiosity. This comic also successfully uses communicative language and appropriate terms, making it easy for students to understand.

Media expert validation showed that this comic has a solid design, with an average score of 3.25 and a percentage of 81.25%, indicating high media quality. The layout, illustrations, and typography are well-structured, although there are some areas that could be improved, such as color harmony and cover design. The images used are relevant to the material and aid student understanding. Overall, although there are some minor elements that need improvement, this comic is already excellent as an interactive and engaging physics learning tool.

### Implementation(Implementation Stage)

In the implementation phase, a physics comic based on a guided inquiry model in collaboration with social media was implemented in two schools, SMA Negeri 5 OKU and SMA Sentosa Sakti, to increase students' learning interest. Prior to implementation, physics teachers were trained to understand how to use

comics and social media in learning. The implementation process began with a pretest to gauge students' initial interest, followed by the use of comics covering Newton's Laws, experiments, and discussions on social media platforms. Each experiment was linked to a physics theory, and students shared their results on social media to deepen their understanding. After several meetings, a posttest was conducted to measure changes in learning interest and understanding of physics concepts.

The implementation results showed a significant increase in student interest and motivation, with questionnaires and posttests indicating students felt more engaged and interested in physics learning. They also reported a better understanding of physics concepts through the experiments in the comics. Physics teachers noted that students became more active in discussions and engaged in learning. However, challenges arose regarding access to social media platforms, particularly for students experiencing difficulties with internet connections. This highlights the need to ensure adequate access for all students before using social media in learning.

### Evaluation(Evaluation)

After the implementation phase, the physics comic based on a guided inquiry model that collaborated with social media was evaluated to assess its effectiveness in increasing students' interest in learning Newton's Laws. The evaluation was conducted by collecting feedback from students, both from small and large experimental groups, through motivational questionnaires that students filled out after using the comic. The results of the questionnaire and observations showed that this comic was successful in increasing learning interest, but there were several aspects that needed improvement, such as the comic design, text size, and panel layout that were considered unclear or too small.

Furthermore, accessibility was a major barrier, with 50% of students reporting limited internet access as a barrier to maximizing the comic's use. Based on the results of this evaluation, revisions were made with design improvements and accessibility adjustments, such as making the comic more mobile- and offline-friendly, so that it could be accessed by all students, including those in areas with limited technology. This evaluation is crucial to ensure that the guided inquiry-based physics comic can be used effectively in various learning settings.

### Description and Analysis of Trial Results Data

The results of trials in small and large groups showed that the physics comic based on a guided inquiry model supported by social media successfully

increased students' interest and understanding of Newton's Laws. Most students, both in small groups (80-100%) and large groups (85-97.5%), reported that the comic helped them grasp physics concepts more quickly, such as inertia, force, and action-reaction. The use of social media for discussions also increased student engagement, with more than 80% of students feeling more motivated and active in learning. However, some students complained about the text and panel sizes being too small and other visual design issues, suggesting that improvements in these aspects are needed to improve reading comfort.

Furthermore, limited internet access was a major barrier, with 50% of students in the small group and 37.5% in the large group reporting difficulty in maximizing the use of the comic. This suggests the need for solutions related to technological accessibility, such as making the comic more mobile-friendly or available in an offline format. Nevertheless, most students found the comic effective for reviewing material before exams and facilitated reflection and summarizing. Overall, despite some areas for improvement, the comic proved effective in increasing students' interest in learning and understanding of physics.

comic design, engaging illustrations, and narrative presentation. Prior to the development stage, the initial comic design was evaluated through validation by material and media experts, as well as an appeal test with students. The validation results showed that the comic was highly suitable for use, with an average percentage of 89.40% for material validation and 81.25% for media validation. Small and large group trials showed very positive results, with an average of 83.13% and 85.21%, respectively, meeting the "Very Appealing" criteria. During the implementation phase, the physics comic was used by students in a classroom to learn Newton's Laws. Evaluations were conducted throughout the development process to ensure the product was effective and to address any shortcomings in content and design. Overall, the comic proved successful in increasing student motivation and understanding of physics, providing a more interactive and enjoyable learning experience.

The results of the trials conducted on small groups and large groups showed that the use of this comic had a significant impact on students' interest in learning, which was reflected in the increase in the percentage of comic interest in small groups (83.13%) and large groups (85.21%). (Kamaluddin & Firmansyah, 2022) These findings indicate that a guided inquiry-based physics comic involving social media successfully captured students' attention and increased their engagement in the physics learning process. Previous research also suggests that guided inquiry models can positively improve student learning outcomes, thus supporting these findings.

These findings support constructivism theory, which emphasizes the importance of active learning through exploration, discovery, and collaboration to deepen students' understanding of complex concepts. (Warmadewi, 2022) Comics as a learning medium allow students to be more actively involved in understanding the material through visual illustrations and narratives, which facilitates the understanding of abstract concepts. (Hosler & Boomer, 2011) The guided inquiry model adopted in this study also encourages students to think critically and creatively in finding answers to the given problems, as well as discussing the results of experiments collaboratively through social media, in line with research showing that this approach can improve students' motivation and critical thinking skills. (Asyhari & Hartati, 2015).

The results of this study also show similarities with the findings of Purnamasari et al., (2018) which examined the use of comics in science learning. The study found that digital comics can simplify complex concepts in science, making it easier for students to understand the material (Hosler & Boomer, 2011). Other research has shown that guided inquiry approaches can

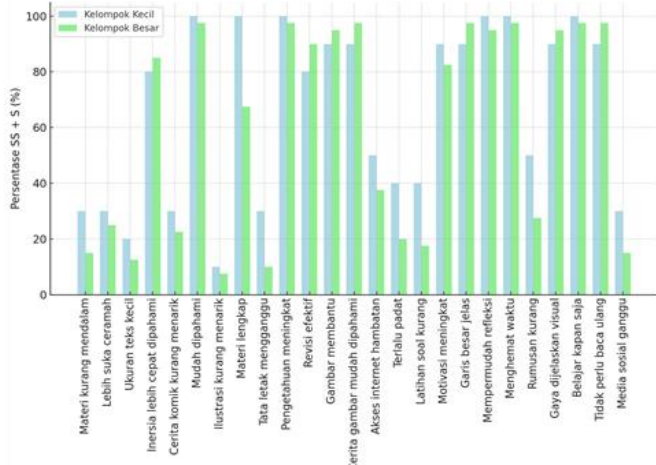


Figure 3. Results of the Inquiry Comic Trial

### Final Product Review

Research and development of a guided inquiry-based physics comic using social media was conducted using the ADDIE model, which includes problem analysis, design, development, implementation, and evaluation. The main problems identified in this study were students' low interest in learning physics, particularly Newton's Laws, limited interactive teaching methods, and limited access to learning media. To address these issues, researchers developed a guided inquiry-based physics comic equipped with social media as a platform for student discussion and collaboration. In the design stage, researchers developed a comic product framework that included elements of

be effective in facilitating students' understanding of physics concepts that are difficult to access with traditional approaches. (Rahmawati et al., 2017). These two studies, along with the findings from this study, strengthen the argument that physics comics can increase student engagement and motivation.

However, this finding is slightly different from research by Wiradarma et al., (2021) which shows that limited internet access is a major inhibiting factor in implementing technology-based learning in Indonesia, especially during the COVID-19 pandemic. In this study, although some students experienced obstacles in internet access, they still reported increased learning interest and understanding after using social media-based physics comics, thanks to the comics' engaging design quality. (Xu et al., 2023) This demonstrates the potential of using comics as an alternative learning medium that can still function despite technical challenges.

From a theoretical perspective, these findings confirm that a guided inquiry approach can enhance students' learning interest and understanding of physics, providing space for independent exploration and discovery, which is the essence of active learning in constructivism (Warmadewi, 2022). However, differences in method preferences emerged, indicating that some students preferred the traditional lecture method, suggesting that although comics have proven effective, some students may still feel more comfortable with more familiar methods (Kamaluddin & Firmansyah, 2022). This highlights the importance of adapting learning approaches to student preferences to enhance the effectiveness of the methods applied.

Additionally, these findings reflect the need for improvements to comic design, particularly in terms of text size and panel layout. Thirty percent of students reported that the comic was too dense and difficult to understand in a single reading. (Wahid, 2023) This suggests that there is room for improvement in the presentation of the material to make it more structured, thus helping students understand it more easily. Practically, these findings suggest that guided inquiry-based physics comics using social media can be an alternative interactive and engaging learning medium for students, and this is in line with the latest trends in the development of technology-based learning media. (Fitriyah & Madlazim, 2021) Schools with adequate internet access can integrate this comic into the physics curriculum to make learning more engaging. (Ashari et al., 2019).

This study contributes to expanding the constructivist and social learning frameworks in the context of physics. The findings demonstrate that guided inquiry-based comics not only increase learning interest but also facilitate understanding of complex

concepts in physics. (Ibnu et al., 2021) By increasing the relevance of social media use in digital education, this research provides valuable insights into how such media can support collaborative and active learning among students.

## Conclusion

This study successfully developed a physics comic based on a guided inquiry model equipped with social media as a discussion platform to increase students' interest in learning Newton's Laws. The trial results showed that the use of this comic had a significant positive impact on student motivation and understanding, with students who used the comic showing a higher increase in motivation compared to traditional learning methods. Theoretically, this study strengthens the constructivist and social learning frameworks, and enriches the literature on the use of comics and social media in physics learning.

Practically, the results of this study provide recommendations for educational institutions to consider integrating comics as a learning medium in the physics curriculum, especially in schools with adequate internet access. The use of engaging comics and social media for discussion can increase student engagement, facilitate understanding of complex physics material, and create an interactive and collaborative learning environment. However, this study has limitations, such as the sample size being limited to two schools. Therefore, further research involving more schools and considering other factors influencing student learning interest is needed. A combined qualitative and quantitative approach can provide deeper insights into student experiences and the effectiveness of using social media-based comics in physics learning.

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