

HARMONY IN PROGRESS:

**INTEGRATING SCIENCE, TECHNOLOGY,
AND
SOCIAL INNOVATION
FOR SUSTAINABLE DEVELOPMENT GOALS**



**e-Book of Extended Abstract
Negeri Sembilan International (NSIEx) & Research Symposium
2025**

PSS006 - VISUALIZING CONTRADICTIONS: AN INTERACTIVE COMIC FOR LEARNING PHYSICAL CONTRADICTION

Aina' Madihah Binti Zulkifli, Jing Rui Tang*, and Wan Nurlisa Wan Ahmad

Fakulti Teknikal dan Vokasional, Universiti Pendidikan Sultan Idris, 35900 Tanjung Malim, Perak, Malaysia.

*Corresponding author: tangjingrui@ftv.upsi.edu.my

ABSTRACT

This study developed an Interactive Learning Comic to teach Physical Contradiction in Form 2 Design and Technology. Using the ADDIE instructional design model and constructivist learning principles, the comic was designed to enhance student engagement and conceptual understanding. Three phases guided the project: identifying instructional requirements, designing and developing the comic, and evaluating its usability through expert interviews. Three subject experts affirmed the comic's effectiveness in simplifying complex concepts via visual storytelling, interactivity, and relatable content. The module offers a practical alternative to traditional textbooks and supports both student learning and teacher instruction. Future work will extend this approach to develop a comic module on time separation inventive principles.

Keywords – Interactive Learning Comic, Design and Technology, Physical Contradiction, Inventive Principles

INTRODUCTION

Teachers face significant challenges in adapting to the transformation of the subject of Integrated Living Skills into the subject of Design and Technology in 2017, which emphasizes problem-solving through TRIZ principles as part of Malaysia's IR4.0 education strategy. This is supported by Sharberi et al. (2020), who noted that learning modules are essential as reference materials, especially those focused on TRIZ principles. The study highlights the importance of interactive teaching aids, such as digital comics, in assisting the teaching of complex topics like Inventive Problem Solving. Previous research found that students retain information better when teaching aids incorporate images and visuals (Abdullah et al., 2015). Mohd Razali and Ayob (2018) also argued that using cartoon illustrations as an interactive module stimulates students' minds to be more active in the classroom. The development of interactive comics in this study aims to enhance students' understanding of the Physical Contradiction subtopic through TRIZ principles, which include the methods of Spatial and Temporal Separation. This comic is expected to improve students' understanding, motivation, and interest in learning complex subject of Design and Technology topics in a more visual and interactive way, while also aiding teachers in delivering more effective instruction.

Interactive comics also play a crucial role in supporting constructivist theory-based learning, where students build knowledge through experiences and simulations in relevant

contexts. This is further supported by Kho et al. (2020), who argued that the use of comics in teaching and learning theoretically strengthens the constructivist approach. With this approach, the study hopes to provide improvements in delivering the content of the subject of Design and Technology and meet the demands of 21st-century learning, which is more interactive and student-centered.

OBJECTIVE

The objectives of this study are to identify the instructional material (IM) requirements for the subtopic of Physical Contradiction in the Form 2 subject of Design and Technology, to develop an Interactive Learning Comic as an instructional material for this subtopic, and to evaluate the usability of the Interactive Learning Comic in supporting the teaching and learning of the Physical Contradiction subtopic in Form 2 subject of Design and Technology.

DESCRIPTION OF THE PROJECT

This qualitative study examines the usability of an Interactive Learning Comic for the Physical Contradiction subtopic in the subject of Design and Technology. Three experienced teachers in the subject of Design and Technology, each with over five years of teaching experience, evaluated the module through semi-structured interviews after reviewing it in advance. Guided by the ADDIE model, the module's development involved:

- (1) Analysing the needs of teachers and students for accessible, visually engaging, and example-rich resources;
- (2) Designing interactive materials with QR codes, real-life examples, and storyboard illustrations to simplify TRIZ inventive principles;
- (3) Developing the comic narrative, practice spaces, and gamified quizzes;
- (4) Implementing and refining the module based on expert feedback; and
- (5) Evaluating its effectiveness over a one-week trial. Thematic analysis of interview data provided insights into the module's suitability and effectiveness in enhancing teaching and learning.

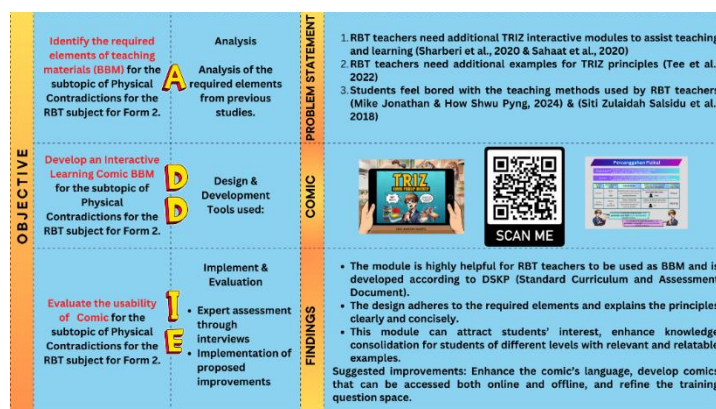


Figure 1: Development and Evaluation of an Interactive Learning Module Using the ADDIE Model.



Figure 2: A section of the comic that visually depicts a problem and its solution using the TRIZ principle, accompanied by illustrated explanations.

NOVELTY

The novelty of this product lies in its integration of the TRIZ inventive principles into a visually engaging comic-based learning module, specifically tailored for the Physical Contradiction subtopic in subject of Design and Technology. Unlike conventional teaching resources that rely heavily on text and static diagrams, this module presents problem scenarios and solutions through illustrated storytelling, supported by interactive elements such as QR codes linking to gamified quizzes. This unique combination of visual narratives, real-life examples, and digital interactivity not only simplifies complex concepts but also enhances student engagement, making it an innovative tool for fostering creativity, problem-solving skills, and deeper conceptual understanding in the classroom.

CONCLUSION

All experts agreed that the developed comic module is useful for both teachers and students, though its usability could be improved for greater effectiveness. The interactive format offers flexible learning, simplifies teachers' preparation by providing reusable materials, and supports online sessions or projection via smartTVs. Interactive learning captures students' interest, actively engages them, and enhances understanding, reducing boredom and drowsiness in class. Overall, the interactive learning comic on physical contradictions helps teachers overcome instructional challenges and fosters a more engaging classroom environment.

REFERENCES

- Kho, A. P., Mohd Noor, M. A., & Md Latip, N. A. (2020). Pengaruh kecerdasan pelbagai terhadap pencapaian akademik pelajar bagi subjek pengajian perniagaan di Larut Matang dan Selama, Perak. *Akademika*, 90(3), 115–130.
- Abdullah, M., Abdullah, A. H., Rosman, A. S., & IliasArieff, M. F. (2015). Garis panduan hafiz al-quran menurut pandang al-nawawi. Paper presented at the International Conference on Islamic Education and Social Entrepreneurship 2015.
- Razali, R. M., & Ayob, A. (2018). Keberkesanan penggunaan modul interaktif terhadap pencapaian membaca murid pemulihan. *International Journal of Education, Psychology and Counseling*, 3(19), 34–56.
- Sharberi, S. N. M., Yee, M. H., Abu Bakar, N., Kok, B. C., Mohamad, M. M., & Abu Bakar, A. (2020). Analisis keperluan pembangunan modul Teori Penyelesaian Masalah Inventif (TRIZ) secara pencantasan dalam Pembelajaran Berasaskan Masalah (PBM). *Online Journal for TVET Practitioners*, 5(2), 12–19.