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DEVELOPING AN INTERACTIVE MODULE INTEGRATING SIAK LOCAL WISDOM AND CREATIVE PROBLEM SOLVING TO IMPROVE CREATIVE THINKING SKILLS IN MOTION AND FORCE LEARNING

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Abstrak- This study aims to develop an interactive module based on Siak local wisdom through the Creative Problem Solving (CPS) model on the subject of motion and force and to test its level of validity and practicality. The background of this study is based on the need for contextual, interactive teaching materials that are able to improve students' creative thinking skills in accordance with the demands of the Independent Curriculum. The study used the Research and Development (R&D) method with a modified ADDIE development model at the analysis, design, and development stages. The trial subjects consisted of three expert validators, five science teachers, and 15 seventh-grade students of SMP Negeri 01 Siak. The research instruments included a needs analysis questionnaire, validation sheets, and teacher and student practicality test questionnaires. The validation results showed that the interactive module obtained an overall average score of 3.56 with a valid category. Furthermore, the results of the practicality test showed an average score of 3.36 from teachers and 3.75 from students with a very practical category. The developed interactive module incorporates elements of Siak local wisdom, such as pompong boats and traditional games, and is supported by interactive multimedia and CPS-based problem-solving activities. Based on the research results, it was concluded that the developed interactive module is suitable for use as a science teaching material to improve the quality of learning on motion and force in junior high schools.

Kata kunci: *interactive module, Siak local wisdom, Creative Problem Solving, creative thinking, motion and force*

1 Introduction

Education has a strategic role in shaping qualified and competitive human resources. Through education, individuals not only acquire knowledge but also develop thinking skills, attitudes, and values needed to face life challenges in the globalization era. Education is a conscious and planned effort to develop students' potential so that they possess spiritual strength, self-control, intelligence, noble character, and skills needed in social life (Ariani et al., 2015). Therefore, the quality of the learning process becomes a determining factor for educational success at every level. The increasingly dynamic development of the era requires the education sector to continuously adapt and innovate. Educational institutions no longer merely function as places for knowledge transfer, but also as spaces for developing higher order thinking skills, creativity, and problem-solving abilities. Fitri and Jamilus (2023) emphasized that the success of educational institutions is strongly influenced by the quality of human resources and the institution's ability to adapt to the changing needs of students. One form of such adaptation is the development of relevant, contextual, and student-oriented teaching materials.

In line with the implementation of the Merdeka Curriculum, the learning process is expected to be more student-centered and provide opportunities for students to learn independently, actively, and

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meaningfully. This curriculum emphasizes the importance of learning flexibility, character strengthening, and the development of 21st-century competencies, including creativity and critical thinking skills. To support this goal, teachers need teaching materials that not only deliver content but also facilitate students' active engagement in the learning process (Rahayu et al., 2024). Teaching materials are important components in the learning process because they function as the main learning resources that help teachers and students achieve learning objectives. Good teaching materials should be systematically and structurally arranged in accordance with the competencies to be achieved (Setiawan, 2023). One form of teaching material that is widely used and developed today is the learning module. Modules are designed to enable students to learn independently with clear guidance, thereby improving learning effectiveness and efficiency (Antonius et al., 2022). The development of information and communication technology has encouraged the transformation of learning modules from printed forms into digital or electronic forms. Electronic modules or e-modules allow the integration of various media such as text, images, animations, audio, and video, making learning more interactive and engaging. Sa'diyah (2021) stated that e-modules have great potential to increase students' learning motivation due to their more varied and flexible presentation. In addition, the use of e-modules can create a more communicative learning environment and reduce student boredom during the learning process (Rahayu et al., 2024).

Interactive modules are one of the innovations in digital teaching materials designed to actively involve students in learning. These modules not only present material but are also equipped with activities, exercises, and evaluations that allow students to independently assess their understanding. Kuswanto (2019) explained that interactive modules should be designed using simple, clear, and effective language and supported by visuals that help clarify concepts. With these characteristics, interactive modules are expected to increase student engagement and motivation. In science learning, the use of interactive modules is highly relevant. Science is a subject that studies natural phenomena through scientific processes involving observation, experimentation, and logical reasoning. The essence of science learning includes three main aspects: scientific attitudes, scientific processes, and scientific products (Panggabean et al., 2021). Therefore, science learning should not only emphasize concept mastery but also the development of students' thinking skills and scientific attitudes. One of the problems frequently found in junior high school science learning is the low level of students' creative thinking skills. Learning still tends to focus on memorization of concepts and routine problem-solving, thus providing limited opportunities for students to develop new ideas and creative solutions. Aji et al. (2024) stated that creative thinking skills are part of higher order thinking skills that are important to develop so students can face real-life problems.

Creative thinking skills include several indicators, namely fluency, flexibility, originality, and elaboration (Wahyuni & Kurniawan, 2018). The development of these skills requires appropriate learning strategies, one of which is the application of learning models emphasizing problem-solving and idea exploration. The Creative Problem Solving (CPS) model is a learning model designed to train students to think creatively through stages of problem clarification, idea generation, idea evaluation and selection, and solution implementation (Sari et al., 2020). The CPS learning model focuses on student activities and encourages them to actively participate in the learning process. This model provides opportunities for students to express various ideas, evaluate the strengths and weaknesses of solutions, and apply those ideas in solving problems. Previous studies showed that the implementation of CPS positively affects students' creative thinking skills compared to conventional learning (Azizah & Santoso, 2023; Abadi et al., 2024).

Besides selecting an appropriate learning model, the learning context also plays an important role in improving students' understanding and engagement. Learning connected to students' daily lives and surrounding environments tends to be more meaningful. One approach that can be applied is the integration of local wisdom into learning. Local wisdom refers to knowledge, values, and cultural practices passed down through generations and becoming the identity of a community (Askodrina, 2021). The integration of local wisdom into science learning can help students understand scientific concepts through contexts closely related to their lives. Almuharomah et al. (2019) stated that local wisdom-based learning can improve creative thinking skills because students are encouraged to relate scientific concepts to real

phenomena in their surrounding environment. In addition, this approach contributes to instilling cultural values and a sense of pride in local heritage.

Siak Regency is one of the regions in Riau Province rich in local wisdom, such as pompong boats, traditional games, weaving tools, and Malay historical heritage. This local wisdom has great potential to be integrated into science learning, particularly in motion and force topics. Motion phenomena in pompong boats, spinning tops, or weaving activities can be used as contextual examples to explain physics concepts more concretely (Hajar & Martianis, 2024; Alfanda & Santosa, 2020). However, the results of needs analysis conducted on teachers and students in Siak Regency showed that the utilization of local wisdom in science learning is still relatively low. Most teachers rarely or have never integrated local wisdom into teaching materials, while students still mainly rely on textbooks as their primary learning resources. This condition indicates the need for innovative, contextual teaching materials that align with students' characteristics.

Based on these problems, the development of an interactive module based on Siak local wisdom through the Creative Problem Solving model becomes a relevant solution. This module is expected to integrate local cultural content with creative problem-solving activities, thereby not only improving students' understanding of motion and force concepts but also developing their creative thinking skills. Furthermore, digital interactive modules enable more flexible and engaging learning through multimedia use and technology-based evaluations. Therefore, this study focuses on developing an interactive module based on Siak local wisdom through Creative Problem Solving on motion and force topics and testing its validity and practicality levels. The results of this study are expected to contribute significantly to the development of innovative, contextual science teaching materials aligned with the demands of 21st-century learning, especially at the junior high school level.

2 Research Methodology

2.1 Research and Design

This study employed a Research and Development (R&D) method aimed at producing an interactive module based on Siak local wisdom through the Creative Problem Solving (CPS) model on motion and force topics, as well as testing the validity and practicality of the product. The R&D approach was selected because it focuses on designing, developing, and evaluating educational products that can be directly applied in the learning process (Sugiyono, 2019).

The development model used in this study was the ADDIE model, consisting of five stages: Analysis, Design, Development, Implementation, and Evaluation. However, this study was limited to the Development stage according to the research objectives and product testing needs (Antonius et al., 2022).

2.2 Research Location and Time

The research was conducted at the Physics Education Study Program, Department of Mathematics and Natural Sciences Education, Faculty of Teacher Training and Education, Universitas Riau and SMP Negeri 01 Siak. The research was carried out from September to October 2025, particularly during the practicality testing stage of the interactive module.

2.3 Research Subjects

The research subjects consisted of expert validators, teachers, and students. The expert validators were three lecturers from the Physics Education Department of the Faculty of Teacher Training and Education, Universitas Riau, who assessed the validity of the module. The practicality test subjects consisted of five science teachers and 15 seventh-grade students of SMP Negeri 01 Siak.

2.4 Development Procedure

The analysis stage was conducted by distributing needs analysis questionnaires to teachers and students to identify learning conditions, teaching material usage, and the need for local wisdom- and CPS-based

modules. The design stage included designing the module framework, preparing motion and force materials integrated with Siak local wisdom, and developing validation and practicality instruments. The development stage involved creating the interactive module equipped with multimedia, CPS-based exercises, and evaluations, followed by expert validation and practicality testing.

2.5 Data Collection Techniques and Instruments

The research data were collected using needs analysis questionnaires, module validation sheets, and practicality questionnaires for teachers and students. The validation instruments covered aspects of content feasibility, pedagogy, presentation, language, and graphics. The teacher and student practicality instruments included aspects of ease of use, material, language, graphics, attractiveness, and usefulness (Roliza et al., 2018).

2.6 Data Analysis Techniques

The data were analyzed descriptively using quantitative and qualitative approaches. Quantitative data were obtained from validator, teacher, and student assessment scores using a Likert scale, while qualitative data in the form of suggestions and comments were used as the basis for module revision. The module was considered valid if the average score was ≥ 3.00 and considered practical if the average score was categorized as practical or very practical (Riduwan, 2015).

Table 1. Research Development Model

Stage	Main Activities
Analysis	Analysis of teachers' and students' needs
Design	Designing the module and research instruments
Development	Developing the module and research instruments

Table 2. Research Trial Subjects

Subjects	Number	Role
Expert validators	3 people	Assessing the validity of the module
Science teachers	5 people	Assessing the practicality of the module
Seventh-grade students	15 students	Assessing the practicality of the module

Table 3. Validity and Practicality Assessment Aspects

Type of Assessment	Assessed Aspects
Validity	Content, pedagogy, presentation, language, and graphics
Teacher practicality	Ease of use, material, language, graphics, and usefulness
Student practicality	Attractiveness, ease of use, language, graphics, and usefulness

3 Results and Discussion

3.1 Research Results

his study was a Research and Development study that produced an interactive science module based on Siak local wisdom through the Creative Problem Solving (CPS) model on motion and force topics for seventh-grade junior high school students. The research results were obtained through three main stages: analysis, design, and development, including expert validation and practicality testing.

3.2 Needs Analysis Results

The analysis stage was conducted to identify the needs of teachers and students regarding teaching materials used in science learning. The teacher needs analysis was conducted by distributing questionnaires

to 21 teachers who are members of the Science Teachers' Association (MGMP IPA) in Siak Regency. The results showed that most teachers still relied on textbooks as the main learning resource and had not optimally utilized interactive modules and local wisdom in learning. The student needs analysis conducted at SMP Negeri 01 Siak showed that 53.6% of students used textbooks as their primary learning resource, while the use of interactive media such as animated videos and digital modules was still relatively low. This condition indicates the need for more engaging, interactive, and contextual teaching materials to improve student involvement in learning. In addition, questionnaire results indicated that both teachers and students expressed the need for teaching materials based on Siak local wisdom that could connect science concepts with everyday life. These findings are consistent with Lestari and Apsari (2022), who stated that local wisdom-based teaching materials can improve students' conceptual understanding and learning motivation because they are contextual.

3.3 Interactive Module Validation Results

The interactive module validation was conducted by three expert validators from the Physics Education Department, Faculty of Teacher Training and Education, Universitas Riau. The validation aimed to assess the feasibility of the module before practicality testing. The evaluated aspects included content feasibility, pedagogy, presentation, language, and graphics.

Table 4. Validation Results of the Interactive Module by Expert Validators

Assessment Aspects	Average Score	Category
Content feasibility	3.50	Valid
Pedagogical aspect	3.58	Valid
Presentation	3.60	Valid
Language	3.55	Valid
Graphics	3.56	Valid
Overall Average	3.56	Valid

Based on the validation results, the module obtained an overall average score of 3.56, categorized as valid. This indicates that the developed interactive module met the feasibility criteria as teaching material. However, the validators provided several suggestions for improvement, such as refining the layout, adjusting the language to be more communicative, and adding explanations to several material sections. These suggestions were used as the basis for revising the module before practicality testing. This validation result aligns with Tanjung and Nababan (2018), who stated that expert validation is an important step to ensure that learning products meet content, pedagogical, and presentation standards before implementation in the field.

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3.4 Practicality Test Results of the Interactive Module

After the module was declared valid, the next stage was practicality testing to determine the ease of use and usefulness of the module in learning. The practicality test was conducted by five science teachers and 15 seventh-grade students of SMP Negeri 01 Siak.

3.5 Practicality Test Results by Teachers

The teacher practicality test covered aspects of ease of use, material, graphics, language, and usefulness. The results showed an overall average score of 3.36, categorized as very practical. Teachers stated that the module was easy to use, systematically organized, and helped them connect motion and force concepts with Siak local wisdom.

Table 5. Practicality Test Results of the Module by Teachers

Assessment Aspects	Average Score	Category
Ease of use	3.40	Very practical

Material	3.40	Very practical
Graphics	3.30	Very practical
Language	3.45	Very practical
Usefulness	3.50	Very practical
Overall Average	3.36	Very practical

3.5 Practicality Test Results by Students

The student practicality test covered aspects of attractiveness, ease of use, graphics, language, and usefulness. The results showed an overall average score of 3.75, categorized as very practical. Students stated that the interactive module was attractive because it included images, animations, videos, Quizizz and Wordwall-based quizzes, and PhET simulations. In addition, students felt that the module helped them understand motion and force materials more easily because they were connected to local wisdom closely related to their daily lives.

Table 6. Practicality Test Results of the Module by Students

Assessment Aspects	Average Score	Category
Attractiveness	3.80	Very practical
Ease of use	3.70	Very practical
Graphics	3.75	Very practical
Language	3.70	Very practical
Usefulness	3.80	Very practical
Overall Average	3.75	Very practical

Discussion

The research results indicate that the interactive module based on Siak local wisdom through Creative Problem Solving fulfilled the criteria of being valid and practical. The high validity of the module indicates that the content, CPS pedagogical approach, presentation, and language are suitable for junior high school science learning characteristics.

The integration of Siak local wisdom, such as pompong boats, spinning top games, and weaving tools, provides real contexts in motion and force learning. This contextual learning helps students relate abstract physics concepts to real phenomena in their environment, thereby improving conceptual understanding. The implementation of the Creative Problem Solving model in the interactive module also contributed to students' active engagement. The CPS stages encouraged students to identify problems, generate ideas, evaluate solutions, and implement ideas creatively. This model proved effective in training students' creative thinking skills.

The practicality test results showed that the module was easy for both teachers and students to use. Teachers found the module helpful because it provided structured materials and ready-to-use learning activities. Meanwhile, students felt more motivated and interested in learning due to the interactive and contextual module design. Overall, the results indicate that the interactive module based on Siak local wisdom through CPS is not only theoretically feasible but also practical for science learning. This module has the potential to become an innovative alternative teaching material to support the implementation of the Merdeka Curriculum and the development of junior high school students' creative thinking skills.

4 Conclusion

This development research aimed to produce an interactive module based on Siak local wisdom through the Creative Problem Solving (CPS) model on motion and force topics for seventh-grade junior high school students and to test its validity and practicality. Based on the research results and discussion, it can be concluded that the developed interactive module fulfilled the criteria as feasible teaching material for junior high school science learning. The validation results from three expert validators showed that the interactive module obtained an overall average score of 3.56, categorized as valid. The assessment covered aspects of content feasibility, pedagogy, presentation, language, and graphics. This achievement indicates

that the presented motion and force material aligns with learning competencies, science learning principles, and junior high school students' characteristics.

The practicality test results showed that the interactive module was very practical for both teachers and students. The teacher practicality test obtained an average score of 3.36, categorized as very practical, while the student practicality test obtained an average score of 3.75, also categorized as very practical. Teachers considered the module easy to use, systematic, and supportive of problem-solving-based science learning implementation. Meanwhile, students found the module attractive, easy to understand, and helpful in understanding motion and force concepts through examples closely related to everyday life. The implementation of the Creative Problem Solving model in the interactive module contributed positively to the learning process. The structured CPS stages encouraged students to actively identify problems, generate creative ideas, evaluate solutions, and implement them within the context of science learning. This model has the potential to develop students' creative thinking skills, which are essential components of 21st-century skills.

Overall, the interactive module based on Siak local wisdom through Creative Problem Solving on motion and force topics was declared valid and very practical for use as science teaching material for seventh-grade junior high school students. This module is expected to become an innovative alternative teaching material supporting the implementation of the Merdeka Curriculum and contributing to the development of students' creative thinking skills. Future studies are recommended to conduct effectiveness testing of the module on improving learning outcomes and students' creative thinking skills quantitatively, as well as developing similar modules for other science topics.

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