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ORIGINAL RESEARCH

Material modules based on traditional games "Egrang" to improve students' conceptual understanding

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Abstract
This research aimed was to develop a module on work and energy based on the traditional game of "egrang" that could improve conceptual understanding. The development of the module was carried out using the Research and Development (R&D) method by adapting the 4D development model. The defining stage was conducted by analyzing the syllabus, analyzing the learning objectives, and setting the indicators for basic competency achievement. The design stage was carried out by preparing the module. The development stage involved testing the feasibility of the module's content and language. The dissemination stage was carried out by publishing a scientific article in a journal related to the development of learning tools. The work and energy module based on the traditional game of "egrang" that was produced was validated by two expert validators. The validation results showed that the work and energy module based on the traditional game of "egrang" had an average percentage score of 82.95% for content and 87.5% for language, thus making it highly suitable for use. The work and energy module based on the traditional game of "egrang" can be further improved based on the feedback received and implemented in classroom learning.

Keywords: *Egrang · Module · Conceptual Understanding*

INTRODUCTION

Work and energy material is one of the materials included in abstract material because it is difficult to see the form of the concept directly (Ruswandi et al., 2022). Physics lessons on work and energy materials have low learning outcomes. Only approximately 35% of students can answer questions about the concept of work and energy correctly. Many students experience difficulties in applying the law of conservation of energy and determining the work applied by certain force components (Fauzan et al., 2020).

Even though a lot of research has been done on learning strategies for work and energy material, there are still students' misconceptions about this material. The average student misconception on work and energy material is 36.06% (Lestari et.al, 2021). This is in line with research (Rosuli et.al, 2019) that there are student misconceptions about work and energy. In addition, students' knowledge is often fragmented, so that if it is applied to solve more complex problems, students will find it difficult. Supposedly, students' knowledge is intact and can be used to solve problems with a wider context (Rahmatina et.al, 2018).

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Traditional games are an effective way to create fun and educative learning activities. In addition, traditional games are also cultural assets that have noble values that can be passed on to children as the next generation. In traditional games, we can instill positive values such as fun, freedom, friendship, democracy, mutual assistance, and obedience. These values can help increase students' interest and motivation in learning, as well as help develop students' sensitivity to the surrounding environment so that they can learn from their environment (Azizah, 2016).

Educators can take advantage of playing on stilts as an opportunity to increase students' interest and motivation in learning, as well as help develop students' sensitivity to the surrounding environment. The "Egrang" or stilts that are popular among children in Ledokombo can be an opportunity for teachers to use them as a medium in the teaching and learning process, especially for material on effort and energy (Apriyono et.al, 2019). Mastery of the physics concept of work and energy is an important basis for students. This concept is very useful for understanding motion problems in everyday life. This is a necessary foundation for understanding more complex physics topics (Nuha et.al, 2019). Therefore, an understanding of work and energy material needs to be emphasized more so that students can easily accept subsequent material related to work and energy.

Modules that are varied and innovative can be appropriate learning media for independent learning students. The module is a type of teaching material designed for independent study by students. Therefore, the module is equipped with instructions and instructions so that students can study independently without the teacher's direct presence (Susanti, 2017). Modules that students usually use tend to only contain simple information and practice questions so that for some students who have not been able to learn independently using modules, it is difficult to develop their knowledge (Puspitasari, 2019) .

To ensure that students have the opportunity to apply what they have learned in order to increase students' understanding of concepts, the ICARE learning model can be used in compiling modules. Material module for effort and energy based on traditional stilts game following the syntax of the ICARE learning model. The ICARE learning model is a model that emphasizes student activity in the learning process. This model consists of five key elements, namely *introduction*, *connection*, *application*, *reflection*, *extension*. The purpose of this learning model is to ensure that students have the opportunity to apply what they have learned in real life. The ICARE learning model can change passive learning to be active and creative and change teacher-centered learning to student-centered learning with activity stages consisting of introduction, liaison, explanation and practice, reflection, and evaluation (Nyoman et.al, 2018).

METHODS

The development of work and energy modules based on traditional "egrang" games uses the Research and Development (R&D) method by adapting the 4D development model. The 4D model has four stages: 1) define, 2) design, 3) development, and 4) disseminate.

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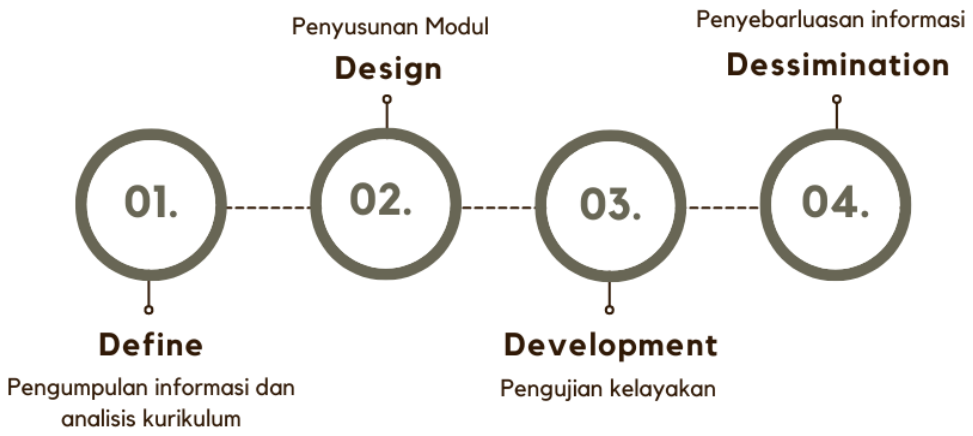

Figure 1. 4D Development Model Flow

The defining stage (define) is carried out by analyzing the syllabus, analyzing KI, analyzing KD, setting learning objectives, and setting indicators for achieving basic competencies. The design stage is carried out by compiling modules. The development stage is carried out by testing the feasibility of the content and language of the module. The dissemination stage is carried out by disseminating information in the form of journals related to the development of learning tools. Table 1 show the module assessment validation questionnaire.

Table 1. Module assessment validation questionnaire

Aspect	Indicator
Fill	The suitability of the material with the learning objectives
	The depth and completeness of the material effort and energy
	The overall arrangement of activities and content of learning material associated with traditional stilts games can improve students' understanding of concepts
	The clarity of the images used
	Compatibility of the physics concept of traditional stilt games with work and energy materials
	The usefulness of the material to knowledge
	Suitability to the needs of students
	Conformity of evaluation questions with the material presented
	Conformity of the concept of learning materials with the media used
	Ease of material to understand
	Systematic, coherent, logical flow, and clear
language	Compatibility of the optical instrument module with PUEBI
	Ease of optical instrument sentences to understand

This validity process is carried out to produce valid learning modules. The resulting module was validated by 2 expert validators consisting of lecturers and physics teachers. The validator fills in the instrument in the form of a validation questionnaire that has been provided as input to the module being developed.

learning tools developed in this development research are work and energy modules based on the traditional game of stilts for class X semester 1 of SMA/MA . Effort and energy module based on traditional stilts game developed in the following order: 1) cover, 2) preface, 3) table

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of contents, 4) instructions for using the module, 5) activities for each phase of the ICARE learning model, 6) references.

In collecting data, a validation sheet is used as an instrument. The validation sheet uses a score scale of 1-4 and a response questionnaire with alternative answers is invalid is given a weight of 1, less valid is given a weight of 2, valid is given a weight of 3 and very valid is given a weight of 4. To determine the feasibility of the module is done by analyzing the validity using a Likert scale. The validity of the developed learning tools is analyzed using the following equation:

$$P = \frac{f}{n} \times 100\% \quad (1)$$

where P is percentages, f is score, and n is total score (Egista et al., 2022). The percentage results obtained are then converted to the following learning device validity criteria based on Table 2.

Table 2. Learning Devices Validity Criteria

Percentage (%)	Eligibility/Validity
0 – 49.99	Invalid
50.00 – 59.99	Less valid
60.00 – 79.99	Valid
80.00 – 100	Very valid

RESULT AND DISCUSSION

Research development that has been carried out by researchers produces work and energy modules based on traditional stilts games to increase understanding of concepts that support the learning process for high school students. Making the work and energy module uses the ICARE learning model and using existing concepts on stilts so that students more easily understand the concepts of work and energy in the teaching-learning process in class.

Research and development were carried out to produce work and energy modules based on traditional stilts games to increase understanding of concepts that can be recognized and accounted for. In its development process, the work and energy module based on traditional stilts games has passed the validation stage. The results of development research are expected to be able to provide new innovations in the world of education and preserve traditional stilt games through learning in schools, especially in work and energy subjects.

Defining Stage

The define phase is carried out by analyzing the syllabus for class X high school physics subjects. With the syllabus is determined by KI, KD, indicators of achievement of basic competencies, and learning objectives. The basic competencies determined are analyzing the concepts of energy, work, work and energy changes, the law of the conservation of energy, and its application in daily events.

The competency achievement indicators determined are describing the concept of work according to physics, calculating the work generated by force in the same direction as the direction of its displacement, calculating the amount of work generated by a force that forms an angle to the direction of its displacement, analysing the relationship of effort, force, and

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displacement, describing the concept of kinetic energy according to physics, and describe the concept of potential energy according to physics.

The learning objectives determined are that after understanding the learning module, students are expected to be able to know the concept of potential energy on stilts correctly, and after understanding the learning module, students are expected to be able to know the concept of kinetic energy on stilts correctly, after understanding the learning module, students are expected to able to know the concept of mechanical energy on stilts, after understanding the learning module, students are expected to know the concept of effort on stilts correctly, after understanding the learning module, students are expected to be able to know the concepts of potential energy, kinetic energy, mechanical energy. and the work as a whole.

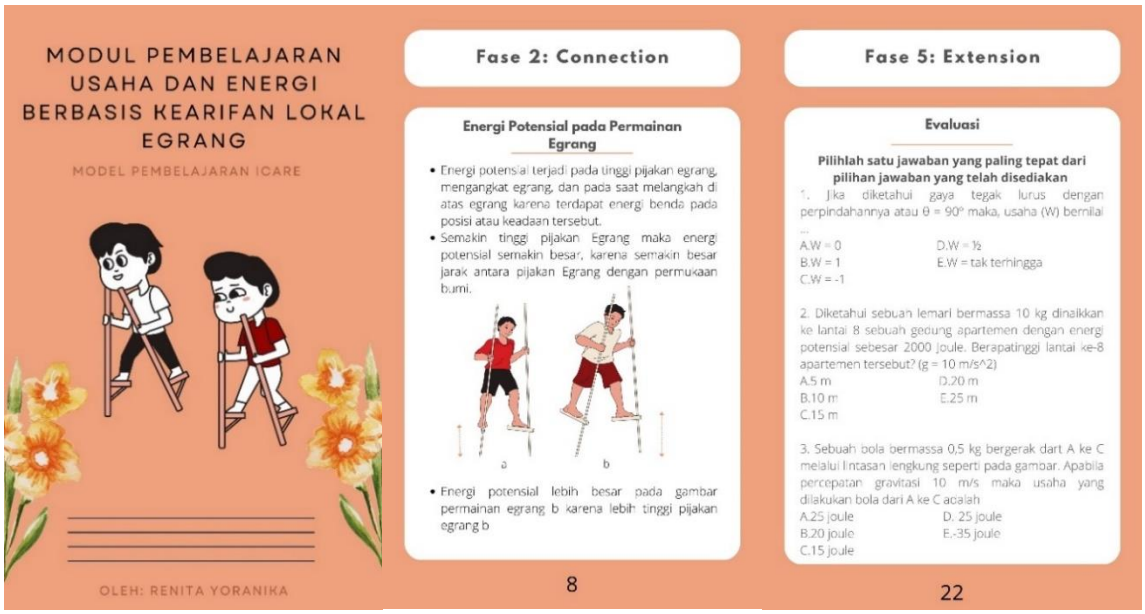

Figure 2. Effort and energy modules based on traditional stilts games to improve students' understanding of concepts

Development Stage

Development stage is carried out by testing the feasibility of the content and language of the work and energy module based on traditional stilt games to improve students' conceptual understanding. After the work and energy module based on traditional stilts games to improve students' understanding of concepts has been completed, then the validation stage is carried out. The validation stage will determine the feasibility of the stilts-based traditional game-based work and energy modules to improve students' conceptual understanding.

Test process This feasibility is carried out to produce valid learning discussion modules. The resulting module is validated by one lecturer and one physics teacher, who are experts in the field of physics. The validator has filled out an assessment instrument in the form of a validation questionnaire that has been provided as input to the module being developed. Validity results are shown as follows.

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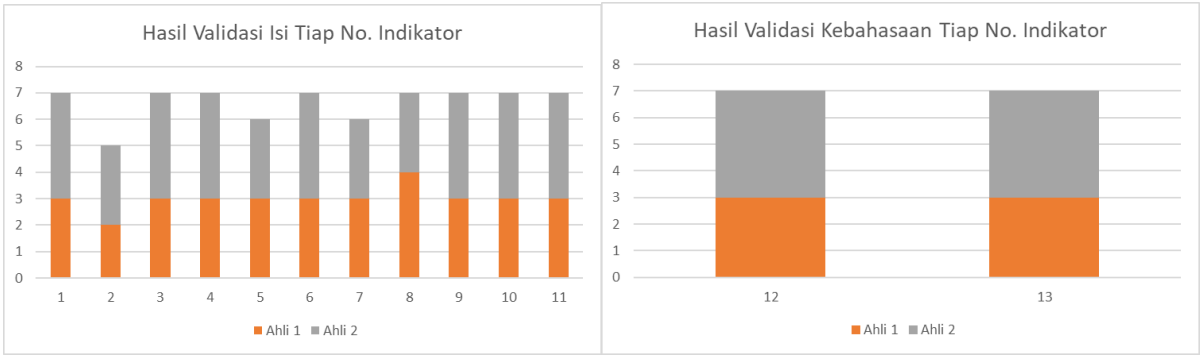

Figure 3. Graph of the results of the validation of the contents of each indicator number

In indicator 2, the content aspect, in the form of depth and completeness of the material for work and energy activities/steps, gets the smallest points but is still feasible to use because it already includes work and energy material for high school students but still needs to be explained more broadly and given an analysis of the energy effort style concept on stilts for an increase students' understanding of concepts according to the validator's suggestions.

In general, the results for each indicator of the content aspect of the work and energy module based on traditional stilts games to increase students' conceptual understanding are in the very valid category and have been tested and used according to the following table.

Table 3. Module Validation Results

Aspect	Percentage Average	Information
Fill	82.95 %	Very valid
language	87.5 %	Very valid

Stage of Deployment (*Dissemination)*

Dissemination stage is carried out by disseminating information in the form of publication of scientific articles in journals related to the development of learning tools.

From the results of the validation of the work and energy module based on traditional stilts games to increase students' understanding of concepts it is feasible to be tested and used. The effort and energy module based on traditional stilts games to improve students' conceptual understanding can be refined again according to the suggestions received.

Effort and energy modules based on traditional stilts games to improve students' understanding of concepts This development has several advantages, namely: 1) using the ICARE learning model, 2) learning is designed to use traditional games on stilts to understand the concepts of work and energy directly, and 3) there is material and questions regarding the concepts of work and energy in traditional games on stilts.

Combining physics concepts in local wisdom can help students to understand the subject. This is in line with research (Sukma et.al, 2019) that traditional game-based teaching materials are appropriate for use in the learning process and can improve high school student's understanding of physics concepts. The traditional game of stilts which is one of the local wisdom can help students understand the concept of effort and energy when playing it. Traditional stilt games can also be an effective way to create fun and educative learning activities.

The work and energy material module based on traditional stilts games to improve student understanding of concepts developed has several advantages, namely: using the ICARE

learning model, learning is designed to use traditional stilts games to understand the concept of work and energy directly, and there are materials and questions regarding the concept of work and energy in the traditional game of stilts. However, the work and energy material module based on traditional stilts games to improve student understanding of concepts developed also has drawbacks, namely, there is no energy effort style analysis on stilts, there are typographical errors, and the material presented is incomplete. The effort and energy module based on traditional stilts games to improve students' understanding of concepts can be further developed to facilitate students to be able to learn independently (*student-centered learning*) and be able to improve their mastery of concepts. The characteristics of a good module are *self-instruction*, *self-contained*, *user-friendly*, *adaptive*, and *stand-alone* (Agustina & Adesti, 2019). A good module should have easy-to-use instructions, easy-to-understand instructions and easy responses for students (Husnulwati & Sardana, 2019).

CONCLUSION

Based on the results of the analysis and discussion above, it can be concluded that the work and energy module based on traditional stilts games to increase conceptual understanding is feasible to use. The results of the feasibility test showed that the work and energy module based on traditional stilts games on the content aspect had an average percentage of 82.95% and on the language aspect had an average percentage of 87.5% so it was very feasible to use. The effort and energy module based on traditional stilts games to improve students' understanding of concepts can be refined again by explaining more broadly and adding an analysis of the energy effort style concept on stilts according to the suggestions received.

REFERENCES

Agustina, N., & Adesti, A. (2019). Pengembangan Modul Mata Kuliah Strategi Belajar dan Pembelajaran Pada FKIP-Universitas Baturaja. *Syntax Literate; Jurnal Ilmiah Indonesia, 4*(9), 83-93.

Apriyono, F., Rosyidah, E. A., Purnomo, T., Sulityo, J., Munir, M. M., & Safitri, V. W. (2019). Eksplorasi ethnomatematika pada permainan tradisional egrang di Tanoker Ledokombo Jember. *Sigma, 4*(2), 51-58.

Arianti, N. N. S., Astawan, I. G., & Krisnaningsih, M. (2021). Penerapan model pembelajaran ICARE untuk meningkatkan hasil belajar IPS siswa kelas IVB SD. *Jurnal Ilmiah Pendidikan Profesi Guru, 4*(2), 240-250.

Azizah, I. M. A. (2016). Efektivitas pembelajaran menggunakan permainan tradisional terhadap motivasi dan hasil belajar materi gaya di kelas IV MIN Ngronggot Nganjuk. *Dinamika Penelitian: Media Komunikasi Penelitian Sosial Keagamaan, 16*(2), 279-308.

Egista, E., Taufik, M., Zuhdi, M., & Kosim, K. (2022). Pengembangan perangkat pembelajaran fisika pada materi getaran harmonis menggunakan model discovery learning untuk meningkatkan penguasaan konsep peserta didik. *Jurnal Ilmiah Profesi Pendidikan, 7*(1), 41-46.

Fauzan, A. S., Sinaga, P. & Purwana, U. (2020). Implementasi strategi pembelajaran writing to learn menggunakan format tulisan metakognitif untuk meningkatkan kemampuan kognitif dan keterampilan komunikasi siswa SMA pada materi usaha dan energi. *Wahana Pendidikan Fisika, 5*(2), 41–48.

Husnulwati, S., Sardana, L., & Suryati, S. (2019). Pengembangan E-Modul Pendidikan Kewarganegaraan Berbasis Aplikasi Android. *Indonesian Journal Of Educational Research and Review, 2*(3), 252-259.

https://doi.org/10.17509/wapfi.v7i2.54069

Lestari, P., & Hayat, M. S. (2021). Analisis miskonsepsi siswa SMA pada materi usaha dan energi di kabupaten Kendal. *UPEJ Unnes Physics Education Journal*, *10*(3), 233-240.

Nuha, S. A., Kusairi, S., & Sujito, S. (2017). Pengaruh implementasi formative feedback berbasis web dengan menggunakan butir isomorfik terhadap penguasaan konsep fisika siswa SMA pokok bahasan: usaha dan energi. In *Seminar Nasional Fisika dan Pembelajarannya* (pp. 128-137).

Puspitasari, A. D. (2019). Penerapan media pembelajaran fisika menggunakan modul cetak dan modul elektronik pada siswa SMA. *JPF (Jurnal Pendidikan Fisika)*, 7(1), 17-25.

Rahmatina, D. I., Sutopo, S., & Wartono, W. (2018). Identifikasi kesulitan siswa SMA pada materi usaha-energi. *Momentum: Physics Education Journal*, *2*(1), 8-14.

Rosuli, N., Koto, I., & Rohadi, N. (2019). Pembelajaran remedial terpadu dengan menerapkan model pembelajaran generatif untuk mengubah miskonsepsi siswa terhadap konsep usaha dan energi. *Jurnal Kumparan Fisika*, *2*(3), 185-192.

Ruswandi, W., Sinaga, P., & Purwanto, P. Profil konsistensi representasi dan konsistensi ilmiah konsep fisika pada topik usaha dan energi siswa SMA negeri pada pembelajaran jarak jauh di Kabupaten Bandung. *WaPFi (Wahana Pendidikan Fisika)*, *7*(2), 113-123.

Sukma, T. A., Mundilarto, M., & Putri, N. D. (2019). Local wisdom-based electronic book on newton's law. *Jurnal Ilmiah Pendidikan Fisika Al-Biruni*, *8*(2), 197-206.

Susanti, R. (2017). Pengembangan modul pembelajaran PAI berbasis kurikulum 2013 di kelas V SD Negeri 21 Batubasa, Tanah Datar. *JMKSP (Jurnal Manajemen, Kepemimpinan, dan Supervisi Pendidikan)*, *2*(2), 156-172.

https://doi.org/10.17509/wapfi.v7i2.54069