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Description of Students' Creativity and Motivation in Physics: Introducing Madurese Local Wisdom "*Karapan Sapi*" as Ethnophysics Learning Media

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Creative thinking skills are one of the important abilities in the 21st century because they play an important role for individuals in approaching the solution of daily life problems. The importance of creativity in education demands an effort to foster this skill in various learning activities. However, teachers tend to still not apply learning activities that can train creativity by design. Ethnoscience-based learning based on the local wisdom of Madura karapan sapi can be an alternative solution in overcoming these problems. Therefore, this research aims to describe students' creativity and motivation as well as explore the potential of karapan sapi as a physics learning media. The research design used was mixed-method exploratory with quantitative methods of one-shot case study and survey to 37 students of SMAN 3 Sidoarjo combined with interviews and observations to the owner of the bull race. The results showed that students still have a creativity score of 9.51 or at low criteria. Meanwhile, more than 75% of students claimed to lack motivation to learn physics. To remediate this, the application of cow race tradition in physics learning makes students closer and feel more contextualized in understanding physics concepts in order to increase their creativity and motivation.

Keywords: Creativity; Motivation; Local Wisdom; Karapan Sapi

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INTRODUCTION

Ilmu Creative thinking is the ability to identify and deepen a problem by seeking related information to generate new and effective ideas (Khoiri et al., 2023; Purwandari & Yusro, 2018). Creativity is not limited to the realms of art and science; rather, it plays a crucial role for individuals in solving everyday life problems. Creative thinking enables us to approach problem-solving from different perspectives, a skill of utmost importance in navigating the challenges of the 21st century. Creativity is a skill that should be fostered across all intellectual and social domains (Desi et al., 2019; Rizal et al., 2020).

Physics is a scientific discipline that investigates natural phenomena through empirical evidence and experiments conducted by experts (Putra et al., 2019). In the context of physics education, creative thinking plays a pivotal role in understanding complex concepts and solving problems. For instance, (Wulandari, 2016) found that creative thinking accounts for 29.16% of students' understanding of physics concepts. This finding aligns with research conducted by (Sambada, 2012), which demonstrates a positive correlation between creativity and problem-solving abilities in physics education. Moreover, creative thinking has been shown to significantly impact students' comprehension of physics concepts (Athifah & Syafriani, 2019; Trianggono, 2017), as it encourages the generation of diverse, authentic, and detailed ideas to tackle physics-related challenges.

Recognizing the significance of creativity in education, there is a demand for learning activities that can nurture this skill, such as ethnoscience-based learning (Andani et al., 2020). Ethnoscience-based learning immerses students in the cultural context of their surroundings to foster creative cognitive thinking skills (Dewi et al., 2021; Khoiri et al., 2019). By incorporating local culture into the learning process, ethnoscience learning facilitates better understanding of educational materials and simultaneously instills an appreciation for the nation's cultural heritage.

Indonesia offers a wealth of local wisdom, and one such example is the tradition of "karapan sapi". Karapan sapi is a traditional Madurese game involving cow racing, where the jockeys must be skilled (Suprapto et al., 2022; Wulandari, 2016). Although this understanding has been passed down through generations, the scientific application of these concepts has not been explicitly conveyed. Therefore, there is a need for a learning approach that can elucidate the scientific principles underlying this cultural tradition, particularly in the context of physics.

Prior research has already explored ethnoscience-based approaches in learning, both in the development of educational media and the analysis of concepts embedded in cultural practices. For example, (Melati et al., 2023) conducted an analysis and evaluation of physics concepts found in the traditional Acehnese game "tarek siteuk", revealing principles related to force and friction. Similarly, (Matsun et al., 2019) investigated the "meriam karbit" game from Pontianak, which applies concepts from physics and chemistry. Various educational media have been developed and tested for their suitability in facilitating learning. Additionally, (Khoiri et al., (2019) demonstrated that ethnoscience-based learning effectively enhances student creativity. While there have been previous ethnoscience studies on karapan sapi as a context for physics learning conducted by (Siyati & Kamariyah, 2022), research specifically linking creativity in physics education with the tradition of karapan sapi remains limited.

Thus, this study aims to describe profile of student creativity in physics lessons and explore the potential of using karapan sapi as an ethnoscience-based physics learning media. By investigating this area, the research will contribute to enhancing student creativity as a vital 21st-century skill, whereas also introducing the educational content embedded in the karapan sapi culture to students.

METHOD

This study utilizes a mixed-method exploratory design to describe the profile of students' creativity in physics lessons and explore efforts to enhance it through ethnoscience-based learning of karapan sapi (Sugiyono, 2020). The chosen design aims to extract new information and is in its preliminary stages. The quantitative research employs a one-shot case study and survey involving 37 students from SMAN 3 Sidoarjo. The qualitative research methods include observations and interviews, which were conducted in Tengket Village, Arosbaya District, Bangkalan Regency, Madura.

The research instruments consist of creativity test questions, which assess fluency, flexibility, originality, and elaboration using essay types (Hasanah et al., 2018), as well as a 5-question physics learning motivation questionnaire employing the Likert scale. Instead of using indicators, motivational questions use direct questions such as "I lack motivation to learn physics". The process of completing test questions and questionnaires takes approximately 30 minutes. Additionally, a semi-structured interview rubric with 8 guiding questions was prepared, focusing on topics related to karapan sapi tradition.

The data collection process begins with analyzing problems and needs regarding the level of student creativity in physics lessons. This analysis involves conducting a written test and survey on February 23, 2023. After identifying issues concerning the level of creativity and learning motivation, the subsequent step is analyzing the potential of ethnoscience-based physics learning through the implementation of local wisdom from the karapan sapi tradition. To strengthen this potential, observations and interviews were conducted with karapan sapi owners on July 18, 2023. The observations involved studying cows and the tools used, while interviews were conducted with one karapan sapi owner. The purpose of observations and interviews is to obtain information about the workings and concepts of the bull race tradition, trustworthing the research results. Through this process, a profound insight into the tradition of karapan sapi was obtained, which can be integrated into physics learning.

Quantitative data analysis employs descriptive methods to portray the profile of student creativity and learning motivation in physics lessons. Whereas the creativity scores are interpreted as follows: 0-33 (Low); 34-66 (Medium); 67-100 (High), the learning motivation scores are analyzed based on percentage of each question. For the qualitative data, the Miles and Huberman method is used, which includes data reduction, data presentation, and drawing conclusions (Sugiyono, 2020).

RESULT AND DISCUSSION

Description of Students' Creativity in Physics Lesson

Students' creative thinking skills can be identified by asking questions about everyday life problems. In addition, questions used to identify creative thinking skills are also required to contain indicators of creative thinking. In this study, first described the creativity of students in physics lessons. The level of creativity of students is shown in Figure 1.

[Figure 1 about here.]

It can be seen that students, as a whole, have creative thinking skills that are categorized into low levels. Their average overall score was 9.51 or low criteria. In this case it can also be said that they cannot solve questions related to problems in everyday life related to motion dynamics. Creativity is synonymous with being able to find innovative solutions to various problems faced (Marisda et al., 2022). This is because in reality, physics learning in schools has not applied material content in everyday life, so it seems that physics application examples are less clear, identical to complicated formulas, misconceptions about the material, and lack of motivation to learn from students.

The above findings are in line with several research results related to the difficulty of learning physics and student creativity in physics learning (Azizah & Maryani, 2021; Hidayatun et al., 2015; Urban et al., 2021; Zulvita et al., 2017). In addition, it is necessary to review students' creative thinking ability from each indicator of creative thinking ability. This review is carried out because each indicator of creative thinking shows the scope of the process of thinking activities so that it cannot be separated between one indicator and others. Consistent with research by (Marisda et al., 2022) related to the four steps of the thinking process, namely forming an understanding, forming opinions, making decisions, and forming conclusions. The results of the review of the creative thinking ability of each indicator are shown in Table 1.

[Table 1 about here.]

It can be observed that the originality indicator is an indicator of creative thinking with the highest overall score of 1.838 students. The elaboration indicator is an indicator of creative thinking with the lowest score because none of all students can ask questions with the elaboration indicator. The flexibility indicator became the second highest value of 0.649, then continued with the fluency indicator with the third value of 0.081.

The questions of each indicator tested must also contain the meaning of each indicator of student creativity. According to Alvino, the fluency indicator can bring up a series of problem-solving options; flexibility indicators, able to see problems from various points of view; indicators of originality, able to create unique ways of expressing themselves; elaboration indicator, able to determine the details of an object and ideas become more attractive (Hasanah et al., 2018).

As can be taken from the description of each indicator can be taken some information. Originality indicator questions are synonymous with the ability to express oneself by sparking original ideas personally, resulting in they can answer the question correctly. However, in contrast to the elaboration indicator question, identical to the ability to develop, detail, and detail an idea or an object, all students cannot answer the question with the elaboration indicator. Regarding elaboration indicator questions, students have misconceptions about detailing the vector components of Newton's Laws. This is in line with another research that states the material of motion dynamics, especially Newton's Law, has a high misconception of 44.8% (Zulvita et al., 2017). Misconceptions will impact students' creative thinking abilities in line with research by (Hidayatun et al., 2015), which states that improving every aspect of students' creativity will not be optimal without being supported by a correct understanding of students' concepts without misconceptions.

Analysis of Problems and Needs

Based on Figure 2, the first statement, "I feel the current physics lesson is very boring", and most (78.73%) students agree. It can be concluded that physics subjects are very boring because they only contain many formulas, concepts, and teacher methods in delivering boring material. Basically, physics material containing many formulas and concepts can make students bored, coupled with teaching methods that cannot invite students to apply formulas and concepts correctly, making physics very monotonous. (Azizah et al., 2015) stated that 51% stated that physics was challenging to understand, of these 71% stated that physics had too many formulas, and 25% stated that teacher learning methods were boring.

[Figure 2 about here.]

The second statement was "I lack motivation to learn physics" and most (81%) students agreed with this statement (Figure 3). It can be indicated that this may be related to the previous statement. If students already consider physics subject matter very dull, it will make students less motivated to learn physics. As a result, students will not focus on learning physics. This is in line with research (Sari & Sunarno, 2018) with the result that the majority of students have low learning motivation in physics lessons.

[Figure 3 about here.]

The third statement was "I find kinematics and dynamics more difficult to understand than other materials" and most (91.8%) students agreed with this statement (Figure 4). We can conclude that kinematics and motion dynamics are more difficult to understand than other materials. This is due to many misconceptions about matter, kinematics and motion dynamics, especially Newton's Laws. This misconception can arise because of convoluted motion dynamics formulas and the application of material examples that are less clear and unrelated to everyday life. This aligns with (Zulvita et al., 2017) research-related misconceptions about Newton's Laws.

[Figure 4 about here.]

The fourth statement "I like to study physics whose material is associated with everyday life such as local wisdom" and most (91.8%) students agree with this statement (Figure 5). We can conclude that students' pleasure in learning physics can arise when learning physics is associated with everyday life, such as local wisdom in Indonesia, so that meaningful understanding will be created. This is confirmed with (Utami et al., 2017) study that the use of local culture, such as traditions and indigenous practices can help improve science skills in students.

[Figure 5 about here.]

The fifth statement is "I agree with the application of virtual labs to physics learning" and most (81%) students agree with this statement (Figure 6). We can conclude that students agree that learning media such as virtual laboratories can be applied to physics learning because virtual laboratories are flexible and can be used anywhere and anytime according to student needs. In addition, virtual laboratories support learning using experimental methods to make students more active and optimize learning time compared to lecture methods. This aligns with (Rambega, 2018) research that concludes that learning using physics virtual laboratory media can increase student creativity.

[Figure 6 about here.]

The last statement is "I agree with the application of AR to physics learning" and most (94%) students agree with this statement (Figure 7). We can conclude that students need appropriate learning media, such as Augmented Reality to more efficiently represent physics material known for many complex and abstract concepts. In addition, it can also foster motivation to learn physics due to the concept of AR, which is interactive, real-time, and visual display given in 3D form. This is in line with several studies related to AR physics learning media (Nandyansah et al., 2020; Suprapto et al., 2021, 2023)

Physics Concepts in Karapan Sapi

The *karapan sapi* tradition, a unique cultural practice in Madura Island, Indonesia, holds potential as an innovative teaching method, particularly in the context of physics education (Anggraini & Kuswanto, 2019). This traditional event involves a competition where two decorated carts race along a straight track, each pulled by a pair of bulls. The tradition is deeply rooted in the local culture and serves as a valuable source of knowledge that can be harnessed for educational purposes (Abroriy, 2020).

In this tradition, several important vocabularies need to be understood, namely *kaleles* and jockeys. *Kaleles* are bamboo mounted on the back of a cow so that it can be ridden by a jockey (Figure 7), while jockeys are people who spur cows to run. While the selection of bamboo is considered as *kaleles* because of its lightweight, the jockeys who ride in *kaleles* are primarily small children, so the weight is lighter, increasing the running speed of the cows. This is consistent with the results of the interview.

[Figure 7 about here.]

"*Kaleles from bamboo, yes so that it is light, if the wood is heavy"*

"The jockey must be small so that it is not heavy, and must be trained".

The above argument is in line with the Second Newton's theory of Law, where mass is directly proportional to the force, so that if the mass is smaller, the force required to attract it will be lighter, increasing acceleration from running cows. Thus, the choice of bamboo species in *kaleles* and small children as jockeys is very appropriate to the theory. Empirically, bamboo does have a ranged density from 0.42 to 0.64 g/cm^3, which was lower than most of the other wood species (Hartono et al., 2022; Lee et al., 2023).

In a race where cows run, force and motion concepts are applied, as shown in Figure 8. According to Newton's Second Law, the equation of force applicable to *karapan sapi* is formulated in Eq. (1) and (2), whereas the equation of motion is formulated in Eq. (3), (4), and (5).

$$\sum F = m.a \quad (1)$$

$$F - f_s = m.a \quad (2)$$

$$s = v_0.t + \frac{1}{2}a.t^2 \quad (3)$$

$$v_t = v_0 + a.t \quad (4)$$

$$v_t^{\,2} = v_0^{\,2} + 2.a.s \quad (5)$$

[Figure 8 about here.]

Consequently, the tradition of *karapan sapi* as Madurese local wisdom contains physics content that has the potential to be applied in learning. The use of these traditions in the learning aspect can provide a deeper understanding related to the concepts learned.

***Karapan Sapi* as Ethnoscience-based Physics Learning Media**

Ethnoscience-based learning refers to an educational approach incorporating local cultural practices, beliefs, and traditional knowledge into teaching and learning scientific subjects (Hidaayatullaah et al., 2021). In the case of Karapan Sapi, this traditional event can serve as a captivating and relevant platform for teaching various scientific concepts, particularly in physics and related disciplines. Engaging with traditional practices and customs stimulates students' imagination and encourages them to think creatively within the context of their own heritage (Utari et al., 2020).

The application of the *karapan sapi* tradition in physics learning can be packaged in the form of learning media. Based on the results of exploring physical concepts in the tradition, students can investigate the concepts of force and motion. They may investigate the relationship between mass, acceleration, and force, or determine the frictional force on *kaleles*. To support this potential, a literature study was conducted related to similar research on physics learning media based on local wisdom to increase creativity. Table 2 shows previous research on physics learning media based on local wisdom.

[Table 2 about here.]

Physics learning media is very influential in the physics learning process. In addition, learning media by applying daily life, such as Indonesian local wisdom can also attract students during learning because students' learning experiences will be more memorable and meaningful (Bulkani et al., 2022). The learning media developed are diverse, starting from photonovelas, web modules, worksheets, and virtual laboratories. In addition, the objectives of the learning media developed are very diverse, starting to improve understanding of physics concepts, creative thinking, and introduce students to Indonesian local wisdom.

Local wisdom is related to the student's learning environment helping students understand real-life relationships and knowledge that has been learned in the classroom. This may lead to interest in learning physics when they know a meaningful understanding of what they are learning in class (Suastra et al., 2017). As we know before, the ability to think creatively cannot be separated from the ability to provide innovative solutions in everyday life problems, so physics learning media based on local wisdom is appropriate in improving the ability to think creatively (Hikmawati & Suastra, 2023; Orab et al., 2023). When students' creative thinking ability increases, students' learning motivation automatically increases. This is consistent with research by (Urban et al., 2021), which states that learning motivation has a significant relationship with creativity.

Thus, *karapan sapi* as Madurese local wisdom can be internalized in learning physics through a medium. The possible media is a virtual laboratory, allowing students to investigate or discover relationships between related variables. The integration of *karapan sapi* into physics learning media may increase creativity, learning motivation, and preserve the tradition.

CONCLUSION

The survey analysis shows students' low motivation to study physics. Students consider physics to be a monotonous lesson with many formulas that must be memorized. Learning physics is considered too abstract and irrelevant to life in the surrounding environment. This lack of motivation affects student creativity because creativity must first be based on understanding concepts. The solution is to apply a learning that is more relevant to everyday life, such as the tradition of *karapan sapi*. Through this study, students will feel closer in learning physics through the Madurese culture of *karapan sapi*. Students also feel more contextual and real learning in the environment around them.

However, the limitations of this study are limited to exploring physical concepts in the *karapan sapi* tradition, and ethnoscience-based learning has not yet been implemented. As a remedy, further research can develop ethnoscience-based learning of *karapan sapi,* which is integrated in a learning media. The implication of this research is the exploration of physics concepts in the *karapan sapi* tradition as a learning medium that can improve creativity and skills of the 21st century.

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REFERENCES

Abroriy, D. (2020). Etnomatematika dalam Perspektif Budaya Madura. *Indonesian Journal of Mathematics and Natural Science Education*, *1*(3), 182–192. https://doi.org/10.35719/mass.v1i3.44

Almuharomah, F. A., Mayasari, T., & Kurniadi, E. (2019). Pengembangan Modul Fisika STEM Terintegrasi Kearifan Lokal "Beduk" untuk Meningkatkan Kemampuan Berpikir Kreatif Siswa SMP. *Berkala Ilmiah Pendidikan Fisika*, *7*(1), 1. https://doi.org/10.20527/bipf.v7i1.5630

Andani, D. T., Gani, A., Pada, A. U. T., & Rahmatan, H. (2020). Ethnoscience-Based Student Worksheet Development to Improve Senior High School Student Creativity. *Jurnal Penelitian Pendidikan IPA*, *7*(1), 26–33. https://doi.org/10.29303/jppipa.v7i1.457

Anggraini, R., & Kuswanto, H. (2019). Karapan Sapi as Android-Based Learning Module Material of Physics. *Journal of Physics: Conference Series*, *1233*(1), 12063. https://doi.org/10.1088/1742-6596/1233/1/012063

Athifah, D., & Syafriani. (2019). Analysis of students creative thinking ability in physics learning. *Journal of Physics: Conference Series*, *1185*(1), 12116. https://doi.org/10.1088/1742-6596/1185/1/012116

Azizah, R., Yuliati, L., & Latifah, E. (2015). The Physic Problem Solving Difficulties on High School Student. *Postgraduate Medical Journal*, *5*(2), 44–50. https://doi.org/10.1136/pgmj.53.620.343

Azizah, S., & Maryani, M. (2021). Analisis Gerak Kendaraan pada Kasus

Kecelakaan sebagai Bahan Ajar Fisika di Sekolah Menengah Atas. *Jurnal Edutech Undiksha*, *9*(1), 40–47. https://doi.org/10.23887/jeu.v9i1.33085

Bulkani, B., Fatchurahman, M., Adella, H., & Setiawan, M. A. (2022). Development of Animation Learning Media Based on Local Wisdom to Improve Student Learning Outcomes in Elementary Schools. *International Journal of Instruction*, *15*(1), 55–72. https://doi.org/10.29333/iji.2022.1514a

Desi, D., Mujamil, J., Lesmini, B., & Hidayat, I. (2019). Student Creativity through Project-based Learning Experiences. *SEJ (Science Education Journal)*, *3*(2), 67–82. https://doi.org/10.21070/sej.v3i2.2651

Dewi, C. A., Erna, M., Martini, M., Haris, I., & Kundera, I. N. (2021). The Effect of Contextual Collaborative Learning Based Ethnoscience to Increase Student s Scientific Literacy Ability. *Turkish Journal of Science Education*, *18*(3), 525–541. https://doi.org/10.36681/tused.2021.88

Hartono, R., Iswanto, A. H., Priadi, T., Herawati, E., Farizky, F., Sutiawan, J., & Sumardi, I. (2022). Physical, Chemical, and Mechanical Properties of Six Bamboo from Sumatera Island Indonesia and Its Potential Applications for Composite Materials. *Polymers*, *14*(22), 4868. https://doi.org/10.3390/polym14224868

Hasanah, A., Yuliati Zaqiah, Q., & Heryati, Y. (2018). Model of Islamic Education Curriculum Development to Improve Students' Creative Thinking. *Proceedings of the International Conference on Islamic Education (ICIE 2018)*, 187–191. https://doi.org/10.2991/icie-18.2018.34

Hidaayatullaah, H. N., Suprapto, N., Hariyono, E., Prahani, B. K., & Wulandari, D. (2021). Research Trends on Ethnoscience based Learning through Bibliometric Analysis: Contributed to Physics Learning. *Journal of Physics: Conference Series*, *2110*(1), 12026. https://doi.org/10.1088/1742-6596/2110/1/012026

Hidayatun, N., Karyanto, P., & Fatmawati, U. (2015). Penerapan E-Module Berbasis Problem-Based Learning untuk Meningkatkan Kemampuan Berpikir Kreatif dan Mengurangi Miskonsepsi pada Materi Ekologi Siswa Kelas X MIPA 3 SMA Negeri 6 Surakarta Tahun Pelajaran 2014/2015. *Bioedukasi: Jurnal Pendidikan Biologi*, *8*(2), 28. https://doi.org/10.20961/bioedukasi-uns.v8i2.3868

Hikmawati, & Suastra, I. W. (2023). Local wisdom-based learning to develop student's creativity in high school physics studies course. *The 1st International Conference on Science Education and Sciences*, 090016. https://doi.org/10.1063/5.0122572

Khoiri, A., Nulngafan, N., Sunarno, W., & Sajidan, S. (2019). How is Students' Creative Thinking Skills? An Ethnoscience Learning Implementation. *Jurnal Ilmiah Pendidikan Fisika Al-Biruni*, *8*(2), 153–163. https://doi.org/10.24042/jipfalbiruni.v8i2.4559

Khoiri, N., Ristanto, S., & Kurniawan, A. F. (2023). Project-Based Learning Via Traditional Game in Physics Learning: Its Impact on Critical Thinking, Creative Thinking, and Collaborative Skills. *Jurnal Pendidikan IPA Indonesia*, *12*(2), 286–292. https://doi.org/10.15294/jpii.v12i2.43198

Kua, M. Y., Suparmi, N. W., & Laksana, D. N. L. (2021). Virtual Physics Laboratory with Real World Problem Based on Ngada Local Wisdom in Basic Physics Practicum. *Journal of Education Technology*, *5*(4), 520–530. https://doi.org/10.23887/jet.v5i4.40533

Lee, S. H., Md Tahir, P., Al-Edrus, S. S. O., Uyup, M. K. A., Beng, O. C., & Baharuddin, N. (2023). Physical and Mechanical Properties of Malaysian Round Bamboo. In *Multifaceted Bamboo: Engineered Products and Other Applications* (pp. 111–130). Springer Nature Singapore. https://doi.org/10.1007/978-981-19-9327-5_7

Marisda, D. H., Hamid, Y. H., R, R., Samsi, A. N., & M, M. (2022). Assessmen Fluency of Thinking, Flexibility, Dan Elaboration Calon Guru Fisika: Desain, Dan Validitas. *Jurnal Teknologi Pendidikan*, *11*(2), 136–142. https://doi.org/10.32832/tek.pend.v11i2.6014

Matsun, M., Andrini, V. S., Maduretno, T. W., & Yusro, A. C. (2019). Development of physics learning e-module based on local culture wisdom in Pontianak,West Kalimantan. *Journal of Physics: Conference Series*, *1381*(1), 12045. https://doi.org/10.1088/1742-6596/1381/1/012045

Melati, D. S., Lira, F., Radiati, Lubis, N. A., & Nurmasyitah. (2023). Analisis penerapan konsep fisika terintegrasi kearifan lokal permainan tradisional aceh tarek siteuk. *GRAVITASI: Jurnal Pendidikan Fisika Dan Sains*, *6*(1), 32–37. https://doi.org/10.33059/gravitasi.jpfs.v6i01.8150

Mulyawati, R., & Arkiang, F. (2021). Pengaruh penggunaan web module fisika berbasis NTT's local wisdom terhadap kemampuan berpikir kreatif. *Journal of Nusantara Education*, *1*(1), 33–39. https://doi.org/10.57176/jn.v1i1.4

Nandyansah, W., Suprapto, N., & Mubarok, H. (2020). Picsar (Physics Augmented Reality) as a Learning Media to Practice Abstract Thinking Skills in Atomic Model. *Journal of Physics: Conference Series*, *1491*(1). https://doi.org/10.1088/1742-6596/1491/1/012049

Orab, N., Odja, A. H., Supartin, S., & Abdjul, T. (2023). The Effect of Local Wisdom Based Learning Media on Science Process Skills in Straight Motion Material. *SEJ (Science Education Journal)*, *7*(1), 73–97. https://doi.org/10.21070/sej.v7i1.1639

Purwandari, P., & Yusro, A. C. (2018). Pembelajaran Fisika Menggunakan Inkuiri Terbimbing dengan Metode Eksperimen dan Proyek Ditinjau dari Kreativitas dan Kemampuan Berpikir Kritis Siswa. *Momentum: Physics Education Journal*, *2*(1), 39–46. https://doi.org/10.21067/mpej.v2i1.2369

Putra, D. S., Zain, M. S., & Subiantoro, C. (2019). Identifikasi Sikap: Ketertarikan Meluangkan Waktu Belajar Fisika, Normalitas Ilmuwan, Adopsi Sikap Ilmiah. *SEJ (Science Education Journal)*, *3*(2), 93–100. https://doi.org/10.21070/sej.v3i2.2701

Rahayu, A., Sutikno, & Masturi. (2015). Pengembangan Media Pembelajaran Hukum Newton Menggunakan Fotonovela Berbasis Kearifan Lokal. *Prosiding Seminar Nasional Fisika (E-Journal)*, *4*(1), 35–35.

Rambega, U. L. (2018). Implementasi Media Laboratorium Virtual Pada Pendekatan Kooperatif Terhadap Peningkatan Kreativitas Fisika Mahasiswa STMIK Handayani Makassar. *Jurnal Pendidikan Mipa*, *8*(2), 137–141. https://doi.org/10.37630/jpm.v8i2.66

Rizal, R., Rusdiana, D., Setiawan, W., & Siahaan, P. (2020). Creative thinking skills of prospective physics teacher. *Journal of Physics: Conference Series*, *1521*(2), 22012. https://doi.org/10.1088/1742-6596/1521/2/022012

Sambada, D. (2012). Peranan kreativitas siswa terhadap kemampuan memecahkan masalah fisika dalam pembelajaran kontekstual. *Jurnal Penelitian Fisika Dan Aplikasinya (JPFA)*, *2*(2), 37. https://doi.org/10.26740/jpfa.v2n2.p37-47

Sari, N., & Sunarno, W. (2018). Sekolah Menengah Atas the Analysis of Students Learning Motivation on Physics Learn- Ing in Senior Secondary School. *Jurnal Pendidikan Dan Kebudayaan*, *3*(1), 17–32.

Siyati, R., & Kamariyah, E. I. (2022). Analisis Budaya Kerapan Sapi di Madura Sebagai Sumber Belajar Berbasis Etnosains. *Jurnal Luminous: Riset Ilmiah Pendidikan Fisika*, *3*(2), 89–95. https://doi.org/10.31851/luminous.v3i2.8412

Suastra, I. W., Jatmiko, B., Ristiati, N. P., & Yasmini, L. P. B. (2017). Developing Characters Based on Local Wisdom of Bali in Teaching Physics in Senior High School. *Jurnal Pendidikan IPA Indonesia*, *6*(2), 306. https://doi.org/10.15294/jpii.v6i2.10681

Sugiyono, S. (2020). *Metode Penelitian Kuantitatif, Kualitatif, dan R&D* (2nd ed.). Alfabeta.

Suprapto, N., Ibisono, H. S., & Mubarok, H. (2021). The Use of Physics Pocketbook Based on Augmented Reality on Planetary Motion To Improve Students' Learning Achievement. *Journal of Technology and Science Education*, *11*(2), 526–540. https://doi.org/10.3926/jotse.1167

Suprapto, N., Prahani, B. K., Deta, U. A., Rizki, I. A., & Bakri, F. (2023). Bibliometric analysis of peer-reviewed literature on augmented reality with an emphasis on education versus physics education. *World Journal on Educational Technology: Current Issues*, *15*(1), 145–168. https://doi.org/10.18844/wjet.v15i1.7500

Suprapto, N., Suliyanah, S., Deta, U. A., Sya'roni, I., & Nisa', K. (2022). Glocalization of Bull Racing: A Program for Preservation Kerapan Sapi as Madurese Local Wisdom. *Kawalu: Journal of Local Culture*, *9*(1), 35–52. https://doi.org/10.32678/kawalu.v9i1.5897

Trianggono, M. M. (2017). Analisis Kausalitas Pemahaman Konsep Dengan Kemampuan Berpikir Kreatif Siswa Pada Pemecahan Masalah Fisika. *Jurnal Pendidikan Fisika Dan Keilmuan (JPFK)*, *3*(1), 1–12. https://doi.org/10.25273/jpfk.v3i1.874

Urban, K., Pesout, O., Kombrza, J., & Urban, M. (2021). Metacognitively aware university students exhibit higher creativity and motivation to learn. *Thinking Skills and Creativity*, *42*, 100963. https://doi.org/10.1016/j.tsc.2021.100963

Utami, I. S., Septiyanto, R. F., Wibowo, F. C., & Suryana, A. (2017). Pengembangan STEM-A (science, technology, engineering, mathematic and animation) berbasis kearifan lokal dalam pembelajaran fisika. *Jurnal Ilmiah Pendidikan Fisika Al-BiRuNi*, *6*(1), 67–73. https://doi.org/https://doi.org/10.24042/jpifalbiruni.v6i1.1581

Utari, R., Andayani, Y., Savalas, L. R. T., & Anwar, Y. A. S. (2020). Validity of Ethnoscience Based Chemistry Learning Media Emphasizing Character Values and Conservation Behavior. *Jurnal Penelitian Pendidikan IPA*, *7*(1), 45–48. https://doi.org/10.29303/jppipa.v7i1.469

Wisnuputri, A. F., Izzulhaq, A., & Setiaji, B. (2023). LKPD Hukum Newton Berbasis Kearifan Lokal Nglarak Blarak Berbantuan PhET. *OPTIKA: Jurnal Pendidikan Fisika*, *7*(1), 1–9. https://doi.org/10.37478/optika.v7i1.2293

Wulandari, A. E. (2016). Hubungan Kemampuan Berpikir Kreatif dan Pemahaman Konsep terhadap Kemampuan Memecahkan Masalah Matematika. *EKUIVALEN-Pendidikan Matematika*, *24*(2). https://doi.org/10.37729/ekuivalen.v24i2.3204

Zulvita, Z., Halim, A., & Kasli, E. (2017). Identifikasi dan remediasi miskonsepsi konsep hukum newton dengan menggunakan metode eksperimen di man darussalam. *Jurnal Ilmiah Mahasiswa (JIM) Pendidikan Fisika.*, *2*(1), 128–134.

Conflict of Interest Statement: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

LIST OF TABLES

TABLE 1 / Profile of Students' Creativity Levels per Indicator

Creativity Indicators							
Fluency		**Flexibility**		**Elaboration**		**Originality**	
0.081	Low	0.649	Low	0.000	Low	1.838	Low

Range Note:
Range 1-33 = Low; 34 – 66 = Medium; 67-100 = High

TABLE 2 / Review of some Literature related to the use of Learning Media based on Local Wisdom

Article Title	Results
Pengembangan Media Pembelajaran Hukum Newton Menggunakan Fotonovela Berbasis Kearifan Lokal (Rahayu et al., 2015)	Learning media in the form of photonovelas of Newton's Law material based on local wisdom *othok-othok* ship is able to increase understanding of Newton's Law physics concepts and love Indonesian local wisdom by 86.2%.
Pengaruh Penggunaan Web Module Fisika Berbasis NTT's Local Wisdom terhadap Kemampuan Berpikir Kreatif (Mulyawati & Arkiang, 2021)	Learning media in the form of a physics Web module based on NTT local wisdom can improve students' creative thinking as evidenced by the acquisition of *N-gain* of 0.62 for the experimental class and 0.39 for the control class while the effect size value is $f = 0.40$
LKPD Hukum Newton Berbasis Kearifan Lokal Nglarak Blarak Berbantuan PhET (Wisnuputri et al., 2023)	Learning media in the form of Student Worksheets local wisdom *Nglarak Blarak* Newton's law assisted by PhET can improve conceptual understanding and critical thinking by 77%.
Pengembangan Modul Fisika STEM Terintegrasi Kearifan Lokal "Beduk" untuk Meningkatkan Kemampuan Berpikir Kreatif Siswa SMP (Almuharomah et al., 2019)	Learning media in the form of STEAM modules based on local wisdom *Beduk* can improve creative thinking on sound wave material as evidenced by the acquisition of an N-gain of 0.92 in the high category.
Virtual Physics Laboratory with Real World problem Based Ngada Local Wisdom in Basic Physics Practium (Kua et al., 2021)	Learning media in the form of a Virtual Laboratory based on *Ngada* local wisdom, in this case the author of the article does not mention improving any abilities during learning.

LIST OF FIGURES

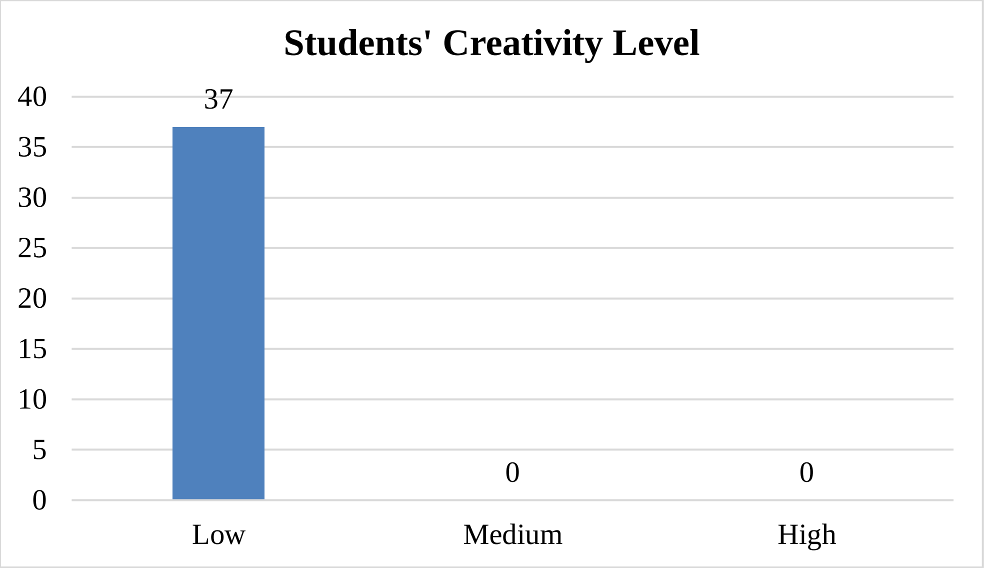

FIGURE 1 / Distribution of Students' Creativity Levels

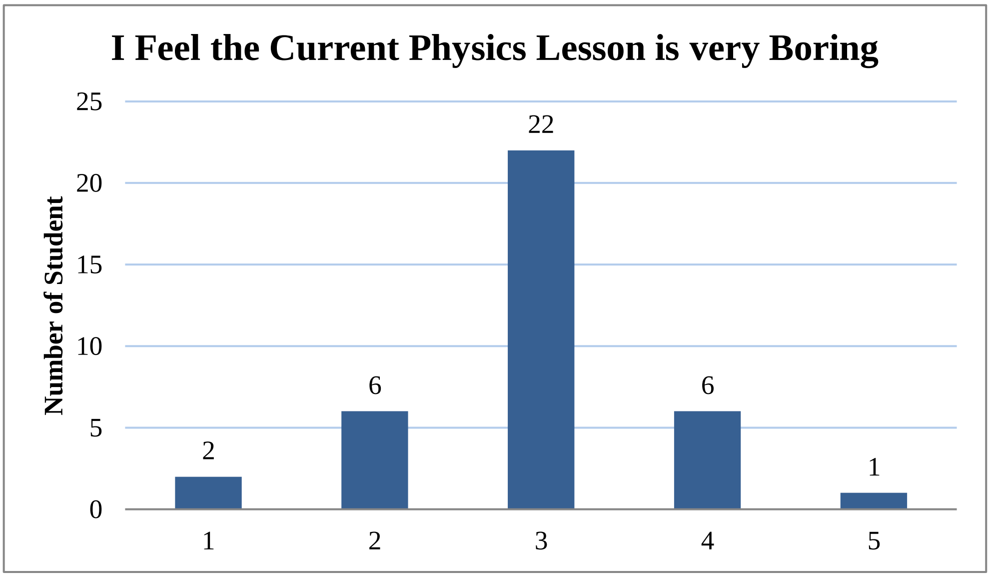

FIGURE 2 / Students Response to the First Statement

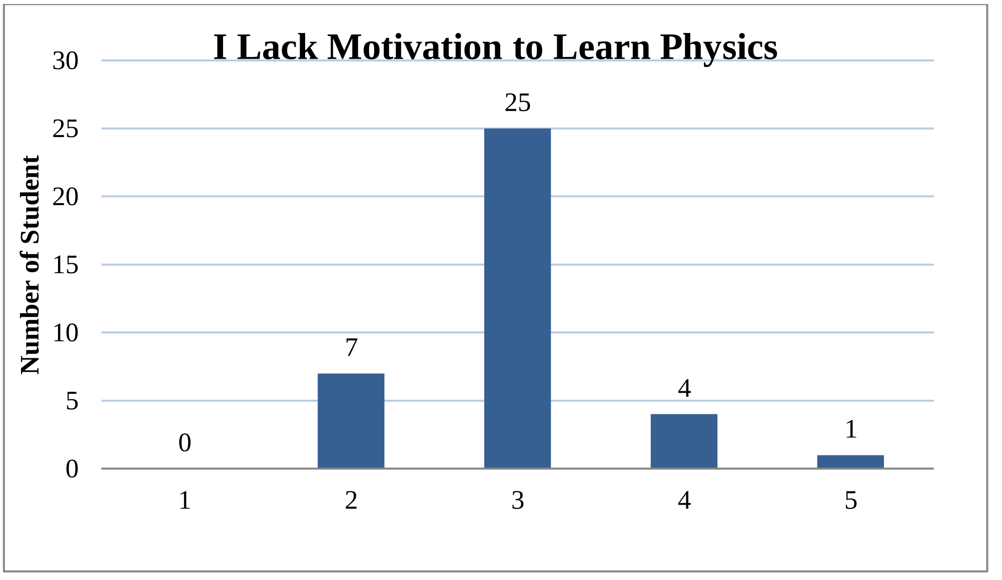

FIGURE 3 / Student Response to the Second Statement

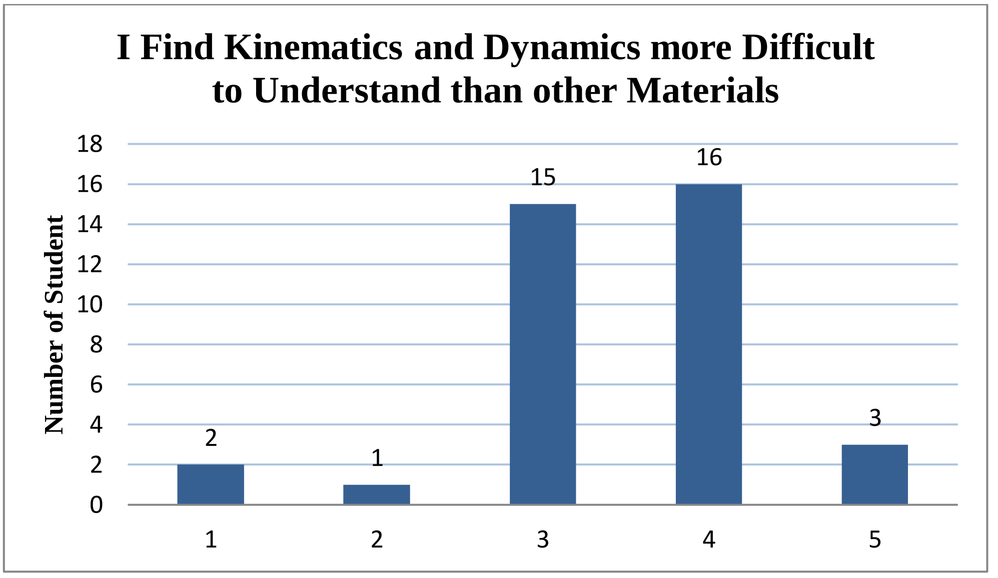

FIGURE 4 / Student Response to the Third Statement

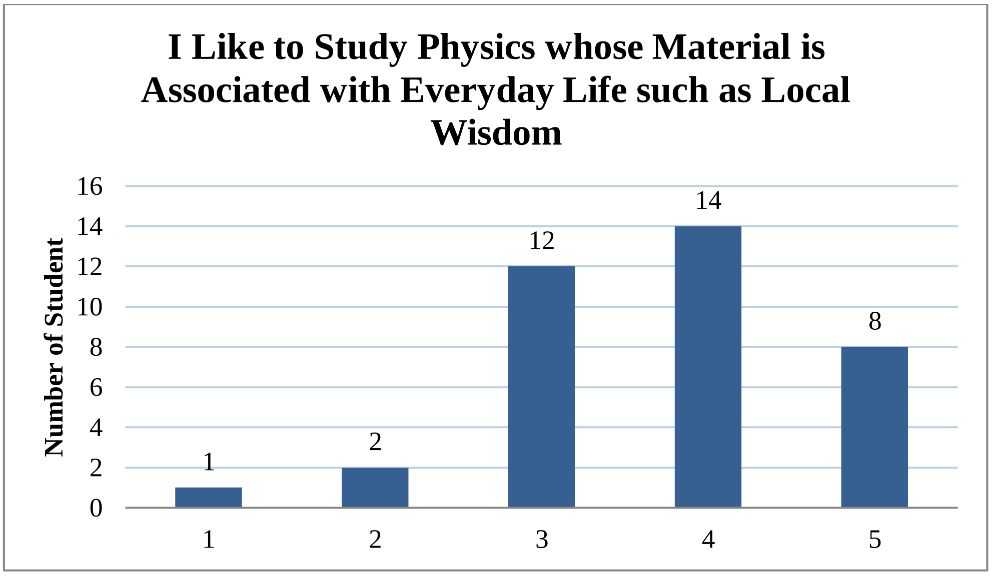

FIGURE 5 / Student Response to the Fourth Statement

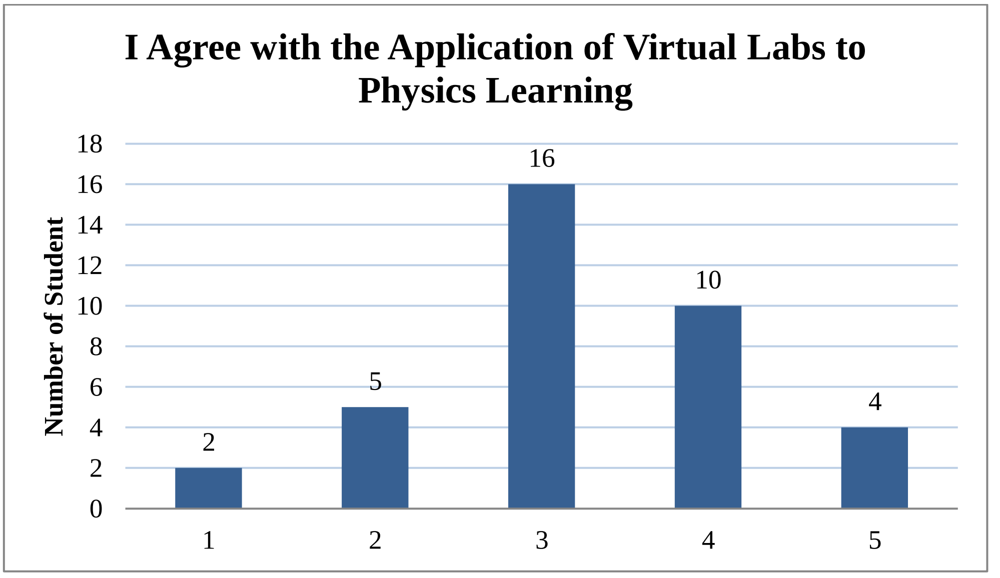

FIGURE 6 / Student Response to the Fifth Statement

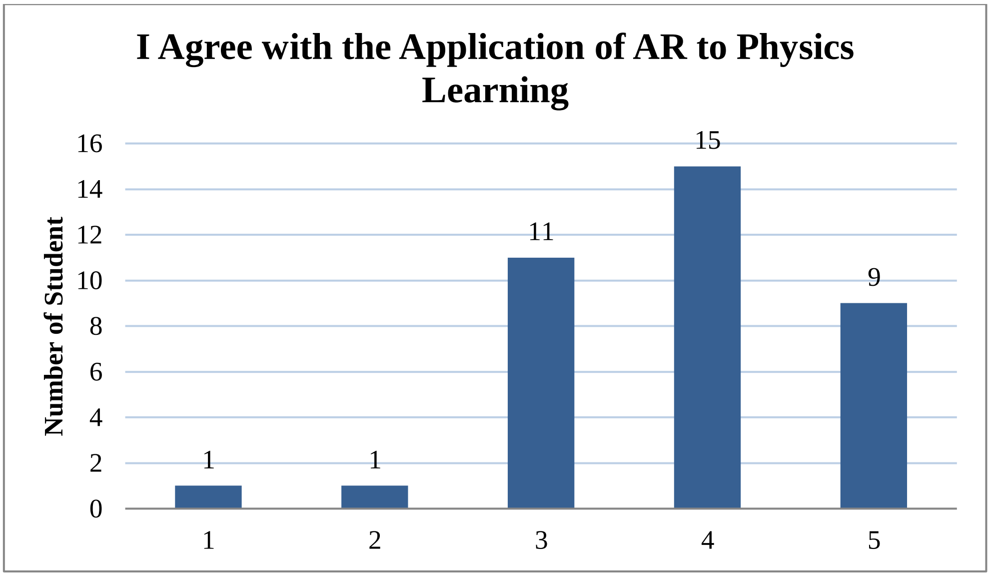

FIGURE 7 / Student Response to the Sixth Statement

FIGURE 8 / *Kaleles* on *Karapan Sapi*

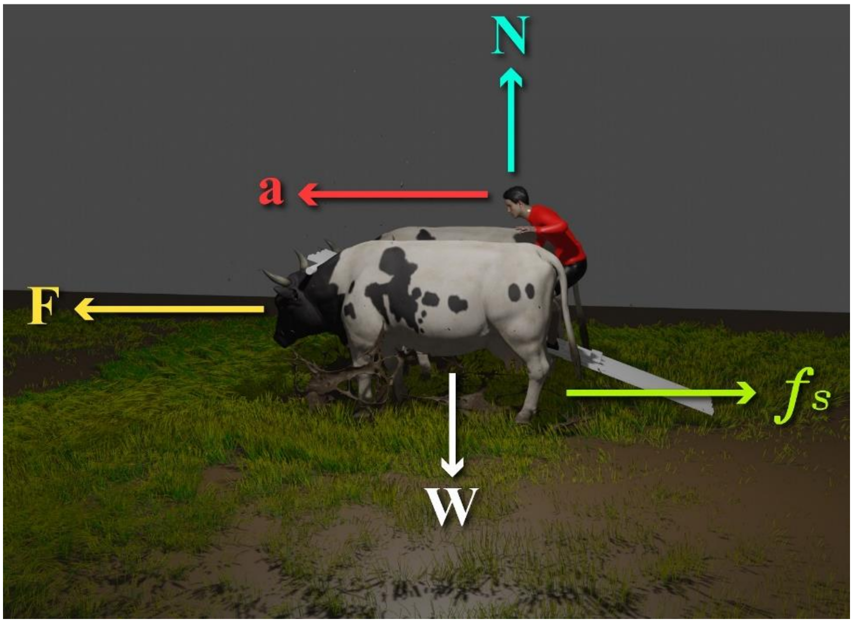

FIGURE 9 / *Force* Diagram in *Karapan Sapi*