e-ISSN: 3125-0475
Journal of Ethnophysics, Vol.1, No.2, July, 2026: 74-85

Exploring Physics Concepts in *Songkok Recca* Craft of the Bugis People in Bone South Sulawesi

A Arsyad
Department Physics Education, Faculty of Mathmematics and Natural Science, Universitas Negeri Makassar, Indonesia
Corresponding Author: azhararsyad12012021@gmail.com

Article Info

Article history:

Received: 19 April 2026
Revised: 16 June 2026
Accepted: 30 June 2026
Available Online: 1 July 2026

Keywords:

Exploring;
Physics;
Songkok Recca;

ABSTRACT

Songkok Recca is a handicraft product of the Bugis Bone People of South Sulawesi and is an intangible cultural heritage in Indonesia. *Songkok Recca* contains various physics concepts that can be explored scientifically. Physics learning is often considered difficult for students, so there needs to be evaluation through the contextual and meaningful learning approach provided to help students form better understanding of physics concepts. This research aims to identify the physics concepts involved in the process of making *Songkok Recca* crafts and explore their potential in physics learning in a contextual manner. The method used in this research is a literature review research with data used as a source from various literature on the topic being studied. Based on the research that has been conducted, the physics concepts found in the *Songkok Recca* craft include force, pressure, work and energy, momentum and impulse, and equilibrium. The results of the research show that the *Songkok Recca* crafts of the Bugis Bone People of South Sulawesi can be used as a meaningful source of contextual physics learning. This research contributes to the development of ethnophysics by providing a comprehensive scientific interpretation of *Songkok Recca* crafts. In addition, the integration of *Songkok Recca* in physics learning is expected to improve the ability to understand concepts, physics literacy, and appreciation of local culture for students.

OPEN ACCESS cc BY NC ND

INTRODUCTION

Indonesia is an archipelagic nation comprising 17,508 islands and 1,328 ethnic groups, each with diverse arts, languages, and cultures. Indonesia itself has been recognized as a country with a high degree of cultural diversity (Sriwahyuni, 2024). Every island, every province, and every regency has its own distinctive characteristics and culture. Cultural diversity in Indonesia serves as a vital social asset in shaping character, cultural image, and cultural identity across all regions. This diversity constitutes intellectual and cultural wealth as part of a cultural heritage that must be preserved (Yusaerah, 2023).

One of Indonesia's cultural heritages is the *Songkok Recca*, also known as the *Songkok* To Bone, which originates from the Bugis people of Bone Regency, South Sulawesi. In 2018, the Ministry of Education and Culture of the Republic of Indonesia (Kemendikbud RI) officially designated the *Songkok Recca* as an intangible cultural heritage of Indonesia, as evidenced by a certificate stating that the *Songkok Recca* originates from Bone Regency and cannot be claimed by any other party (Copy of the Minister of Education and Culture, 2018). One of the primary raw materials in the production of the *Songkok Recca* is the lontar palm. This plant offers various benefits that extend beyond food needs to include traditional craft materials such as the *Songkok Recca* (Nurlaeliana et al., 2025; Akhmad et al., 2025). *Songkok Recca* is made from Ure' Ca' (palm frond fibers) that are di*recca' recca'* (pounded) until only the fibers remain, which are then finely sorted to be woven using a hat shaped mold called an assareng made from jackfruit wood. After the weaving process is complete, the *Songkok Recca* is then soaked in black mud for several days to produce its characteristic natural black color (Ariandi & Jufri, 2022).

Songkok Recca originated during the era of the ancient kingdoms in the Bugis-Makassar region. In the past, the *Songkok Recca* was reserved exclusively for the nobility, traditional leaders, or scholars; thus, its use signified a specific social status and was not intended for the general public. Oral tradition states that some *Songkok Recca* are adorned with a layer of golden thread, symbolizing the wearer's nobility and authority. As times have changed, the use of the *Songkok Recca* is no longer limited to specific groups but can be worn by the general public as part of the cultural heritage of the Bugis Bone people. *Songkok Recca* is not only used in traditional and formal events but also in daily activities. It is no wonder that the *Songkok Recca* has become one of the favorite souvenirs for visitors to Bone Regency (Yusaerah, 2023). *Songkok Recca* not only represents the cultural heritage of the Bugis Bone ethnic group but also embodies various physics concepts that can be scientifically explored. These physics concepts can be observed through the fiber processing, manufacturing, and crafting processes involved in creating the *Songkok Recca*.

Physics at the high school level SMA/MA is often perceived as a difficult, boring, and abstract subject due to the large number of concepts, formulas, and mathematical solutions that students must grasp. This is because the material presented lacks context and is far removed from everyday experiences, making it difficult for students to understand physics concepts. In addition to these difficulties, this also results in low physics literacy among students that is, the ability to apply physics concepts to understand natural phenomena and make decisions based on scientific data (Sasmi et al., 2025). Study of physics is a branch of natural science that observes phenomena directly related to the surrounding environment (Ansar et al., 2026).

Teaching physics through phenomena found in the surrounding environment is a strategic approach to bridging abstract concepts with the realities of daily life. A contextual approach helps students understand physics concepts that are present not only in the laboratory but also in cultural activities and local products. The surrounding environment provides authentic learning resources for directly exploring physics concepts (Musniar et al., 2023). Physics instruction should be connected to the surrounding environment to make learning more meaningful for students. One approach that can be used is the integration of local wisdom into instruction. This approach is known as ethnophysics. Ethnophysics is an approach that explores physics concepts through the cultural knowledge and practices of a community. Physics instruction that incorporates local wisdom can enhance students' understanding of physics concepts (Krisanti et al., 2026).

The novelty of this research lies in the integration of ethnophysics and local cultural heritage through an exploration of the physics concepts found in the craft of *Songkok Recca*. Unlike other research, which primarily focus on cultural or historical significance, this research systematically maps the physics concepts involved in the process of making the *Songkok Recca* as a contextual resource for students' physics learning. Given this background, it is necessary to conduct research on the Exploring Physics Concepts in *Songkok Recca* Craft of the Bugis People in Bone, South Sulawesi. This research aims to identify the physics concepts involved in the process of making the *Songkok Recca* craft and to explore its potential as a source of contextual physics learning. The research questions in this study how are physics concepts present in the *Songkok Recca* craft? and how can these physics concepts support contextual physics learning?

RESEARCH METHOD

The type of research used is qualitative descriptive research, specifically a literature review (Wada et al., 2024; Damarsha et al., 2024; Aspers & Corte, 2019). The research flowdesign is illustrated in the figure 1 below.

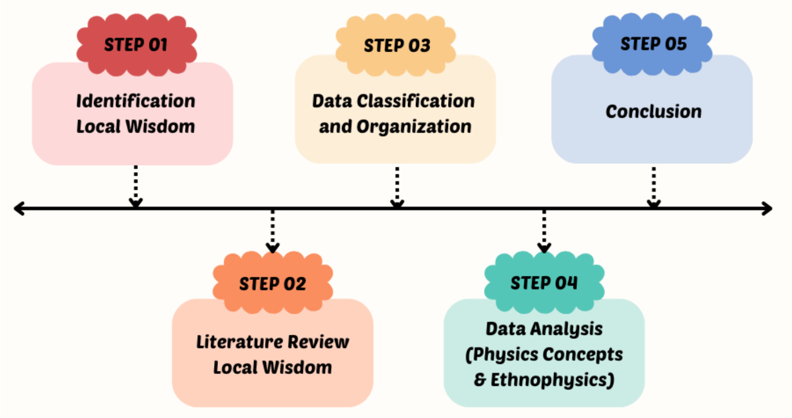

Figure 1. Descriptive Qualitative Research Flow

This research was conducted in February 2026. In the first stage, the researcher identified local wisdom phenomena to be studied. At this stage, the researcher selected local wisdom that could be examined through the lens of physics. In the second stage, the researcher conducted a literature review on local wisdom related to physics. In the third stage, the researcher collected data from various information sources, such as scientific articles related to the research subject, media narratives, and other literature supporting the research subject. In the fourth stage, the researcher analyzed the data collected from various information sources to facilitate the explanation of the process of analyzing physics concepts based on the research subject. In the final stage, the researcher concluded the research results.

Because this research is a literature review, the data sources are not human participants directly, but rather information found in various national, local, and cultural media discussing the *Songkok Recca*, as well as digital documents depicting the process of making the *Songkok Recca*. The research is supported by scientific articles on ethnophysics and the *Songkok Recca*, as well as books and academic studies related to the process of making the *Songkok Recca*.

RESULTS AND DISCUSSION

Songkok Recca is a traditional headdress of South Sulawesi, particularly in Bone Regency. It is characterized by its distinctive black and golden-yellow colors. In addition to its colors, the *Songkok Recca* is also unique in that it is made from lontar palm fronds (Musniar et al., 2023). The process of making the *Songkok Recca* involves principles of physics that influence everything from the manufacturing techniques to the final product.

Figure 2. *Songkok Recca*

The process of making the *Songkok Recca* uses material made from the fibers of the lontar palm fronds, which are pounded a process known in the Bugis language as *direcca-recca* until only the fibers remain. These fibers produce a variety of colors. The fibers, which are initially white, turn brown after 2–3 hours of drying under the scorching sun. To turn them black, the fibers are soaked in mud for 2 days. The resulting fibers can be used to make the *Songkok* frame. The thread used to weave the *Songkok Recca* is made of gold. The thread is first softened by heating it. After the heating process, it is ready to be used for weaving the *Songkok* frame.

The results of the conceptual exploration of the physics of the *Songkok Recca* headdress of the Bugis people of Bone, South Sulawesi, as outlined in the following explanation:

a) Force Concepts

The physics concept of force is evident when a craftsman weaves using thread. The craftsman pulls the thread using their fingers and the palm of their hand.

Figure 3. The Process of Weaving the *Songkok Recca*

The artisan pulls the thread using their fingers and palms. When pulling the thread, the hand exerts a force parallel to the direction of the thread, causing tension due to the pulling force. In physics, a force is a pull or push that can cause an object to change its shape or position, as well as alter the direction or state of its motion (Fajriyani 2023; Setyawan, 2020). If the tension applied is too light, the weave becomes loose and the resulting *Songkok* is asymmetrical. Conversely, if the tension applied is too strong, the threads may break and the weave structure may come apart. The proper way to produce a good *Songkok Recca* is for the artisan to apply balanced tension to the threads. In addition, the threads must be pulled steadily and consistently, without any jerks. This relates to the physics concept of tensile force in thread. Tensile force is the pulling force acting on the thread as it is woven. The right amount of tension makes the weave strong, neat, and unbroken.

Figure 4. The Process of Weaving the *Songkok Recca*

In the process of weaving a *Songkok Recca*, the acceleration of the threads is very small, so the forces acting on them play a more dominant role in changing the shape and tension of the pulled threads. The magnitude of the force during the weaving of a *Songkok Recca* can be calculated using the equation derived from Newton's Second Law as follows:

$$\vec{F} = m\vec{a} \tag{1}$$

Information:
$\vec{F}$ = weaving force (N)
m = mass of the thread (kg)
$\vec{a}$ = acceleration of the thread (m/s^2)

b) Pressure Concepts
The physics concept of pressure comes into play when the artisan presses the thread with their finger, which has a small contact area.

Figure 5. The process of shaping the surface of the *Songkok Recca*

In physics, pressure is defined as the force acting perpendicular to a surface divided by the area of that surface (Khaeruddin et al., 2024). If the magnitude of the applied force is constant, a small contact area results in high pressure. This high pressure helps the threads fit tightly into the weave pattern. A high weave density enhances the mechanical strength of the *Songkok* structure. This is because tightly packed threads distribute forces more evenly throughout the weave. When the *Songkok* is worn or subjected to external pressure, the load is not borne by a single section but is distributed across the entire woven structure, making the *Songkok* sturdier and more precise or resistant to deformation. The force exerted when pressing the thread can be calculated using the following equation:

$$P = \frac{F}{A} \tag{2}$$

Information:
P = thread pressure (N/m^2)
F = thread compressive force (N)
A = contact area (m^2)

c) Work and Energy Concepts
Work Concepts
The physics concept of work is demonstrated when the artisan's hands apply pulling and pushing forces to the thread, causing the thread to move according to the weaving pattern.

Figure 6. The thread transfer process

As the artisan's hands apply pulling and pushing forces to the thread, the thread moves according to the weaving pattern. The direction of the pulling force is parallel to the direction of the thread's movement. In physics, work is defined as the force applied to an object that causes it to move (Poernomo, 2021). Every pull of the thread as it moves generates work. The longer and more frequent the pulls, the greater the total work performed by the craftsman, and the neater and denser the structure of the *Songkok* becomes. The relationship between the direction of the force and the direction of the displacement determines how effective the effort is. Therefore, to determine the force exerted by the artisan while weaving the thread, the following equation can be used:

$$W = F\cos\theta . s \tag{3}$$

Information:
W = work done in weaving the thread (Joule)
F = tensile force of the thread (N)
θ = angle formed between the direction of force and displacement (°)
s = displacement of the thread (m)

Weaving the *Songkok Recca* requires a high degree of precision because the fibers of the lontar palm fronds are very thin. The artisans apply force and movement in specific directions during several crucial stages, including:

1. When tightening the woven palm fiber, the artisan pulls or pushes the new fibers to fit snugly against the existing weave. The artisan applies a pushing force in the same direction as the fibers' path $(\theta = 0^{\circ})$. This ensures that 100% of the craftsman's energy is directed toward closing the gaps. If the force is applied at an angle, the weave will become loose, uneven, or even cause the palm fibers to break due to unnecessary shear stress.
2. *Songkok Recca* is woven using an intricate crisscross pattern with a wooden mold or *assareng*. As the fibers are inserted diagonally, the direction of the artisan's hand forms a specific angle relative to the hat's vertical or horizontal axis. The diagonal placement of the fibers creates a strong interlocking effect, allowing the *Songkok Recca* to stand firmly and form a perfect circle that follows the shape of the *assareng*.
3. When weaving the circular edge, the artisan must keep the fibers in place so they do not shift out of the mold. The artisan applies a restraining force inward (toward the center of the circle), while the weaving process continues to move forward around the mold (perpendicular to the restraining force). Although this inward restraining force does not physically exert work on the circular movement, this perpendicular force is crucial as a balancing force to keep the weave symmetrical and prevent it from stretching outward.

Energy Concepts

In the process of weaving the *Songkok Recca*, the movements are relatively slow and there are no significant changes in height. Consequently, the energy generated by the artisan while weaving the *Songkok Recca* with thread is primarily kinetic energy from the hands.

Figure 7. The process of moving the hand to pull the thread

As the artisan moves their hands to pull the threads, then presses and adjusts the weave, kinetic energy is generated in the hands, which is used to alter the position and shape of the weave. According to the principles of physics, kinetic energy is the energy possessed by an object due to its motion (Saripudin et al., 2009). The faster the hand movements, the greater the kinetic energy. However, this must be done carefully because if the hand movements are not controlled properly while moving the thread, it can damage the woven fabric. Therefore, the artisan must work at a moderate and steady pace to ensure efficient use of energy and precise weaving results. The kinetic energy when the artisan moves their hand to pull the thread can be calculated using the following equation:

$$Ek = \frac{1}{2}mv^2 \quad (4)$$

Information:
Ek = kinetic energy of the pulling string (Joule)
m = mass of the string (kg)
v = speed of the pulling string (m/s)

d) Momentum and Impulse Concepts

Momentum Concepts

The physics concept of momentum comes into play when craftsmen use the *Recca* beating technique to extract fibers from the fronds of the lontar palm. The technique used by craftsmen in striking the *Recca* can be analyzed using the law of conservation of mechanical energy. Based on the law of conservation of mechanical energy, when the hammer is repeatedly moved up and down to strike the *Recca* placed on the striking platform, the velocity of the hammer affects the *Recca* fibers, thereby generating kinetic energy upon impact. When the hammer is moved upward, it also affects the height of the strike, reaching maximum height at the peak to strike the *Recca*, thereby generating potential energy. This is consistent with the law of conservation of mechanical energy, which states that energy cannot be created or destroyed. Energy can only change into another form or transfer from one object to another (Muafiah & Resmiyanto, 2025) so that:

$$Ek_{bawah} + Ep_{bawah} = Ek_{puncak} + Ep_{puncak}$$
$$\frac{1}{2}(m_{recca} + m_{palu})v^2 + 0 = 0 + (m_{recca} + m_{palu})gh$$
$$\frac{1}{2}(m_{recca} + m_{palu})v^2 = (m_{recca} + m_{palu})gh$$
$$v^2 = 2gh$$
$$v = \sqrt{2gh} \quad (5)$$

Figure 8. The height of the *Recca* strike

When the artisan swings the hammer at a higher speed, the resulting momentum increases. This affects the quality of the resulting fibers *Recca*. The hammer, which serves as a tool for striking the fibers *Recca*, has mass. If the artisan uses the hammer to strike the fibers *Recca* at such a high speed, it will generate significant momentum. This high momentum determines the quality of the struck *Recca* fibers. According to the principles of physics, the momentum of a moving object is directly proportional to its velocity (Nurachmandani, 2009). The momentum when striking *Recca* can be calculated using the following equation:

$$p = mv$$

$$p = m\left(\sqrt{2gh}\right) \quad (6)$$

Information:
p = momentum (kgm/s)
m = mass of the hammer (kg)
v = velocity of the hammer (m/s)
g = acceleration due to gravity (m/s^2)
h = height of the hammer's swing (m)

Impulse Concepts
The physics concept of impulse applies to the tool used by craftsmen when striking *Recca* fibers. The tool used to strike *Recca* is a hammer. The purpose of using a hammer is to shorten the contact time with the *Recca*, thereby generating a greater impulse force (Wahyono, 2019).

Figure 9. The time interval between hits on *Recca*

When the bat head touches the bat plate or collides with it, the force at the moment of impact acts for a relatively short period of time, causing a change in velocity. At that moment, a change in momentum occurs. This change in momentum is called impulse. Impulse is a change in momentum defined as the product of force and the time during which the force acts. (Muafiah

& Resmiyanto, 2025). The magnitude of the impulse generated during the hammering process can be calculated using the following equation:

$$I = F\Delta t$$
$$I = mg(t_f - t_i) \quad (7)$$

Information:
I = impulse (Ns)
F = force with which the craftsman strikes *Recca* (N)
Δt = time difference of striking *Recca* (s)
m = mass of *Recca* (kg)
g = acceleration due to gravity (m/s^2)
t_i = initial time of striking *Recca* (s)
t_f = final time of contact with *Recca* surface (s)

e) Equilibrium Concepts

The physics concept behind the balance of the *Songkok Recca* lies in the analysis of its cylindrical shape. This examination of the cylindrical form involves an analysis of gravitational force, normal force, and the center of mass.

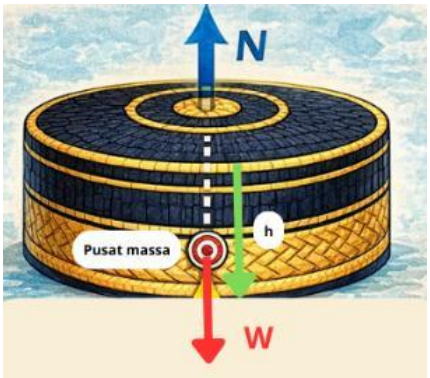

Figure 10. The Balance of the *Songkok Recca*

In physics, a cylinder is highly stable because mass is distributed evenly in a circular pattern, the flat base provides a wide contact area, and the vertical axis of symmetry helps maintain stability. This relates to the principle of equilibrium, which occurs when the sum of forces and torques is zero (Palupi et al., 2009). On the cylinder, weight (W) acts downward and normal force (N) acts upward. For equilibrium, the following equagtions hold:

$$\sum F = 0$$
$$N - W = 0$$
$$N = W \quad (8)$$

Information:
N = normal force (N)
W = weight (N)

Based on its center of gravity or center of mass, the *Songkok Recca* is in static equilibrium, which means the object is at rest. The center of mass is the point at which the entire mass of the object is considered to be concentrated. Since the *Songkok Recca* resembles a homogeneous cylinder, its center of mass can be determined using the following equation:

$$y_{pm} = \frac{h}{2} \quad (9)$$

Information:
y_{pm} = center of mass the *Songkok*
h = height of the *Songkok* (m)

This research successfully revealed that the traditional *Songkok Recca* craft of the Bugis People in Bone Regency, South Sulawesi, not only embodies history, cultural values, and local wisdom but is also rich in physics concepts. Through a literature review, a connection was found between the physical activities performed by local artisans and the concepts of classical mechanics in high school level SMA/MA physics learning. The process of preparing raw materials through to weaving threads from lontar palm fronds onto a *Songkok* or *assareng* mold was shown to apply the principles of the laws of motion, equilibrium of rigid bodies, and conservation of energy. The identification of physics concepts in the *Songkok Recca* holds great potential for integration into context based ethnophysics oriented physics learning with in the local environment, making the subject meaningful for students.

The findings of this research reveal that every stage of the *Songkok Recca* making process from the technique of pounding lontar palm fronds, weaving threads from the fronds' fibers, compressing the woven threads, to shaping the final structure of the *Songkok Recca* consistently applies concepts of physics. The physics concepts successfully identified include Force, Pressure, Work and Energy, Momentum and Impulse, and Equilibrium. These findings demonstrate that the local wisdom of the Bugis Bone community is empirically aligned with scientific principles, making it a valuable resource for high school level SMA/MA physics learning through an ethnophysics approach that is closely connected to the students' environment.

The scientific interpretation of each physics concept found in the *Songkok Recca* headdress of the Bugis Bone People in South Sulawesi, as outlined in table 1 below.

Table 1. Interpretation the Physics Concepts Behind *Songkok Recca* Craft of the Bugis Bone People in South Sulawesi

Physics Concepts	Activity Stages	Description
Force	Pulling the thread using your fingers and the palm of your hand.	Artisans intuitively apply an even and consistent pulling force. If the pulling force is too weak, the weave becomes loose and asymmetrical. Conversely, if it is too strong, the threads will break. The neatness of a *Songkok* depends on the artisan's ability to maintain a consistent pulling force.
Pressure	Pressing the thread with your fingertips while tightening the weave	In accordance with the principle of pressure, the small surface area of the fingertip generates significant pressure even when the applied force is moderate. This high pressure causes the *lontar* fibers to close tightly, increasing the weave density and making the *Songkok* structure extremely sturdy and durable.
Work and Energy	The movement of the hand moves the thread (Work) and the speed at which the hand pulls the thread (Energy).	The weaving process occurs due to the movement of the threads in the direction of the force applied during weaving. The chemical energy from the artisan's body is converted into the kinetic energy of their hands as they weave the threads. The artisan must maintain a steady pace so that the energy is transferred effectively without damaging the delicate *lontar* fibers.
Momentum and Impulse	Hitting the *lontar* fronds with a hammer	The speed at which the hammer strikes the *lontar* fibers from a certain height generates momentum that separates the leaf sheath's pulp, leaving behind fine fibers. Using a hammer to strike the fibers shortens the contact or impact time, thereby generating an impulse force that effectively breaks

		down the outer tissue of the leaf sheath without damaging the fibers inside.
Equilibrium	The cylindrical shape of the finished *Songkok*	The cylindrical structure of the *Songkok Recca* is in a state of static equilibrium, in which the downward force of gravity is perfectly counterbalanced by the normal force from the surface. The center of mass, located precisely on the axis of symmetry, provides high geometric stability, ensuring that the *Songkok* does not easily shift position when worn.

CONCLUSION

Based on the results and discussion, it can be concluded that the stages of making the *Songkok Recca* craft involve physics concepts that can be identified and explained scientifically, including force, pressure, work and energy, momentum and impulse, and equilibrium. The results of this research imply that local wisdom can be utilized as a contextual learning resource capable of bridging abstract physics concepts with students' real-world experiences. Scientifically, this research strengthens the field of ethnophysics by providing evidence that the activities of local artisans in the production of *Songkok Recca* crafts possess educational value relevant to physics learning. The main contribution of this research is the presentation of a comprehensive analysis of physics concepts in the *Songkok Recca* making process, which can serve as a basis for developing innovative teaching materials. However, this research has limitations as it focuses solely on the identification and qualitative analysis of physics concepts present in the *Songkok Recca* making process. Therefore, future research is recommended to develop and implement *Songkok Recca* based teaching materials, such as e-books, digital pocket books, or interactive learning media, and to test their impact on students' conceptual understanding, physics literacy, and appreciation for the preservation of local culture through more meaningful and contextual physics learning.

REFERENCES

Akhmad., Amir., Romadhoni, B., Hafid, A., & Akhmad, M. A. (2025). Development Model for Creative Economy Based on Local Wisdom: The Case of Songkok Recca in South Sulawesi Province. *International Journal of Scientific Research and Management (IJSRM)*, *13*(06), 9193-9206. https://doi.org/10.18535/ijsrm/v13i06.em06

Ansar, Y., Azhar, H. H., & Jafar, A. F. (2026). The Use of a Physics E-Module Supported by Google Sites for the Topic of Work and Energy on the Learning Outcomes of 10th-Grade Students at State High School 13 Makassar. *Pendas: Scientific Journal of Basic Education*, *11*(01), 138-149. Retrieved from https://www.journal.unpas.ac.id/index.php/pendas/article/view/42020

Ariandi, M. F., & Jufri, M. (2022). The Existence of the Songkok Recca in the Civilization of the Bone Community. *CARITA: Journal of History and Culture*, *1*(1), 45-64. Retrieved from https://ejurnal.iainpare.ac.id/index.php/carita/article/view/3413

Aspers, P., & Corte, U. (2019). What is Qualitative in Qualitative Research. *Qualitative Sociology*, *42*(2), 139–160. https://doi.org/10.1007/s11133-019-9413-7

Copy of the Minister of Education and Culture (2018). *Designation of Indonesian Intangible Cultural Heritage*.

Darmalaksana, W. (2020). *Qualitative Research Methods: Literature Review and Field Study*. Pre-Print Digital Library UIN Sunan Gunung Djati Bandung, 1–6.

Fajriyani (2023). Structure Of Tongkonan Traditional House Buildings As A Source Of Physics Learning. *AL-KHAZINI: Jurnal Pendidikan Fisika*, *3*(1), 1-15. https://doi.org/10.24252/al-khazini.v3i1.36241

Khaeruddin., Palolloan, P., & Wahyuni, A. S. A. (2024). *Project-Based Learning Teaching Materials on Fluids*. Jaya Abadi Publishing: Makassar.

Krisanti, G. D., Aisah, S. N., Damarsha, A. B., Suprapto, N., Admoko, S., & Mulatu, K. K. (2026). Analysis of Physical Concepts in Nganjuk Tourism Banyu Biru Hot Springs. *Journal of Ethnophysics*, *1*(1), 46–55. Retrieved from https://journal.unesa.ac.id/index.php/ethnophysics/article/view/46723

Muafiah, L. A., & Resmiyanto, R (2025). *Enrichment Book: Uncovering the Physics Behind Tradition. Understanding Mechanics and Sound Waves in the Traditional Art of Gejog Lesung*. Yogyakarta.

Musniar, A., Martawijaya, M. A., & Subaer, S. (2023). Physics Concepts for High School Students in North Bone in Advancing the Production of the Songkok Recca. *Journal of Science and Physics Education*, *19*(3), 252-261. https://doi.org/10.35580/jspf.v19i3.32760

Nurlaeliana., & Bachtiar, T., Ekawati, M., & Hasmatang (2025). Ethnobotanical Study of Borassus flabellifer as Raw Material for Songkok Recca, a Distinctive Feature of the Bugis Community in Bone. *Biogenerasi: Journal of Biology Education*, *10*(2), 1734-1740. https://doi.org/10.30605/biogenerasi.v10i2.6881

Nurachmandani, S. (2009). *Physics 2 for Senior High School/Madrasah Aliyah Grade 11*. National Education Department Book Center: Jakarta.

Palupi, D. S., Suharyanto, & Karyono (2009). *Physics for Senior High School/Madrasah Aliyah Grade 11, Volume 2*. National Education Department Book Center: Jakarta.

Poernomo, J. B. (2021). *Physics with Local Wisdom*. Faculty of Science and Technology, UIN Walisongo Semarang: Semarang.

Saripudin, A., Dede, R. K., & Adit, S. (2009). *Practical Physics 2 for High School/MA Grade 11 Science Program*. National Education Department Book Center: Jakarta.

Sasmi, R. R., Shiha, S. N., Saregar, A., & Deta, U. A. (2025). High School Students' Perspectives on Local Wisdom, Science Literacy, and Learning Motivation in Physics Education. *Reog: Journal of Ecoethnoscience Education*, *1*(1), 32-39. https://doi.org/10.58706/reog.v1n1.p32-39

Setyawan, H. (2020). *High School Physics Learning Module on Newton's Laws of Motion in Linear Motion for Grade 10*. Directorate of High Schools, Directorate General of Early Childhood Education, Basic Education, and Secondary Education.

Sriwahyuni, E. (2024). Identification of Physics Concepts in the Creation of the Traditional Tennong-Tennong Musical Instrument. *Syntax Literate: Indonesian Scientific Journal*, *9*(2), 753–761. https://doi.org/10.36418/syntax-literate.v9i2.15203

Wada, F. H., Pertiwi, A., Hasiolan, M. I. S., Lestari, S., Sudipa, I. G. I., Patalatu, J. S., Boari, Y., Ferdinan., Puspitaningrum, J., Ifadah, E., & Rahman, A. (2024). *Textbook on Research Methodology*. Jambi: PT. Sonpedia Publishing Indonesia.

Wahyono, B. (2019). *Enrichment Module for 10th Grade High School/MA*. Publisher: CV. Graha Pustaka: South Jakarta.

Yusaerah, N. (2023). *Promoting Local Wisdom Through Ethnopedagogy*. IAIN Parepare Nusantara Press: Parepare.

Author (s):

*Azhar Arsyad (Corresponding Author)
Physics Education, Faculty of Mathematics and Natural Science, Universitas Negeri Makassar
Jl. Dg. Tata Raya, Makassar 90224, Indonesia
Email: azhararsyad12012021@gmail.com