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Cultural-Based Analysis of Local Language Diversity in Quantity and Measurement Concepts: An Ethno-Creative Physics Study

John Rafafy Batlolona[1]*, Jamaludin[2], Yohanis Hukubun[3], Mehmet Altan Kurnaz[4]

[1,2]*Department of Physics Education, Faculty of Teacher Training and Education, Universitas Pattimura, Indonesia*
[3]*Department of Indonesian Language and Literature Education, Faculty of Teacher Training and Education, Universitas Pattimura, Indonesia*
[4]*Department of Mathematics and Science Education, Faculty of Education, Kastamonu University, Turkey*

*Correspondence to: *john.batlolona@lecturer.unpatti.ac.id*

Abstract: This study focuses on the physics concept of quantities and units found in local wisdom in Maluku. However, to our knowledge, there is a paucity of empirical research that investigates how the concept of quantities and units relates to learning creativity, particularly in the island communities of Maluku. Previous studies have largely focused on what has been established by international committees with standardized measurements. Meanwhile, traditional measurement systems are still applied in daily activities. Using a qualitative research approach, this study employed observation, interviews, and documentation to gather data, as well as qualitative analysis to identify patterns and themes. Through this methodology, we identified various aspects of local wisdom in Maluku that relate to physics concepts. Our findings show that students can describe local wisdom in physics, specifically in the concepts of quantities and units, based on four indicators of creative thinking. This study highlights the potential of integrating local wisdom into physics learning, making it more relevant to the Merdeka Curriculum. By doing so, this research contributes to the field of physics education by providing a culturally sensitive approach to teaching and learning, and by demonstrating the value of local wisdom in enhancing students' understanding of physics concepts.

Keywords: *creative thinking; ethnophysics; local language diversity in Maluku; measurement; quantities and units*

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INTRODUCTION

Without measurement, there would be no science. Modern science is established and developed through the hypothesis-testing-model-theory cycle. Physics and measurement are inseparable. Measurements are conducted to enhance knowledge and understanding of the world we inhabit. Physical measurements aim to obtain values in agreed units to determine the size of physical quantities. Physical constants relate physical quantities to form physical laws (Zhan & Xie, 2020). The science of measurement is the foundation of modern science and technology, and, consequently, of modern civilization. Length is the most crucial measurement in every aspect of life. Early methods of measuring length were based on human body parts. The lengths and widths of fingers, thumbs, hands, spans, cubits, and the body range were popular choices. However, there would be significant variation in the length of different people's body parts, so using a piece of wood or other materials as a unit of length was a brilliant idea for measuring length. Ancient India used units of length such as *dhanus* (bow), *krosha*, and *yojana*. During the Mughal period, Akbar used *gaz* as a unit of length. Each gaz was divided into 24 equal parts, each called a *tassuj*. Gaz was widely used as a unit of length until the metric system was introduced in 1956.

During the British period, inches, feet, and yards were used to measure length, while grains, ounces, pounds, etc., were used to measure mass. Important mass units used in India included *ratti*, *masha*, *tola*, *chattank*, *seer*, and *maund*. *Ratti* is a red seed weighing about 120 mg, widely used by goldsmiths and practitioners of traditional medicine in India. In ancient India, the length of shadows cast by trees or other objects was used to estimate the time of day. Long durations were expressed in lunar cycles. During the Vedic period in India, various units of measurement were used for calculating *tithi*, *nakshatra*, etc., for social and religious events. Many civilizations and emperors established their own measurement standards accepted throughout their countries (Shrivastava, 2017).

The history of measurement shows that human efforts to understand physical quantities began with measuring space, particularly length and area (Nyblom, 2023). Essentially, measurement involves assigning numerical values to continuous quantities to support comparison, ordering, and calculation. To appreciate the achievements of measurement culture, consider continuous quantities such as time, temperature, and speed, which are part of our daily experiences. They are intangible, yet we have mastered them through measurement. Historically, many factors influenced the choice of measurement units. For instance, the human body shape

made the foot a common unit of length, and the Roman duodecimal numbering system made the hour a basic time unit that groups a day. Although tangible evidence is still scarce, most historians believe that spatial measurements began in the second millennium BC. Greek mathematicians such as Euclid, Pythagoras, and Eratosthenes made many advances in measurement and geometry. Geometry provides descriptive characterizations of two- and three-dimensional shapes in terms of their spatial properties, where measurement is essentially metric, assigning numerical values to spatial quantities (length, area, angles, and volume) (Smith & Barrett, 2017).

Although measurement plays a fundamental role, the concepts of physical quantities and units are among the most difficult topics for students to understand in physics. Many students struggle to distinguish between quantities and units, perform unit conversions, and relate abstract measurements to real-world contexts. These difficulties are often caused by incomplete prior knowledge, misconceptions, and the tendency of physics content to be abstract. As a result, students' physics learning outcomes remain low, and many have not met the minimum mastery criteria, particularly in the topic of quantities and units (Fraser et al., 2014; Tawil et al., 2023). This condition indicates the need for more contextually and meaningfully oriented learning approaches. The primary influencing factor is ingrained cultural issues (Batlolona, 2024). Language use is one of the main barriers, as evidenced by the measurement methods in each region being very different. This is an extraordinary wealth of the archipelago. In ancient times, ancestors provided creative ideas for naming measurements, which have been passed down through generations to this day. Creativity is closely related to measurement and language.

Physics learning that integrates language and local wisdom is believed to enhance students' creativity. Acquiring new languages enriches an individual's conceptual knowledge by exposing them to diverse linguistic and cultural norms and values, which can stimulate creative thinking (Li & Wei, 2024). Studies show, for instance, that in Indonesia students in Klaten Regency demonstrate average creative thinking skills in the low category (Sugiyanto et al., 2018). The same is evident in studies of student creativity in Maluku, particularly in the Aru Islands, which indicate that student creativity remains low (Leasa et al., 2021). Consequently, students must actively apply 21st-century skills, demonstrate initiative, and collaborate effectively (Ahmad et al., 2016). The physics learning process is expected to shape scientific concepts, encouraging mastery that in turn fosters deep thinking, problem-solving, and critical thinking. A learning process grounded in local culture and wisdom can help students acquire the targeted learning competencies. Through physics learning, students will gain problem-solving skills relevant to everyday life (Ardan, 2016). Teachers' classroom experiences over the years greatly enhance students' conceptual understanding. Teacher characteristics, student misconceptions, and incomplete understanding of lessons, everyday life experiences, and the use of everyday language contribute to the formation of misconceptions (Tasci, 2024).

Language plays an important role in shaping conceptual understanding in science learning. Language is a crucial factor in learning and can take the form of a mother tongue, a foreign language, or a local dialect (Akello & Timmerman, 2018). The distribution of linguistic skills in multilingual societies is essential for understanding opportunities and challenges at both the individual and societal levels. Furthermore, linguistic landscapes are not static and can be changed by economic and cultural incentives to acquire languages other than one's mother tongue (Alcalde-Unzu et al., 2022). Numerous studies on the shift in regional languages and efforts to preserve them have been conducted in various places. This condition indicates that language shift is serious, prompting researchers to investigate it, as many regional languages are experiencing shifts or even extinction. Generally, research findings revealed by researchers conclude that three main factors cause shifts in the use of regional languages: 1) Family factors; 2) Education factors; and 3) Peer factors. Inter-ethnic marriages (mixed marriages) are the most prominent factor often highlighted in several studies. Inter-ethnic marriages not only eliminate the use of regional languages but also erode culture (Holmes et al., 2013). Language shift is highly likely if the children are born to parents from different ethnic backgrounds or to families that have migrated. Language, as a cultural asset, can only be passed down to the next generation through learning transferred in both non-formal settings, such as the family realm, and formal educational settings. In the realm of regional language education, local languages should be taught officially in certain educational units, even at the primary level, such as early childhood education, as this stage is the initial stage of language learning. However, the field observation indicates that students' language skills do not meet expectations. Various factors can contribute to this, both internal language factors and external factors (Lubis et al., 2023).

The integration of local cultural traditions into science education has been a topic of ongoing research. Previous studies have shown that ethnoscience enhances students' understanding of science concepts in Nigeria (Fasasi, 2017). Similar findings were reported by Morales (2017) regarding the use of traditional games, such as Laro-ng-Lahi, in physics learning, which resulted in significant improvements in students' conceptual understanding. According to Parsons and Carlone (2013), culture is a complex phenomenon tied to context and time, existing on various scales from local to global and historical to contemporary. Culture plays a crucial role in shaping societal knowledge and understanding through the process of cultural transmission from one generation to the next, often unconsciously. This enables societies to make sense of current events and plan

for their future. In recent years, Indonesia has become a focal point for research on ethnoscience based on local cultural traditions. This research aims to integrate science and technology with society's rich cultural traditions, making science more accessible and beneficial to students. Moreover, ethnoscience in science education also seeks to introduce students to and instill in them a love for their native culture. Previous studies have demonstrated that ethnoscience can be applied to various aspects of societal life, such as traditional Javanese culinary arts (Sudarmin et al., 2017), innovative fashion design related to local color culture, particularly traditional costumes of the Yi ethnic group in Liangshan, China (Ji et al., 2020) and Reog Ponorogo (Habibi et al., 2025). Meta-analyses of Ethnophysics studies over the last seven years have shown that the cultural aspects investigated remain limited to traditional dances, games, and houses. Research has also been limited to specific regions, such as Jayapura, Demak, East Java, West Java, Jambi, West Sumatra, Aceh, South Sulawesi, and South Central Timor, within regional or ethnic contexts, using shared materials (Festiyed et al., 2024).

On the other hand, Riau province in Sumatra Island has a rich Malay cultural tradition, including the Pacu Jalur tradition, which is a local and national annual competitive event (Zulirfan et al., 2023). Furthermore, studies on measurement in cultural contexts in Maluku have not been specifically conducted related to local languages used to measure length, mass, and time. However, field observations indicate that local communities in rural areas and market activities in Maluku still use length, mass, and time measurement standards consistent with local languages, even though relevant institutions have established international standards. This is a tangible example of the art or creativity in the form of uniqueness created by ancestors in the past. They have developed a measurement system based on their local language and culture, which is still in use today. Research on ethnophysics of this tradition can provide deeper insights into the relationship between culture and science, as well as how local communities develop knowledge and technology that suits their needs and cultural context. Thus, this study can help us understand how local communities in Maluku develop a unique measurement system and how it relates to their culture and tradition. Additionally, this research can also contribute to the development of more contextual and locally-based science and technology.

Organizational creativity is crucial for generating new, useful ideas that address operational problems and ensure sustainable innovation for future businesses (Lee et al., 2025). In a rapidly changing economic landscape, the importance of developing creative thinking skills is recognized across many countries, and teachers are encouraged to foster them under the banner of 21st-century skills (McLure et al., 2024). In the Australian curriculum, the teaching of creative thinking skills is mandated across all subject areas (Australian Curriculum Assessment & Reporting Authority, 2010). In the Australian curriculum, teaching creative thinking skills is mandated across all subject areas (Australian Curriculum Assessment & Reporting Authority, 2010). Findings indicate that while teachers can identify many elements of creativity and creative thinking described in the literature, many still feel uncertain about what creative thinking entails. For classroom activities that foster creative thinking, most teachers focus on project-based or inquiry-based learning that requires lengthy class time to complete (McLure et al., 2024). In science education, teaching creative thinking skills has additional significance in the context of the nature of science (Ivan et al., 2025).

Although science is recognized as an empirical discipline, there are many instances in which creativity or imagination is used to build scientific explanations (Xu et al., 2025). Despite creative thinking being incorporated into curricula in many countries, research has repeatedly reported that teachers struggle to implement ways to develop students' creative thinking skills (Li, 2023). In the Australian context, since 2010, teachers have been tasked with implementing teaching strategies that develop creative thinking skills; it is expected that over these years, teachers have built a good understanding of what creativity means and have a repertoire of teaching strategies to develop creative thinking (Murphy et al., 2024). Creative thinking can be considered one of the key competencies of the 21st century, and its impact is far-reaching. Creative thinking enables us to fly to the moon, create works of art, develop computers, and cure diseases. The term 'creativity' is rooted in the Latin 'cre', meaning 'to create' or 'make,' and generally refers to the ability to generate original ideas or solutions to problems (Mumford, 2003). Besides its role in problem-solving, creativity allows us to remain flexible. Cognitive flexibility enables us to face opportunities and changes in our complex, rapidly changing world (Reiter-Palmon et al., 1998). To meet the needs of the 21st century, academics, business leaders, and policymakers worldwide have placed creativity at the forefront of their agendas (Ritter & Mostert, 2017).

Creativity is essential for survival in the ever-changing modern world. Creativity is the seed of innovation, which is critical for human societal development. Therefore, a creative workforce is essential (Karunarathne & Calma, 2024). The increasing importance of creativity and innovation has economic, social, and cultural significance (Lewis, 2025). For example, creativity is a machine for economic and technical development (Liu et al., 2023), vital for generating new ideas, enhancing efficiency, and designing solutions to complex problems (Plucker et al., 2004). This is evident in the transformation and enhancement of industries, as the Chinese government has implemented innovation-driven development strategies. As the ability to generate new and useful ideas (Luo et al., 2021). Japan, also a country with the world's best innovations, has proven its

technological excellence, especially during Japan's economic miracle period until the 1980s (Yusof & Othman, 2016). Additionally, a technologically advanced country like Israel is considered one of the leading economies in innovation achievements (Bar-El et al., 2019). This country ranked 11th out of 127 countries according to the Global Innovation Index (Dutta et al., 2018). On one hand, Israel is supposed to be a survival country; small, lacking natural resources, and forever threatened by an increasingly unstable, hostile geopolitical environment (Tawil, 2015).

Individuals with creativity possess psychological traits such as curiosity, adventure, challenge, and imagination in their emotions. Creativity describes the psychological process of going beyond existing experiences, breaking through habitual boundaries, and forming new ideas in new situations (Bereczki & Kárpáti, 2018). Creativity is the individual's ability to produce innovative and viable ideas to solve problems (Wang & Jiang, 2022). Creative thinking helps professionals succeed in complex problem-solving and decision-making processes and successfully adapt to everyday life demands (Morris, 2022). Creativity not only drives societal progress through inventions and discoveries but also helps society advance by changing how people relate to the world, others, and themselves, making them more flexible and open to change (Glaveanu et al., 2020). Creativity is also associated with other cognitive activities, such as leadership, critical thinking, decision-making, metacognition, and motivational and behavioral factors (Zhang et al., 2018).

Therefore, higher education institutions, as places to train intellectuals, need to actively facilitate supportive environments, resources, and opportunities that enhance creativity, making it an explicit part of students' higher education experience (Vincent-Lancrin, 2023). In 76 studies in China and the US, they ranked the highest in recent reviews (Smare & Elfatihi, 2023). According to Pllana (2019), both countries focus on improving higher-order thinking skills in their education systems. In China, creative thinking has recently attracted increased attention. The development of creative thinking in this country is considered an important educational goal that must be incorporated into regular curricula and across all subjects (Cheng, 2010). Moreover, the promotion of creative thinking in children has become a priority in the education policymakers' agenda in China since 2001 (Vong, 2008). American academics and educators currently recognize that creative thinking underpins modern education (Pllana, 2019). However, despite its importance, creativity is not promoted in most American school districts due to numerous constraints, primarily related to standardized testing (Pllana, 2019). Activities that train students' creative thinking skills in learning are expected to support the development of ideas and insights, leading to new, meaningful understanding (Forte-Celaya et al., 2021).

Creativity is an essential aspect of learning. Thanks to creativity, students develop a positive attitude toward learning and find it more enjoyable. Through creativity, students activate passive information by transforming it into a product. Due to creativity acquired from a young age, individuals can more easily solve everyday problems and become more productive in adulthood. This is one of the primary goals of education: to equip students well for their future lives and educate them as productive citizens (Şenel & Bağçeci, 2019). Creativity can enable students to understand physics concepts deeply and apply them in new situations (Sidek et al., 2020). However, despite this increasing recognition, many students struggle to achieve adequate physics learning outcomes, often failing to meet minimum competency standards (Batlolona, 2019). This issue highlights the urgent need to investigate further the impact of creative thinking on physics learning outcomes.

This is because students with high creativity also achieve better learning outcomes (Said et al., 2024). In physics learning, it is very effective in enhancing students' creative thinking and problem-solving abilities (Widyaningtyas et al., 2024). Although research on ethnoscience and ethnophysics continues to develop, studies that specifically examine measurement systems based on local languages and their relationship to students' creativity in physics learning remain very limited. To date, few studies have investigated how local measurement terms in Maluku can be systematically integrated into physics instruction, particularly in the topic of physical quantities and units, to foster students' creativity. This gap indicates the need for research that links the concepts of physical quantities and units in physics, Maluku local wisdom, and creativity within a coherent learning framework. The purpose of this research is to analyze students' creativity in the concepts of quantity and unit based on Maluku's local wisdom.

METHODS

This research is a qualitative study that adopts an analytical approach. The method aims to describe and interpret the meanings of the data obtained in relation to the phenomena under study and their accompanying characteristics (Lim, 2025). Data collection was conducted between January and July 2025 using triangulation, which included observation, interviews, and literature reviews, supported by documentation. Primary data were obtained through observation, interviews, and documentation, while secondary data were taken from literature reviews (Febrian & Jumadi, 2022). With this comprehensive qualitative approach, this research aims to provide a deeper understanding of the phenomena being studied (Villamin et al., 2024). The purpose of qualitative studies is to provide a comprehensive summary, in everyday contexts, of specific events experienced by individuals or groups (Hall & Liebenberg, 2024). By carefully analyzing and interpreting the data obtained, this research aims to make a significant contribution to the development of theory and practice in

relevant fields. Additionally, the results of this research are expected to serve as a reference for future studies and support better decision-making in the context of the phenomena being researched. The study participants are students of the Elementary School Teacher Education program at one of the largest campuses in Maluku, Indonesia. They went into the field during their holiday, collected local creativity from their respective regions, and conducted portraits and direct interviews with the community while engaging in trading activities. After conducting activities in the village, the data were collected based on the findings from the field. The instrument was developed with reference to four indicators of CTSs, i.e., fluency, flexibility, originality, and elaboration (Hart, 1994).

They also conducted observations, both direct and indirect. Direct observations included the processes of local wisdom objects and the sales system in Maluku. Meanwhile, indirect observations came from documentation provided by respondents to the researchers (Bazen et al., 2021). These observation activities help researchers understand the process of direct creation or application, thereby facilitating the analysis of local wisdom in the context of physics. Interviews were conducted directly in the field, namely in local markets in Ambon City and in rural areas where the community typically trades. Open-ended questions were used to analyze the research topic while maintaining ethical standards towards respondents. The literature review in this study was conducted by seeking as many references as possible from various sources, including journal articles, books, and previous research (Snyder, 2019; Saphira et al., 2022).

The collected qualitative data will be interpreted using the Miles and Huberman (1994), The implementation stages include: 1) collecting detailed information about local wisdom in Maluku, such as sales systems through interviews, direct and indirect observations, literacy reviews, and documentation; 2) data reduction by summarizing and sorting relevant information with physics concepts, so that the reduced data provides a clearer picture and facilitates further data collection; 3) exploring physics concepts in Maluku's local wisdom, which is done by studying literacy to explain the physics concepts found in the local culture. Concept analysis is conducted by formulating physical facts, principles, laws, and theories based on local wisdom; 4) summarizing the physics concepts found in local wisdom in Maluku and presenting the data. In qualitative research, data will be presented in the form of descriptive or narrative text; 5) drawing conclusions and recommendations based on the results obtained. These findings may include concrete evidence, cause-and-effect relationships, or theories that will form the research's conclusions, identifying scientific concepts and principles in local wisdom in Maluku.

In a study on buying and selling in the Maluku market, data analysis was conducted using a systematic flow technique to understand the transaction process and the measurement of goods sold. This technique involves three main stages: data reduction, data presentation, and the conclusion and verification of findings. Data reduction involves selecting and filtering data on buying and selling transactions in the Maluku market, including the types of goods sold, prices, and measurement methods. In this stage, irrelevant or inaccurate data is eliminated, and similar or redundant data is combined. For example, incomplete or inaccurate data on buying and selling transactions can be eliminated, while data on the type of goods sold and prices can be combined to obtain more accurate information (Mezmir, 2020). After data reduction, the data is presented objectively, systematically, and communicatively. Data presentation is carried out in a clear, easily understandable form, allowing researchers to gain a clear understanding of the transaction process and the measurement of goods in the Maluku market.

For example, data on the type of goods sold and prices can be presented in tables or graphs to facilitate understanding (Ningi, 2022). The final stage is the conclusion and verification of findings. In this stage, researchers conclude the transaction process and the measurement of goods in the Maluku market based on the presented data. Researchers also verify their findings to ensure that the conclusions drawn are based on accurate and relevant data. For example, researchers can verify findings on the measurement methods of goods used in the Maluku market by conducting direct observations or interviews with traders (Bowen, 2009). By using the systematic flow technique, data analysis can be conducted systematically and structurally, allowing researchers to gain an in-depth understanding of the transaction process and measurement of goods in the Maluku market. The results of this study can be used to improve the quality of buying and selling transactions in the Maluku market and ensure that the measurement of goods conducted is accurate and fair.

RESULT AND DISCUSSION

With humanity's transition from nomadic tribes to agricultural civilizations, metrology became increasingly important for addressing hunger and managing populations. It has been reported that measurement systems have existed since 6000 BC. These systems were necessary when it was important to calculate crop distribution and the volume of food consumed by families. However, it is characteristic that unit systems were applied to limited populations in small areas in the past. Each region had its own unit system for measuring length, area, mass, and volume. Evidence has been found for well-defined, uniform systems of weights and measures with the development of trade among the ancient Egyptians, the river-based Mesopotamian civilization along the Euphrates and Tigris rivers, the Indus Valley civilization along the Indus River, and Elam around 3000

– 4000 BC. They practiced the oldest types of measurement, using a uniform system of weights and measures worldwide. The ancient Egyptians and Babylonians used forearms, hands, and fingers for measuring length, solar and lunar periods for measuring time, and the volume of metal or clay vessels filled with seeds for measuring volume. They used seeds and stones as standards for mass. For example, in modern times, the carat unit is used to measure gemstones and pearls, derived from the carob seeds in ancient times. This unit, along with its accuracy and uniformity across various civilizations, became very important for agriculture, construction, and trade. Parts of the human body, such as the width of the human palm, the size of the human foot, and the distance from the elbow to the tip of the middle finger, are measured in ancient length units. Even to this day, these units are still used by society because they are quick and easy to determine. The names of these length units are derived from human morphology, such as palm and foot, as shown in Figure 2.

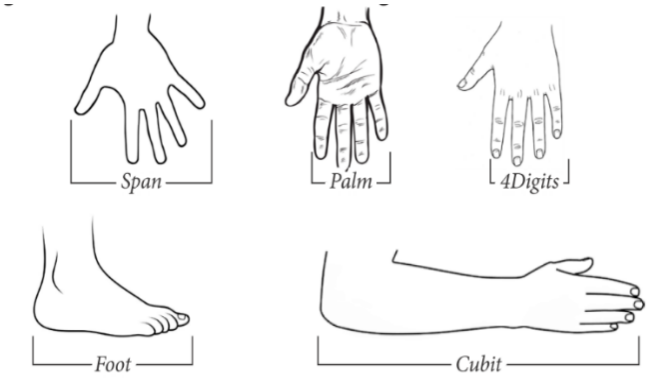

Figure 1. Human Morphology for Measurement

Because these historical unit systems were built on natural bases, their accuracy levels are low and difficult to determine. Furthermore, these units are not homogeneous, making it challenging to trade them among different regions or countries. As a result, these units were standardized using rods and standard cords to provide a uniform representation of measurements. These rods were displayed in public places. These measuring tools were regarded as measurement standards and were then distributed to the community. One example of this occurrence is in Mesopotamia and Egypt, where rods were kept in temples. The length of the cubit varies depending on the region and culture that uses it. The Egyptian cubit shown in Figure 2 is the length from the tip of the middle finger to the elbow. The length of the Egyptian cubit typically varied from 444 mm to 529.2 mm, depending on the ruling pharaoh.

Figure 2. The Egyptian Cubit

When students' results are evaluated overall, about 25% define the symbols and units of basic physical quantities, while 20% do not. Some students are unable to understand the symbols, units, and formulas for fundamental physical quantities in classical mechanics, such as torque, heat, impulse, momentum, magnetic dipole moment, magnetization, and inductance (Gok, 2018). Explanations of this topic have been detailed by Glavič (2021), who recounts that the French Revolution gave rise to the metric and decimal systems. This system began in 1792, and the first prototypes of the meter and kilogram were standardized in 1799. In 1861, coherent measurement units were introduced, including length (centimeter), mass (gram), and time (second). In 1875, the Meter Convention (Convention du Mètre, also known as the Meter Agreement) was signed by 17 member countries. The following international organization and its two bodies were formed: 1) The General Conference

on Weights and Measures (Conférence Générale des Poids et Mesures, CGPM); 2) The International Committee for Weights and Measures (Comité International des Poids et Mesures, CIPM); 3) The International Bureau for Weights and Measures (Bureau International des Poids et Mesures, BIPM).

In 1901, the CGPM declared the kilogram as a unit of mass, not weight. In 1960, the CGPM adopted the International System of Units (Système International d'Unités, SI) ("International System of Units," 1972) with four additional "base units" for the meter and kilogram: the second for time duration, ampere for electric current, kelvin for thermodynamic temperature, and candela for luminous intensity. The seventh base unit, the mole for substance, was accepted by the CGPM in 1971. Six additional derived units with special names have been gradually adopted, bringing the total to 22. The SI base units have been redefined several times, with the most recent occurring in 2018 to use "exact numerical values for the seven defining constants expressed in SI units" (Feller, 2011); for example, "the meter is redefined based on the speed of light, and the second is redefined based on the microwave frequency of the cesium atomic clock." In the European Union (EU), the acceptance and adaptation of the SI are led by the European Commission, and member states implement its directives. Currently, the SI is in use worldwide, with only Myanmar (Burma) and Hong Kong not using it. The UK and the US still predominantly use the old imperial system with British imperial units and US customary units, respectively, alongside the SI (referred to as a hybrid system); both are used in the public but not in science, engineering, medicine, and many industrial companies, especially not in multinational corporations.

Additionally, both have been precisely defined by SI units. The United States National Institute of Standards and Technology (NIST) has adopted and published the SI. The symbols for base units and derived units with special names have been developed in parallel with metric units and are now well established. The SI system also provides twenty prefixes for unit names and unit symbols that can be used when specifying multiples or submultiples of ten (i.e., decimal) of SI units. The meeting of the General Conference on Weights and Measures (CGPM) held in Paris on November 16, 2018, approved the new and revised SI, adapted for the 21st century. This note is made to convey these changes to the readers of Chemistry International. These changes will be implemented on May 20, 2019, the next 'World Metrology Day' and the anniversary of the signing of the Meter Convention in 1875. Of particular interest to chemists are the changes in the definitions of the SI unit's kilogram and mole. The meeting resulted in 5 brief summaries of the changes adopted in the SI (Mills & Marquardt, 2019).

An archipelago is a group of islands connected in a cluster. The islands that emerge from the water's surface are merely the small tips of a large underwater structure that forms the foundation of the archipelago. In a certain sense, these islands are separate, yet at the same time connected. The concept of an archipelago helps us think about mixing methods by allowing us to view different data as separate islands while simultaneously seeing them as fundamentally connected by a foundation, much as in an archipelago (Lawrenz & Huffman, 2002). The term "archipelago" is used to explain the dynamics of dominance/subordination between the main island and the other islands in the chain. However, the islands can be significantly affected by transportation issues, as well as environmental and cultural degradation. Establishing a rhythm of sustainable development is crucial to the industry's survival. Addressing the geographical challenges posed by island dispersion is increasingly recognized as key to industrial development. Plans are often made to build stronger infrastructure to facilitate the movement of people and goods, though implementation can be costly, leaving it available only at tourism offices (Santo, 2016).

Five centuries ago, the area under study was at the center of European interest in Asia. At the dawn of modern history, the waters surrounding several small islands in the eastern part of the Indonesian archipelago were a global arena of competition. As the only place where cloves, nutmeg, and mace were produced, the "fragrant gold" helped finance Dutch wealth in the 17th century (Lape, 2000). The soaring prices of spices in late medieval Europe made access to the legendary Spice Islands a priority for seafaring nations, not to mention the dream of the East. The Portuguese, Spanish, English, and Dutch all equipped fleets to (semi-)circumnavigate the globe via different routes to approach these islands for spices and to prevent others from obtaining them (Xu, 2020). While pepper grew in many parts of maritime Asia, cloves and nutmeg were only found in Maluku. It goes without saying that other groups, such as Chinese traders, had an interest in the spice-producing islands, although they documented their interest relatively little. Just fourteen years after Vasco da Gama arrived in India, in 1512, the first Portuguese sailors arrived in Maluku from the recently conquered Melaka (Hägerdal, 2015).

Culturally, there has been an evolving discourse among the people of Maluku, from generation to generation, that they originated from Seram Island, which was once called "Nusa Ina" (Nusa = island and Ina = mother). Through this narrative, Seram has been legitimized as the core of Maluku society in terms of genealogy, culture, and economy. This can be seen in the symbols and songs of Maluku, which tend to emphasize Seram as the core of the Maluku people's lives. The discourse of Seram as Nusa Ina, in fact, dominates the identity narrative of the Maluku people, claiming that all Maluku people come from Seram Island, even though not all Maluku people originate there. This is evidenced by various studies by experts such as Pattiasina, who cites Wattimury, who originated in China, and Ajawaila, who explains that the culture of the

Central Maluku people is very different from that of the Southeast Maluku people. For example, the Kei community has a caste system, while the Seram community does not recognize it (Andries, 2017). Traditionally, the customs and culture of the Central Maluku people regard wives as household managers and organizers of family activities.

Wives assist their husbands in the fields and trade in the markets, especially during lean seasons. This trading activity is called *Papalele*, and both married and unmarried women are allowed to engage in it. This activity can be conducted by occupying a fixed spot in the market or selling in various market locations. For instance, Sopamena and Ura (2012) found that Papalele women in Hitu Messing Village work in the informal sector and contribute 70 per cent to family income, while the remaining 30 per cent comes from their husbands' income. Living in small coastal islands makes local communities struggle to make ends meet. The limited income of husbands as fishermen means wives play a crucial role in supporting the household economy. Working as a papalele is a common choice for fishermen's wives, as it not only allows them to market their husbands' catch but also provides a relatively easy and quick way to generate income.

The papalele group with the highest income is the fish papalele group, followed by the vegetable papalele group and the bread vendors group. Another study by Kissiya (2023) found that Papalele creates its own market without relying on existing markets. Traditional Papalele can be easily recognized by the distinctive Cele clothing (traditional Maluku blouses) worn by the vendors. This reflects the enduring commitment of Papalele, predominantly practiced by women, to their cultural heritage. Their strong cultural roots influence their pricing approach. With a unique cultural identity that sets them apart from other communities in Indonesia, Papalele also gives rise to a distinctive pricing concept (Amaliah et al., 2015). Culture is a manifestation of mental strength that encompasses creativity, initiative, and intelligence. On the other hand, culture can also be defined as the expression of creativity, initiative, and intelligence. However, in anthropology, the term "culture" is considered to have the same meaning and can be used interchangeably. Culture plays a vital role in human life, encompassing a social group's social structure, mindset, feelings, and unique activities. This allows for a clear distinction between one social group and another.

Furthermore, culture can also be understood as a lifestyle adopted and practiced collectively by members of society (Rukadikar et al., 2022). In short, culture serves as a vessel for humans in a society to live, interact, and develop values that become the foundation of their behavior. Thus, the relationship between humans and culture is extremely close and inseparable, as culture is an integral part of human life in society. Cultural diversity can be a beneficial attribute, fostering a balanced and stable culture when different cultural values coexist and reinforce one another, resulting in harmony and cohesion (Yolles & Rautakivi, 2024). Individual cultural values are shaped by the environments in which they are raised and influenced by the culture of their nation or society, ultimately leading to variations in creativity. Additionally, individuals engage in creative processes to produce objects that can manifest their culture and influence others' behavior and responses (Gong et al., 2025).

According to Nadra et al. (2014), 43 types of object classifiers were found in buying and selling at traditional markets in Jakarta and Surabaya. Of these forty-three forms, thirty-four are used in both traditional markets in Jakarta and Surabaya. The classifiers in question are: (1) basket, (2) box, (3) carton, (4) bundle, (5) comb, (6) bunch, (7) seed, (8) sack, (9) bag, (10) jar, (11) can, (12) wrap, (13) stick, (14) pack, (15) bottle, (16) bunch, (17) piece, (18) cut, (19) pair, (20) set, (21) grain, (22) pot, (23) polybag, (24) kodi, (25) dozen, (26) tail, (27) sheet, (28) roll, (29) meter, (30) quintal, (31) ton, (32) liter, (33) kilo (kilogram), and (34) stalk. Furthermore, there are object classifiers used only in traditional markets in Jakarta. The classifiers in question are four forms: (1) display, (2) pis, (3) renceng, and (4) gabung. Conversely, there are object classifiers used only in traditional markets in Surabaya. The classifiers in question are five forms: (1) renteng, (2) lonjor, (3) rimpang, (4) krat, and (5) sack.

Figure 3. Creativity in trading in the islan d region of Maluku using the local language; a) *Sopi Satu Gen; b) Sopi Satu Guci; c) Ikan Satu Tusuk; d) Ikan Satu Tampa; e) Pisang Satu Sisir; f) Lemon Cina Satu Tampa; g) Sagu Mantah Satu Tumang; h) Cili Satu Tampa; i) Tomat Satu Tampa; j) Cengkeh Satu Cupa; k) Gula Merah Satu Buah; l) Kacang Satu Plastik dan Enbal Satu Tampa; m) Roto Karing, Sarut dan Bagea Dari Saparuan*

Since ancient times, the people of Maluku have demonstrated remarkable creativity in their trading systems. Maluku, known as the "Spice Islands," has a rich trading tradition and has been a center of the spice trade for centuries. The creativity in Maluku's trading system is evident not only in trading methods but also in product development, marketing, and social interactions within the community. In ancient times, the people of Maluku relied on barter as their primary method of trade. They exchanged goods, particularly spices, seafood, and agricultural products. The creativity in this barter system is reflected in the community's ability to assess the value of goods and match them with desired items. For instance, a fisherman could trade his catch for a farmer's agricultural produce, creating a mutually beneficial economic network.

The people of Maluku are known for their unique local products, such as cloves, nutmeg, and various types of fish. The creativity in product development is strong, and the community utilizes abundant natural resources around them. In addition to spices, they also produce handicrafts, such as ikat weaving and wood carvings, which have their own appeal in trade. These products not only meet local needs but are also highly sought after in international markets. Since ancient times, the people of Maluku have developed innovative marketing methods. They hold traditional markets, festivals, and community events to promote their products. In this context, creativity is evident in how they display their merchandise, interact with buyers, and create unique shopping experiences. For example, sellers often use local stories and traditions to attract buyers, creating a deep emotional appeal. Creativity in the trading system in Maluku is also reflected in the community's ability to adapt to changes. As times evolve and consumer needs change, they are not hesitant to alter their trading strategies. In the modern era, some Maluku traders have begun leveraging technology, such as social media and e-commerce platforms, to market their products. This adaptation shows that creativity in trading is not only about creating new products but also about reaching consumers more effectively.

Creativity in the trading system in Maluku is also part of a rich cultural heritage. Traditional trading practices are often preserved and passed down from generation to generation, creating a strong cultural identity. The community engages in trading not only to meet economic needs but also to preserve existing cultural values and traditions. For instance, traditional methods of producing and selling spices are often accompanied by rituals and ceremonies that reflect local beliefs and customs. Overall, throughout history, the people of Maluku have shown great creativity in their trading systems. Through traditional trading systems, local product development, marketing innovations, adaptation to change, and the preservation of cultural heritage, they have created a trading system that is not only effective but also rich in meaning and value. This creativity continues to this day, forming the foundation for more modern and complex trading practices while maintaining the uniqueness of Maluku's culture amid globalization. Interview results are presented in Table 1.

Table 1. Results of Student Interviews with Informants

Topic	Question	Informant's Answer	Creativity Category
Tumang Sago	Traditionally, local communities in Maluku usually sell sago in various forms (S2)	It is usually sold in small balls or *tumang*. Depending on people's preferences, buyers often choose the ball-shaped form so that when making papeda there is no waste and only the needed amount is used. The *tumang* form is typically brought by sago farmers, who sell it to traders, who then resell it to consumers as small balls. (T3)	Fluency
Cloves	Usually, how many cupa is 1 kg of wet or dry cloves? (S34)	Fourteen cupa of wet cloves is equivalent to 1 kg, or seven cupa of dry cloves is equivalent to 1 kg (T1)	Original
Fish	Why do many villages in Maluku, such as those in the Tanimbar Islands Regency, Aru, and Southeast Maluku, still sell fish using strings? (S45)	The reasons vary, including: Selling fish using strings has been practiced for generations. This method has become part of the culture and customary practices of coastal communities in fish trading activities (T8). Strings are easy to obtain, inexpensive, and practical to use. Fishermen can directly tie several fish without the need for scales or modern measuring instruments (T6). The number of fish on a single string is usually based on a mutual agreement between sellers and buyers. Thus, the string functions as a non-standard unit that is commonly understood within the community (T7). Many villages are in island regions far from urban centers, resulting in limited access to scales or adequate market facilities (T5).	Flexibility
Sopi	How is sopi usually sold, in bottles or gens? (S10)	We sell sopi per bottle, and sometimes per gen if the community needs it for traditional events or cultural ceremonies in the village (T2)	Fluency

In everyday life at traditional markets, the use of classifiers plays a very important role and must be adapted to the cultural context and characteristics of the goods being traded. In various regions, especially in Maluku, these classifiers can vary, reflecting the richness of the local language. Therefore, understanding these local terms becomes crucial, not only for the smoothness of transactions but also for deepening the study of linguistics and local cultural anthropology. For example, in buying and selling interactions, classifiers like "lale," used to refer to fruits, and "eer," used for living animals, are concrete expressions that show how local language can facilitate negotiation and communication between traders and buyers. The use of these terms not only makes transactions more efficient but also strengthens social bonds among market participants. When traders and buyers use familiar words, it creates a warmer, more understanding atmosphere, which, in turn, deepens relationships among individuals in that community. However, it is important to note that dialectal and classifier variations may differ from island to island in Maluku. Each area has its own terms, making local understanding the key to success in every transaction. Training processes for traders and buyers to understand these local classifiers are essential. Thus, they will be better able to communicate efficiently and accurately, ultimately improving the smoothness of every transaction conducted. The diversity of these classifiers not only supports effective communication but also enriches the understanding of local culture. Documenting these classifiers is an important step in preserving local language culture and supporting educational and training activities in the region. By documenting and teaching these terms, we not only safeguard cultural heritage but also ensure that future generations will continue to recognize and appreciate the richness of language and traditions around them. In this way, traditional markets function not only as places for economic transactions but also as spaces to maintain and celebrate a rich cultural identity.

The integration of local wisdom into physics education aligns with the Merdeka Curriculum, which emphasizes contextual and experiential learning. By utilizing local wisdom as a learning object, students can better understand physics material and appreciate their own culture. This will create a generation that is not only intellectually smart but also has a love for their culture and environment. Local wisdom is reflected in various aspects, such as traditional food, customs passed down from generation to generation, dances that depict stories and values, songs that touch the soul, and meaningful ceremonies. Each of these elements carries

its own values and philosophies that can be learned and applied in an educational context. Interestingly, some aspects of local wisdom contain physics concepts that can be used as attractive teaching materials. For example, the trading system practiced by the people of Maluku often follows certain standards regarding quantities and units. This shows that, although it may seem simple, their daily practices encompass a fundamental understanding of physics. By connecting local wisdom with physics education, students not only learn theory but also see real-life applications of the concepts they learn. Maluku's local wisdom can serve as a bridge between scientific knowledge and cultural values, creating a holistic and meaningful learning experience. Thus, physics education that integrates local wisdom can serve to preserve culture and deepen students' understanding of the importance of combining scientific knowledge with cultural values.

Based on findings regarding the use of classification words in transactions at traditional markets in Maluku, several important recommendations can be made to enhance understanding and practice in the field. First, a systematic training program is needed to help traders and buyers understand and correctly use local classification terms. This training can be conducted through workshops or seminars involving language and local culture experts, allowing participants to gain in-depth knowledge about the terms used in daily transactions. Furthermore, documentation and archiving of classification terms are also crucial steps. Conducting more in-depth documentation of various classification words used in each area will be very beneficial. Creating a dictionary or glossary that includes local terms along with their explanations will help preserve cultural heritage and facilitate future generations' understanding of the context of these words' use. In addition, integrating learning about local wisdom, including classification terms, into the school curriculum in the Maluku region is very important. By incorporating this material, younger generations will better understand and appreciate their language and culture, thereby strengthening local identity. However, this research also has several limitations that need to be noted. The scope of this study covers only a few areas in Maluku, so the results may not be fully representative of the entire Maluku region or of other areas in Indonesia. Additionally, the diversity of dialects and classification terms across islands and regions can affect research results, as some terms may not be well identified or represented. Equally important, data collection through interviews or observations can be influenced by the researcher's or respondents' subjectivity, which can affect the accuracy of the information obtained.

CONCLUSION

Based on the findings, it can be concluded that students can explain local wisdom in physics. The rich and diverse local wisdom of Maluku can be a source of engaging, context-based physics learning, helping students understand abstract concepts through real-world applications. Through an educational approach that integrates local wisdom, students in Maluku can understand physics not only as a theory but also as part of their culture and tradition. Thus, students can develop critical, creative, and collaborative thinking skills and gain a deeper understanding of their own cultural context. For future research, several suggestions include conducting comparative studies across areas in Maluku or across other regions in Indonesia to understand the differences and similarities in the use of classification terms. A multidisciplinary approach that combines linguistics, anthropology, and economics can also provide a more holistic understanding of communication dynamics in traditional markets. Integrating quantitative methods into research will help obtain more objective, measurable data on the use of classification terms in transactions. Finally, conducting long-term studies to observe changes in the use of classification words in line with the community's social and economic developments will be highly beneficial. By following these recommendations and suggestions, it is hoped that future research can make a more significant contribution to understanding local language and culture, as well as improving the quality of interactions in traditional markets in Maluku.

REFERENCES

Ahmad, M., Badusah, J., Mansor, A. Z., Karim, A. A., Khalid, F., Daud, M. Y., Din, R., & Zulkefle, D. F. (2016). The Application of 21st Century ICT Literacy Model Among Teacher Trainees. *Turkish Online Journal of Educational Technology*, *15*(3), 151–161.

Akello, L. D., & Timmerman, M. C. G. (2018). Local Language a Medium of Instruction: Challenges and Way Forward. *Educational Action Research*, *26*(2), 314–332.

Alcalde-Unzu, J., Moreno-Ternero, J. D., & Weber, S. (2022). The Measurement of the Value of a Language. *Journal of Economic Theory*, *203*, 1–28.

Amaliah, T. H., Sudarma, M., & Djamhuri, A. (2015). Papalele Selling Price Concept in Cultural Values Scope of Community Maluku. *International Journal of Business and Management Invention*, *4*(1), 1–7.

Andries, F. F. (2017). Politics Representation and Symbolic Violence Through the Discourse of Seram as Nusa Ina. *Jurnal Humaniora*, *28*(3), 265.

Ardan, A. S. (2016). The Development of Biology Teaching Material Based on the Local Wisdom of Timorese to Improve Students Knowledge and Attitude of Environment in Caring the Persevation of Environment. *International Journal of Higher Education, 5*(3), 190–200.

Australian Curriculum Assessment & Reporting Authority. (2010). The Shape of the Australian Curriculum. *Young*, December, 1–30.

Bar-El, R., Schwartz, D., & Bentolila, D. (2019). Singular Factors Behind the Growth of Innovation in Israel. *Athens Journal of Mediterranean Studies, 5*(3), 137–150.

Batlolona, J. R. (2019). Creative Thinking Skills Students in Physics on Solid Material Elasticity. *Journal of Turkish Science Education, 16*(1), 48–61.

Batlolona, J. R. (2024). Misconceptions of Physics Students on the Concept of Equilibrium of Rigid Bodies: A Case Study of Keku Culture. *Jurnal Pendidikan MIPA, 25*(1), 87–102.

Bazen, A., Barg, F. K., & Takeshita, J. (2021). Research Techniques Made Simple : An Introduction to Qualitative Research. *Journal of Investigative Dermatology*, *141*(2), 241–247.

Bereczki, E. O., & Kárpáti, A. (2018). Teachers' Beliefs About Creativity and Its Nurture: A Systematic Review of the Recent Research Literature. *Educational Research Review, 23*, 25–56.

Bowen, G. A. (2009). Document Analysis as a Qualitative Research Method. *Qualitative Research Journal, 9*(2), 27–40.

Cheng, V. M. Y. (2010). Tensions and Dilemmas of Teachers in Creativity Reform in a Chinese Context. *Thinking Skills and Creativity, 5*(3), 120–137.

Dutta, S., Lanvin, B., & Wunsch-Vincent, S. (2018). *Global Innovation Index 2018*.

Fasasi, R. A. (2017). The Impact of Ethnoscience Instruction on Cognitive Achievement in Science. *International Journal of Education and Learning, 6*(2), 33–42.

Febrian, A., & Jumadi, J. (2022). Identification of Science Concepts and Principles Based on Local Wisdom of Pacu Jalur to Develop Science Learning Materials. *Jurnal Pendidikan Sains Indonesia, 10*(2), 355–379.

Feller, U. (2011). The International System of Units-A Case for Reconsideration. *Accreditation and Quality Assurance, 16*(3), 143–153.

Festiyed, F., Asrizal, A., Mufit, F., Tanjung, Y. I., Gunawan, R. G., Ilwandri, I., & Zulherman, Z. (2024). Ethnophysics Studies in Various Indonesian Cultures: A Systematic Literature Review. *Journal of Innovation in Educational and Cultural Research, 5*(1), 169–179.

Forte-Celaya, J., Ibarra, L., & Glasserman-Morales, L. D. (2021). Analysis of Creative Thinking Skills Development Under Active Learning Strategies. *Education Sciences, 11*(10), 1–14.

Fraser, J. M., Timan, A. L., Miller, K., Dowd, J. E., Tucker, L., & Mazur, E. (2014). Teaching and Physics Education Research: Bridging the Gap. *Reports on Progress in Physics, 77*(3), 1–17.

Glaveanu, V. P., Hanchett Hanson, M., Baer, J., Barbot, B., Clapp, E. P., Corazza, G. E., ... & Sternberg, R. J. (2020). Advancing Creativity Theory and Research: A Socio-Cultural Manifesto. *The Journal of Creative Behavior, 54*(3), 741–745.

Glavič, P. (2021). Review of the International Systems of Quantities and Units Usage. *Standards, 1*(1), 2–16.

Gok, T. (2018). Investigation of Students' Knowledge of Physical Quantities' Symbol, Unit And Formula. Asia-*Pacific Forum on Science Learning and Teaching*, 19(2), 1–14.

Gong, Z., Wang, M., Nanjappan, V., & Georgiev, G. V. (2025). Instrumenting Virtual Reality for Priming Cultural Differences in Design Creativity. In *Proceedings of the 14th Conference on Creativity and Cognition* (pp. 510–514).

Habibi, R., Suprapto, N., Prahani, B. K., Satriawan, M., & Nisa, K. (2025). Ethnophysics Study of Reog Ponorogo Art in Physics Learning: A Study of Students' Interests and Understanding. *JIPI (Jurnal IPA dan Pembelajaran IPA), 9*(3), 721–735.

Hägerdal, H. (2015). Eastern Indonesia and the Writing of History. *Archipel. Études Interdisciplinaires Sur Le Monde Insulindien, 90*, 75–97.

Hall, S., & Liebenberg, L. (2024). Qualitative Description as an Introductory Method to Qualitative Research for Master's-Level Students and Research Trainees. *International Journal of Qualitative Methods, 23*, 1–5.

Hart, D. (1994). *Authentic Assessment: A Handbook for Educators*. Addison Wesley Publishing Company.

Holmes, R. M., Liden, S., & Shin, L. (2013). Children's Thinking Styles, Play and Academic Performance. *American Journal of Play, 5*(2), 219–238.

Ivan, F., Pinar, L., Panergayo, A. A. E., Sagcal, R. R., Acut, D. P., Roleda, L. S., & Prudente, M. S. (2025). Fostering Scientific Creativity In Science Education Through Scientific Problem-Solving Approaches and STEM Contexts : A Meta- Analysis. *Disciplinary and Interdisciplinary Science Education Research*, *9*(18), 1–17.

Ji, Z., Huang, W., & Lin, M. (2020). Design Mode Innovation of Local Color Cultures: A Case Study of the Traditional Female Costume of Yi Nationality. *Designs, 4*(4), 1–14.

Karunarathne, W., & Calma, A. (2024). Assessing Creative Thinking Skills in Higher Education: Deficits and Improvements. *Studies in Higher Education, 49*(1), 157–177.

Kissiya, E. (2023). Human's-Planet Connection in Maluku, Indonesia: Ecology Anthropology Perspective. *Advances in Social Science, Education and Humanities Research*, *667*, 426–430.

Lape, P. V. (2000). Political Dynamics and Religious Change in the Late Pre-Colonial Banda Islands, Eastern Indonesia. *World Archaeology, 32*(1), 138–155.

Lawrenz, F., & Huffman, D. (2002). The Archipelago Approach to Mixed Method Evaluation. *American Journal of Evaluation, 23*(3), 331–338.

Leasa, M., Batlolona, J. R., & Talakua, M. (2021). Elementary Students' Creative Thinking Skills in Science in the Maluku Islands, Indonesia. *Creativity Studies, 14*(1), 74–89.

Lee, M. T., Kachen, S., Krishen, A. S., & Raschke, R. L. (2025). Creativity Ambidexterity and Sustainable Business: Taking Advantage of Creative Thinking Techniques. *Technological Forecasting and Social Change, 213*, 1–13.

Lewis, J. (2025). The Cultural, Economic and Social Value of the Creative Industries. In *Research, Development and Innovation in the Creative Industries* (pp. 1–24).

Li, W. (2023). On The Role of Creativity In The Application-Oriented University Students' Engagement and Success. *Heliyon*, *9*(6), 1–7.

Li, C., & Wei, L. (2024). The Enhancement of Creativity Through Foreign Language Learning: Do Personality Traits Matter? *Bilingualism, 28*(2), 510–521.

Lim, W. M. (2025). What Is Qualitative Research? An Overview and Guidelines. *Australasian Marketing Journal, 33*(2), 199–229.

Liu, C., Wu, M., & Gao, X. (2023). The Influence of Challenge Research Stressors on Research Creativity Among Chinese Doctoral Students: A Mediated Moderation Model. *Frontiers in Psychology, 14*, 1–16.

Lubis, M., Anggarasari, N. H., Dewi, R. S., & Nugraha, F. (2023). Local Wisdom in the Use Sundanese Language of Early Childhood in Indihiang Sub-District Tasikmalaya City (Analytical Descriptive Study). *KnE Social Sciences*, 20–30.

Luo, N., Xin, X., Li, H., & Yu, X. (2021). Regulatory Focus, Boundaryless Mindset, and Creativity Among Chinese College Students: A Trait Activation Perspective. *Frontiers in Psychology, 12*, 1–9.

McLure, F., Won, M., & Treagust, D. F. (2024). Science Teachers' Understanding of Creative Thinking and How to Foster It as Mandated by the Australian Curriculum. *Journal of Science Teacher Education, 35*(5), 524–543.

Mezmir, E. A. (2020). Qualitative Data Analysis: An Overview of Data Reduction, Data Display and Interpretation. *Research on Humanities and Social Sciences, 10*(21), 15–27.

Miles, M. B., & Huberman, A. M. (1994). *Qualitative Data Analysis* (pp. 1–337).

Mills, I., & Marquardt, M. (2019). The New SI: The International System of Units Is Getting a Makeover. *Chemistry International, 41*(1), 32–35.

Morales, M. P. E. (2017). Exploring Indigenous Game-Based Physics Activities in Pre-Service Physics Teachers' Conceptual Change and Transformation of Epistemic Beliefs. *Eurasia Journal of Mathematics, Science and Technology Education, 13*(5), 1377–1409.

Morris, T. H. (2022). How Creativity Is Oppressed Through Traditional Education. *On the Horizon, 30*(3).

Mumford, M. D. (2003). Where Have We Been, Where Are We Going? Taking Stock in Creativity Research.

Creativity Research Journal, 15(2–3), 107–120.

Murphy, K., Murphy, S., & Swain, N. (2024). Australian Teachers' Adoption of Critical and Creative Thinking as Curriculum. *Australian Educational Researcher*, 1–20.

Nadra, N., Wahyuni, S., & Mahsun, M. (2014). Bentuk Dan Penggunaan Kata Penggolong Benda Di Pasar Induk Tradisional Di Jakarta Dan Surabaya. *Litera, 13*(2), 237–249.

Ningi, A. I. (2022). Data Presentation in Qualitative Research: The Outcomes of the Pattern of Ideas With the Raw Data. *International Journal of Qualitative Research, 1*(3), 196–200.

Nyblom, J. (2023). How Did the Meter Acquire Its Definitive Length? *GEM - International Journal on Geomathematics, 14*(1), 1–13.

Parsons, E. C., & Carlone, H. B. (2013). Editorial Culture and Science Education in the 21st Century: Extending and Making the Cultural Box More Inclusive. *Journal of Research in Science Teaching, 50*(1), 1–11.

Pllana, D. (2019). Creativity in Modern Education. *World Journal of Education, 9*(2), 136.

Plucker, J. A., Beghetto, R. A., & Dow, G. T. (2004). Why Isn't Creativity More Important to Educational Psychologists? Potentials, Pitfalls, and Future Directions in Creativity Research. *Educational Psychologist, 39*(2), 83–96.

Reiter-Palmon, R., Mumford, M. D., & Threlfall, K. V. (1998). Solving Everyday Problems Creatively: The Role of Problem Construction and Personality Type. *Creativity Research Journal, 11*(3), 187–197.

Ritter, S. M., & Mostert, N. (2017). Enhancement of Creative Thinking Skills Using a Cognitive-Based Creativity Training. *Journal of Cognitive Enhancement, 1*(3), 243–253.

Rukadikar, C., Bajpai, R., Rukadikar, A., & Singh, A. K. (2022). Review Article a Review on Cultural Competency in Medical Education. *Journal of Family Medicine and Primary Care, 11*(8), 4319–4329.

Said, M. A., Ilham, I., Fakhrul, M., & Kadir, A. (2024). Fostering Creativity to Enhance Physics Achievement: An Analysis of the Relationship Between Creative Thinking Ability and Student Learning Outcomes. *Unnes Science Education Journal, 13*(3), 180–188.

Santo, D. (2016). Archipelago Tourism: Policies and Practices. *Tourism Planning & Development, 13*(3), 377–378.

Saphira, H. V., Admoko, S., & Suprapto, N. (2022). Ogoh-Ogoh: An Indonesian Creative Local Wisdom Inspired by Hindu Philosophy as Ethno-Physics. *Vidyottama Sanatana: International Journal of Hindu Science and Religious Studies, 6*(1), 23–33.

Şenel, M., & Bağçeci, B. (2019). Development of Creative Thinking Skills of Students Through Journal Writing. *International Journal of Progressive Education, 15*(5), 216–237.

Shrivastava, S. K. (2017). Measurement Units of Length, Mass and Time in India Through the Ages. *International Journal of Physical and Social Science, 7*(5), 39–48.

Sidek, R., Halim, L., Buang, N. A., & Arsad, N. M. (2020). Fostering Scientific Creativity in Teaching and Learning Science in Schools: A Systematic Review. *Jurnal Penelitian dan Pembelajaran IPA, 6*(1), 13–35.

Smare, Z., & Elfatihi, M. (2023). A Systematic Review of Research on Creative Thinking in Primary Education: Focus on Empirical Methodologies. *Issues in Educational Research, 33*(2), 752–780.

Smith, J. P., & Barrett, J. E. (2017). Learning and Teaching Measurement: Coordinating Quantity and Measurement. In *Compendium for Research in Mathematics Education* (pp. 355–385).

Snyder, H. (2019). Literature Review as a Research Methodology: An Overview and Guidelines. *Journal of Business Research, 104*, 333–339.

Sopamena, J. F., & Ura, S. R. (2012). Hubungan Faktor-Faktor Sosial Ekonomi Dan Tingkat Pendapatan Perempuan Papalele Di Desa Hitumessing Kecamatan Leihitu Kabupaten Maluku Tengah. *Agrinimal*, *2*(1).

Sudarmin, S., Febu, R., Nuswowati, M., & Sumarni, W. (2017). Development of Ethnoscience Approach in the Module Theme Substance Additives to Improve the Cognitive Learning Outcome and Student's Entrepreneurship. *Journal of Physics: Conference Series, 824*, 012024.

Sugiyanto, F. N., Masykuri, M., & Muzzazinah, M. (2018). Analysis of Senior High School Students' Creative Thinking Skills Profile in Klaten Regency. *Journal of Physics: Conference Series, 1006*(1), 1–6.

Tasci, G. (2024). Development of a Two-Tier Diagnostic Test to Assess Misconceptions About Biology Concepts at Primary School. *Science Insights Education Frontiers, 25*(2), 4099–4122.

Tawil, M., Said, M. A., & Suryansari, K. (2023). Exploration of Conceptual Understanding of Science Teachers and Students: Gap Conception of Current, Voltage in Indonesia. *Jurnal Penelitian & Pengembangan Pendidikan Fisika, 9*(1), 163–182.

Tawil, Y. (2015). A "Start-Up Nation". On Performance and Creativity in Israel. *Ethnologie Française, 45*(2), 223–233.

Villamin, P., Lopez, V., Thapa, D. K., & Cleary, M. (2024). A Worked Example of Qualitative Descriptive Design: A Step-by-Step Guide for Novice and Early Career Researchers. *Journal of Advanced Nursing*.

Vincent-Lancrin, S. (2023). Fostering and Assessing Student Critical Thinking: From Theory to Teaching Practice. *European Journal of Education, 58*(3), 354–368.

Vong, K. I. P. (2008). Developing Creativity and Promoting Social Harmony: The Relationship Between Government, School and Parents' Perceptions of Children's Creativity in Macao-SAR in China. *Early Years, 28*(2), 149–158.

Wang, L., & Jiang, N. (2022). Managing Students' Creativity in Music Education – The Mediating Role of Frustration Tolerance and Moderating Role of Emotion Regulation. *Frontiers in Psychology, 13*, 1–11.

Widyaningtyas, F. S., Mundilarto, M., Kuswanto, H., Aththibby, A. R., Muskania, R. T., Rosa, F. O. R., ... & Yanto, B. E. (2024). Creative Physics Problem Solving Based on Local Culture to Improve Creative Thinking and Problem-Solving Skills. *Pegem Journal of Education and Instruction, 14*(1), 234–243.

Xu, G. (2020). Junks to Mare Clausum: China-Maluku Connections in the Spice Wars, 1607-1622. *Itinerario, 44*(1), 196–225.

Xu, S., Reiss, M. J., Lodge, W., & Reiss, M. J. (2025). Science Teachers ' Perspectives On Scientific Creativity In An Examination-Oriented Educational System. *International Journal of Science Education*, 1–21.

Yolles, M., & Rautakivi, T. (2024). Diagnosing Complex Organisations With Diverse Cultures—Part 1: Agency Theory. *Symmetry, 12*(8), 1–38.

Yusof, S. M., & Othman, R. (2016). Leadership for Creativity and Innovation: Is Japan Unique. *Journal of Advanced Management Science, 4*(2), 176–180.

Zhan, M., & Xie, X. (2020). Precision Measurement Physics: Physics That Precision Matters. *National Science Review, 7*(12), 1795.

Zhang, X., Zhang, Y., Sun, Y., Lytras, M., Ordonez de Pablos, P., & He, W. (2018). Exploring the Effect of Transformational Leadership on Individual Creativity in E-Learning: A Perspective of Social Exchange Theory. *Studies in Higher Education, 43*(11), 1964–1978.

Zulirfan, Z., Maaruf, Z., & Riau, U. (2023). Ethnoscientific Literacy in Pacu Jalur Tradition: Can Students Connect Science With Their Local Culture?. *EURASIA Journal of Mathematics, Science and Technology Education, 19*(1), 1–10.