

# Exploration of the Concept of Force and Object Motion in the Process of Making Traditional Sidoarjo Snacks for Elementary Science Learning

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## ABSTRACT

Efforts are needed in science learning so that there is a balance between knowledge, scientific attitudes and regional cultural values that are spread in society. Because learning by connecting to the surrounding environment such as community culture or local wisdom has a good impact on students. Local wisdom that has been included in the list of culinary tours in Sidoarjo, namely klepon bulang, Sidoarjo mud cakes, and ote-ote Porong. In the process of making traditional Sidoarjo snacks, it is necessary to have the forces needed by the snack maker. The purpose of this research is to describe the Force and object Motion in the process of making traditional Sidoarjo snacks. This study uses a qualitative descriptive method through in-depth interviews, direct observation, documentation studies, and reconstruction of the manufacture of traditional Sidoarjo snacks. Data validity techniques in this study were carried out using credibility, transferability, dependability, and confirmability techniques. The data analysis technique used in this research is data reduction, data presentation, conclusion, or data verification. The results of the exploration and analysis of the research data indicate the existence of the concept of force and motion of objects in traditional Sidoarjo snacks. The concept of force contained in the snack includes: 1) muscle force, 2) frictional force, 3) gravitational force, 4) spring force, and 5) magnetic force. While the concept of object motion that appears is: 1) force changes the shape of objects; 2) force changes the direction of objects; 3) force can change a stationary object into a moving object. This study

concluded that the process of making traditional Sidoarjo snacks, especially klepon bulang, kue lumpur, and ote-ote porong, is a community habit that can be applied as a source of learning based on local wisdom in elementary schools. This study also shows the existence of the concept of force and motion of objects in traditional Sidoarjo snacks.

**Keywords:** Exploration, Force, Object Motion, Sidoarjo Traditional Snacks, Elementary Science Learning.

## INTRODUCTION

Traditional knowledge is built in the order of traditional society as a symbolic message, habit, or social culture which is the legacy of ancestral wisdom (Sumarni *et al.*, 2022; Ramanta & Samsuri, 2020; Ali *et al.*, 2020). Ancestral wisdom is also known as local wisdom. Local wisdom is a product of the experiences of certain groups that are implemented in everyday life (Wiratmaja *et al.*, 2021; Ramanta & Samsuri, 2020). Local wisdom is a way to manage culture and protect oneself from unwanted foreign cultures, so information or development components of an area must be included in educational materials to preserve the identity of a group (Rumilah *et al.*, 2021; Nurasiah *et al.*, 2022).

Efforts are needed in science learning so that there is a balance between knowledge, scientific attitudes and regional cultural values that are spread in society. Because learning by connecting to the surrounding

environment such as community culture or local wisdom has a good impact on students (Zahro *et al.*, 2023; Ramdani *et al.*, 2021). So that learning in schools is also expected to be able to raise regional local wisdom to integrate culture into the learning (Aza Nuralita, 2020; Darmadi, 2018; Anilan *et al.*, 2019).

Local wisdom also includes the independent learning curriculum structure in elementary schools (Hartoyo & Rahmadayanti, 2022; Nurasiah *et al.*, 2022). Local wisdom can be included in local content which can be added flexibly by each school in three ways, namely: 1) Integrating local wisdom into other subjects; 2) Integrating local wisdom into the theme of the project strengthening the profile of Pancasila students; 3) Develop local wisdom into a separate subject. However, according to the results of interviews and observations conducted by researchers, several elementary schools have not implemented local wisdom integrated learning in accordance with the independent learning curriculum (Hartoyo & Rahmadayanti, 2022; Widana *et al.*, 2023).

Local wisdom that has been included in the list of culinary tours in Sidoarjo, namely klepon bulang, Sidoarjo mud cakes, and ote-ote Porong (Abadi *et al.*, 2013). Klepon is a typical market snack that is included in the category of wet cakes which are round, the size of a marble, dense, supple, green in color from suji leaves, made from glutinous rice flour filled with liquid brown sugar and served with a sprinkling of grated coconut (Elisa *et al.*, 2022; Setyorini & Qomariah, 2018). Sidoarjo mud cake is a non-perishable wet cake that has a soft texture, and the basic ingredients are easily available in the market, namely milk, sugar, eggs, and flour (Abduh, 2020; Dewanto, 2022; Liyani *et al.*, 2021). Ote-Ote Porong is a typical Sidoarjo food product that is familiar to Sidoarjo and its surroundings it contains meat, oyster, and seaweed fillings which was introduced by a Chinese citizen named Kwee Le Kin who came from Fuzhou city and settled in Porong sub-district, Sidoarjo

Regency. (Khoiridah *et al.*, 2021; Muallifa, 2020; Fitria, 2022).

In the process of making traditional Sidoarjo snacks, it is necessary to have the forces needed by the snack maker such as muscle force, frictional force, gravitational force, spring force, and magnetic force. Then, with the force applied to the process of making traditional Sidoarjo snacks, objects will move.

Research with the title "Analisis Konsep-Konsep Fisika Berbasis Kearifan Lokal pada Pembuatan Jajanan Tradisional Dawet dan Klepon" or in English "Analysis of Physical Concepts Based on Local Wisdom in the Making of Dawet and Klepon Traditional Snacks" by Elisa *et al.* (2022) uses klepon as physics material in the learning process carried out by junior and senior high school students. Research with the title "Exploration Ethnomathematics of the Malind Tribe for Character Building in Elementary Schools" by Fredy *et al.* (2020) who uses the Malind tribe for mathematics material in the learning process carried out on elementary students. Research with the title "The exploration of the elementary geometry concepts based on Tabot culture in Bengkulu" by Agusdianita *et al.* (2021) who uses tabot culture for geometry material in the learning process carried out on elementary students. Thus it can be concluded that no one has examined the process of making traditional snacks in the form of klepon, mud cake, and ote-ote which are used as learning resources for elementary science on the material of force and motion of objects. So the novelty of this research is to use local wisdom in the form of traditional Sidoarjo snacks, namely kelpon bulang, mud cake, and ote-ote porong to be used in science learning at elementary school

In addition, the researchers conducted unstructured interviews with teachers and fourth-grade students at three different elementary schools in Sidoarjo and concluded that the teachers used discovery learning in science lessons with a discussion and question-answer method. This learning

has also been related to everyday life by taking contextual examples. But these examples have not linked local wisdom around students according to the independent curriculum.

Based on this explanation, the researcher will integrate the local wisdom of Sidoarjo, especially the process of making traditional Sidoarko snacks in the form of klepon bulang, mud cake, and porong ote-ote into the elementary science subject on force and motion of objects. Then the problems observed are: 1) Is there a material concept of force and motion of objects in the process of making traditional snacks?; 2) How is the material concept of force and motion of objects related to the process of making traditional Sidoarko snacks in the form of klepon bulang, mud cake, and porong ote-ote?. The purpose of this research is to know and identify the material concept of force and motion of objects related to the process of making traditional Sidoarko snacks in the form of klepon monthang, mud cake, and porong ote-ote. So that the results of the concept exploration obtained can be used as a source of learning science in elementary schools.

## **METHODS**

This study uses a qualitative research method that is used for an organized study of knowledge from the culture that exists in society (Creswell & Guetterman, 2018). The culture included in this study is the culture of producing traditional Sidoarjo snacks. This research involved 3 respondents who made traditional Sidoarjo snacks in the form of klepon bulang, mud cake, and porong ote-ote which are located in Sidoarjo Regency.

In this study, the research procedure carried out has 4 stages according to Moleong (2017) : 1) Preliminary research stages. At this research stage, the researcher conducted a literature study to find general research

problems, and general research objectives, as well as a thorough exploration of these problems in the field. 2) Preparatory stage. At this stage, the researcher will identify the problem and seek information from various knowledge obtained regarding the research to be studied. At this stage, the researcher selects the problem, and research objectives, and determines the research location. Researchers also prepared research instruments that would later be used for research in the field. 3) Stages of implementation. At this stage, the researcher will conduct research in the field by collecting various data in the form of images, audio, and video, as well as field notes resulting from interviews and field observations. 4) Data analysis stage. At this stage, the researcher will carry out the data analysis process, both data obtained in the field and data after being in the field.

Data collection techniques in this study used primary and secondary data collection techniques. Primary data collection was obtained from observation, in-depth interviews, documentation studies, and reconstruction of the process of making traditional Sidoarjo snacks. During the observation technique, the researcher directly observed the process of making traditional Sidoarko snacks in the form of klepon bulang, mud cake, and porong ote-ote. Then the researchers conducted in-depth interviews with traditional Sidoarko snack makers in the form of klepon Bulang, mud cake, and porong ote-ote. Documentation is used to strengthen and support data that has been obtained in the field during observations and interviews with informants. Secondary data were obtained from literature studies, such as journals, books, and other documents that support this research. The research instrument grid of the concept of force and motion in the process of making traditional Sidoarjo snacks are shown in Table 1.

**Tabel 1. The Observational Instrument Grid of The Concept of Force and Motion in The Process of Making Traditional Sidoarjo Snacks**

| The Process of Making Klepon Bulang   | The Process of Making Klepon Bulang  | The Process of Making Ote-Ote Porong  | The Concept of Appearance of Force and Motion   |
|---|--|---|---|
| The process of cutting palm sugar so that it is easy to dissolve                          | The process of boiling coconut milk  | The process of soaking and cleaning soybeans                                      | The concept of force:<br>1) muscle force<br>2) frictional force<br>3) gravitational force<br>4) spring force<br>5) magnetic force<br>The concept of object motion:<br>1) force changes the shape of objects<br>2) force changes the direction of objects<br>3) force can change a stationary object into a moving object. |
| The process of boiling water and palm sugar for the klepon filling                        | The process of adding eggs, wheat flour, rice flour, potato starch, vanilla, sugar, salt, and coconut milk | The process of blending soybeans, garlic, salt, and water                         |   |
| The process of mixing glutinous rice flour, starch, salt, and water                       | The process of making burnt for mud cake   | The process of mixing wheat flour and blender results from soybeans               |   |
| The process of mixing food coloring   | The process of heating mud cake molds  | Chicken boiling process   |   |
| The process of cooking water to a boil  | The process of pouring the dough into the mold   | The process of cutting green onions, celery, shallots, garlic, and boiled chicken |   |
| The process of forming the dough into a guava-like shape and filling it with liquid sugar | The process of closing and lifting a container containing hot charcoal                                     | The process of cooking the ote-ote porong filling                                 |   |
| The process of putting the dough that has been formed into the water                      | The process of lifting mud cake that has been cooked   | The process of forming and cooking Porong ote-ote                                 |   |
| The process of lifting the klepon that is already floating in the water                   | Process of serving and packing   | The process of lifting the ote-ote from the pan                                   |   |
| Process of serving and packing  |  | Process of serving and packing  |   |

The data validity technique in this study was carried out using the credibility technique which is a technique for testing the validity of the results of the research data presented. The researcher uses a source triangulation technique to gain data credibility which aims to test the correctness of the data by checking the data that has been obtained through various sources, such as traditional snack makers, supervisors, researchers, and references. Then transferability which means the presentation of data in the form of a description of data acquisition which is written based on the results that have been obtained. Then dependability which is the auditing of all stages in this research activity, by auditing carried out by the supervising lecturer so that this research is not in doubt. Finally, confirmability means that the data obtained can be confirmed by research sources. The data analysis technique used in this research is data reduction, data presentation, conclusion, or data verification.

## RESULT

Based on the results of observation, in-depth interviews, and documentation studies with three traditional Sidoarjo snack makers, especially klepon bulang, mud cake, and porong ote-ote, information was obtained that the knowledge possessed by the community was directly derived from experience in daily life. Respondents' knowledge about traditional Sidoarjo snacks is knowledge obtained and passed down from their ancestors. After observation, in-depth interviews, and documentation studies on traditional Sidoarjo snack makers, the researchers carried out a reconstruction of the Sidoarjo traditional snack-making process. The results of the reconstruction and exploration of the process of making traditional Sidoarjo snacks found the concept of force and motion of objects. The documentation of the exploration of the concept of force and motion of objects in the process of making klepon bulang are shown in **Figure 1**.



Figure 1. The Process of Making Klepon Bulang

The results of the exploration of the process of making klepon bulang are: 1) Muscle force when cutting palm sugar, stirring the heated palm sugar, the process of pouring the klepon bulang ingredients, the process of stirring the klepon bulang ingredients, pouring the water to be used to boil the klepon, turning on the stove to boil the water, forming the klepon dough, putting the dough into boiling water, draining the klepon, and serving the klepon; 2) The frictional force when cutting the palm sugar that occurs between the knife rubbing against the palm sugar, stirring the boiling palm sugar there is a frictional force that occurs between the spoon and the melted palm sugar, the process of stirring the klepon bulang ingredients there is a frictional force that occurs between the hand and the dough klepon, the process of draining the cooked klepon there is a friction force that occurs between the filter and the water used to cook the klepon; 3) The gravitational force when the palm sugar falls, puts the dough ingredients into the basin, puts the food coloring into the basin, pours the water that will be used to boil the klepon, puts the dough that has been formed into the boiling water; 4) The spring force at the time of packaging is rubber and a stapler used to close the cake mica.

In addition, there is the concept of object motion that appears during the process of making klepon headdress, namely: 1) The force changes the shape of the object, namely when the muscle force (cutting) changes the shape of the palm sugar which was originally a large semi-circle to small palm sugar, muscle force (cutting) changing the shape of the dough which was not originally mixed so that it turns into an elastic dough, muscle force (cutting) changes the color of the dough which was originally white to green, muscle force (forming the klepon dough) changes the shape of the dough to an oval like guava; 2) The force changes the direction of the object, that is, when the muscle force is used to stir the liquid palm sugar from right to left, it is changed from left to right, it will change the direction of rotation of the palm sugar; 3) Muscle force can change a stationary object to move by changing the place of the basin by sliding it.

The second concept of force and motion of objects in the process of making mud cake. The documentation of the exploration of the concept of force and motion of objects in the process of making mud cake are shown in **Figure 2**.



Figure 2. The Process of Making Mud Cake

The results of the exploration of the process of making mud cake are: 1) Muscle force when putting water and coconut milk into the pot, turning on and off the stove, stirring the coconut milk to mix it with water, the process of adding dough ingredients, mixing the mud cake dough, fanning and moving the charcoal to the space provided, turning on and off the stove, spreading margarine mixed with egg on the mud cake molds, pouring the dough into the mud cake molds, closing and lifting the container containing the hot charcoal, lifting the mud cake which has been cooked from the mold, serving in cake plates or mica; 2) Frictional forces when mixing mud cake mixes, applying margarine that has been mixed with eggs on the mud cake molds; 3) Gravitational force when putting water and coconut milk into the pot, the process of adding the dough ingredients, pouring the dough into the mud cake mold, closing and lifting the container containing the hot charcoal; 4) The spring

force at the time of packaging is rubber and a stapler used to close the cake mica.

In addition, there is the concept of object motion that appears during the process of making mud cake, namely: 1) The force changes the shape of the object, namely when the force of the muscle (mixing the dough) changes the shape of the flour, rice flour, and potato flour mixed with coconut milk to become liquid.; 2) The force changes the direction of the object, that is when a muscle force is used to stir coconut milk from right to left, it changes left to right, it will change the direction of coconut milk rotation; the muscle force used to stir the cake dough from right to left is changed left to right will change the direction of rotation of the cake dough.

The third concept of force and motion of objects in the process of making ote-ote Porong. The documentation of the exploration of the concept of force and motion of objects in the process of making ote-ote Porong are shown in **Figure 3**.



Figure 3. The Process of Making Ote-Ote Porong

The results of the exploration of the process of making Porong ote-ote are: 1) Muscle force when pouring water into a container containing soybeans, washing the soybeans, mixing the wheat flour and the results of the blender from soybeans, turning the stove on and off, stirring the chicken that is being boiled, cutting the ote-ote filling, adding the ote-ote filling, pouring the cooking oil, turning the stove on and off, pouring the batter and ote-ote filling into the ote-ote porong mold, lifting the ote-ote from the pan, the process of serving on a plate or mica cake; 2) Frictional forces when washing the soybeans, mixing the wheat flour and the results of the blender from the soybeans, stirring the chicken that is being boiled, cutting the ingredients and the chicken that has been boiled, the friction of the spatula used for cooking; 3) Gravitational force when pouring water into a container containing soybeans, pouring all the dough, putting the ote-ote filling ingredients, putting the ingredients to be cooked into the Teflon, pouring the dough and ote-ote filling into the ote-ote porong mold; 4) The spring force at the time of

packaging is rubber and a stapler used to close the mica cake; 5) There is a magnetic force in the blender machine which is electrified so that the blades in the blender can rotate.

In addition, there is the concept of object motion that appears during the process of making Porong ote-ote, namely: 1) The force changes the shape of the object, namely when the muscle force (pressing the blender button) changes the shape of the mixed soybeans with water it becomes liquid; 2) The force changes the direction of the object, that is when the muscle force is used to mix the ote-ote dough from right to left is changed from left to right will change the direction of rotation of the dough.

## DISCUSSION

Based on the exploration, it can be seen that in the process of making traditional Sidoarjo snacks, it can be implemented for learning science in elementary school on the material of force and motion of objects. The results of this exploration can be restated into the concept of academic education in elementary school into an independent

curriculum with the learning outcomes and learning objectives of science material for the force and motion of objects in grade IV elementary school by Fitri *et al.* (2021) which is shown below:

**Learning Outcomes:** Students take advantage of the phenomenon of magnetism in everyday life, demonstrating various types of forces and their effects on the direction, motion, and shape of objects.

**Learning Objectives:** 1) Identify the various styles involved in daily activities; 2) Utilizing this style to help humans overcome challenges in everyday life.

Based learning outcomes and learning objectives in Table 2, it can be seen that the process of making traditional Sidoarjo snacks can be related to learning science in elementary school on the subject of force and motion of objects. Exploration on the process of making traditional Sidoarjo snacks is used to find several IPA concepts, especially the force and motion of objects. The concept of force contained in the snack includes: 1) muscle force, 2) frictional force, 3) gravitational force, 4) spring force, and 5) magnetic force. While the concept of object motion that appears is: 1) force changes the shape of objects; 2) force changes the direction of objects; 3) force can change a stationary object into a moving object. The concept of force and motion of objects found is in accordance with the material of force and motion of objects in class IV elementary school (Fitri *et al.*, 2021; M.J.A. *et al.*, 2022).

This shows that local wisdom can be linked to learning in schools, especially science, both of which are connected to one another. Therefore, science lessons can be connected with local wisdom, including traditional snacks. This is in line with the opinion of which states that the concept of science can be linked to local wisdom and can increase learning motivation, because local wisdom can facilitate students' understanding and be challenged to learn science (Pramadi *et al.*, 2013; Sudirman *et al.*, 2020). The purpose of using local wisdom in learning is so that students can more easily understand science

lessons and also get to know local wisdom in their area, especially in the Sidoarjo area. The delivery of material related to local wisdom is needed so that students can easily understand material that comes from around them, and students can recognize and preserve the local wisdom around them (Purwandari, 2022; Sulistio, 2021). Thus, students can find the material being studied for themselves, because science learning requires critical thinking to obtain new material (Oliver *et al.*, 2021; Žoldošová & Matejovičová, 2010).

Learning based on local wisdom can also shape the character of the nation so that students can apply the character of the Indonesian nation more (Nugraha *et al.*, 2021; Santika & Sudarmawan, 2022). As a place of formal education, elementary schools should integrate existing community cultural values because the main goal of schools is to transform societal values from one generation to the next generation (Qorib *et al.*, 2020; Santika & Sudarmawan, 2022).

Apart from that, local wisdom also includes the independent learning curriculum structure in elementary schools (Hartoyo & Rahmadayanti, 2022; Nurasiah *et al.*, 2022). Local wisdom can be included in local content which can be added flexibly by each school in three ways, namely: 1) Integrating local wisdom into other subjects; 2) Integrating local wisdom into the theme of the project strengthening the profile of Pancasila students; 3) Develop local wisdom into a separate subject. Thus, the results of this study are included as a way to acquaint students with local wisdom which is included in local content by integrating local wisdom into other subjects (Hartoyo & Rahmadayanti, 2022; Widana *et al.*, 2023).

Thus, teachers must be more enthusiastic in instilling local wisdom values in learning so that students are also eager to follow and apply them (Lidi *et al.*, 2020; Rachmadyanti, 2017). So that learning in schools is also expected to be able to raise regional local wisdom to integrate culture into the learning (Aza Nuralita, 2020; Darmadi, 2018; Anilan *et al.*, 2019).



The results of this study reveal that there is a concept of force and motion of objects in the process of making traditional Sidoarjo snacks, especially klepon bulang, mud cake, and ote-ote Porong which can be implemented in fourth-grade learning in elementary school. The implication of this study is to provide an overview of the concept of force and motion of objects in the process of making traditional Sidoarjo snacks for science learning in elementary schools. This research will be very useful especially for educators especially in elementary schools as a reference in choosing learning resources to teach the concept of force and motion of objects to their students. The limitation of this research lies in the scope of the research which is still very limited.

Suggestions for subsequent research are that it is hoped that there will be the development of other science learning, so that later this research can be used as a reference for developing science learning resources to make it more interesting. Because this research is only focused on finding the concept of force and motion of objects. For educational institutions and teachers, it is hoped that the results of this research can later be used as ideas in the development of science learning through local culture in the local area. For future researchers, it is hoped that they will be able to develop the discussion in this study in order to have a broader and more varied study.

## CONCLUSION

This study concludes that the results of the study indicate the existence of the concept of force and motion of objects in traditional Sidoarjo snacks. The concept of force contained in the snack includes: 1) muscle force, 2) frictional force, 3) gravitational force, 4) spring force, and 5) magnetic force. While the concept of object motion that appears is: 1) force changes the shape of objects; 2) force changes the direction of objects; 3) force can change a stationary object into a moving object. This study

concluded that the process of making traditional Sidoarjo snacks, especially klepon bulang, mud cake, and ote-ote porong, is a community habit that can be applied as a source of learning based on local wisdom in elementary schools. This study also shows the existence of the concept of force and motion of objects in traditional Sidoarjo snacks.

## Declaration by Authors

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## REFERENCES

1. Abadi, T. W., Rohmania, A., Febriana, P., Aesthetika, N. M., & Anjunsari. (2013). Perspektif Kepariwisata Kabupaten Sidoarjo. In H. Leanita (Ed.), *Perwira Media Nusantara (PMN)* (Vol. 4, Issue 1). Perwira Media Nusantara (PMN). <http://eprints.umsida.ac.id/982/>
2. Abduh, M. S. (2020). Uji Coba Penggunaan Tempe Sebagai Pengganti Kentang dalam Pembuatan Kue Lumpur. *Jurnal Ilmiah Pariwisata*, 25(1), 10–25. <https://doi.org/10.30647/jip.v25i1.1311>
3. Agusdianita, N., Widada, W., Afriani, N. H., Herawati, H., Herawaty, D., & Nugroho, K. U. Z. (2021). The exploration of the elementary geometry concepts based on Tabot culture in Bengkulu. *Journal of Physics: Conference Series*, 1731(1). <https://doi.org/10.1088/1742-6596/1731/1/012054>
4. Ali, B., Weni, I. M., & Wiyani, W. (2020). The Peusijek Tradition as a Social Communication Media in the People of Aceh, Indonesia. *International Journal of Advances in Scientific Research and Engineering*, 06(06), 07–19. <https://doi.org/10.31695/ijasre.2020.33829>
5. Anılan, H., Kılıç, Z., & Demir, Z. M. (2019). National and cultural values according to the perceptions of third grade primary students. *International Electronic Journal of Elementary Education*, 11(5), 519–527. <https://doi.org/10.26822/iejee.2019553348>
6. Aza Nuralita. (2020). Analisis penerapan model Pembelajaran berbasis etnosains

- dalam pembelajaran tematik SD. *MIMBAR PGSD Undiksha*, 4(1), 1–8. <https://doi.org/10.23887/jjpsd.v8i1.22972>
7. Creswell, J., & Guetterman, T. (2018). Educational Research: Planning, Conducting, and Evaluating Quantitative and Qualitative Research (6th Edition). In *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*.
  8. Darmadi, H. (2018). Educational Management Based on Local Wisdom (Descriptive Analytical Studies of Culture of Local Wisdom in West Kalimantan). *JETL (Journal Of Education, Teaching and Learning)*, 3(1), 135. <https://doi.org/10.26737/jetl.v3i1.603>
  9. Dewanto, M. A. (2022). *Studi Pembuatan Kue Lumpur Sidoarjo dari Tepung Kulit Buah Naga Merah Sebagai Makanan Selingan Mengandung Antioksidan* [Politeknik Negeri Jember]. <https://sipora.polije.ac.id/17427/>
  10. Elisa, E., Prabandi, A. M., Istighfarini, E. T., Alivia, H., H., L. W. I., & Nuraini, L. (2022). Analisis Konsep-Konsep Fisika Berbasis Kearifan Lokal pada Jajanan Tradisional Dawet dan Klepon. *ORBITA. Jurnal Hasil Kajian, Inovasi, Dan Aplikasi Pendidikan Fisika*, 8(November), 194–199. <https://doi.org/10.31764/orbita.v8i2.10197>
  11. Fitri, A., Rasa, A. A., Kusumawardhani, A., Nursya'bani, K. K., Fatimah, K., & Setyaningsih, N. I. (2021). *Buku Panduan Guru Ilmu Pengetahuan Alam dan Sosial untuk SD kelas IV*. Pusat Kurikulum dan Perbukuan Kementerian Pendidikan Kebudayaan Riset dan Teknologi. <https://buku.kemdikbud.go.id/katalog/bukupanduan-guru-ilmu-pengetahuan-alam-dan-sosial-untuk-sd-kelas-iv>
  12. Fitri, A., Rasa, A. A., Kusumawardhani, A., Nussy'bani, K. K., Fatimah, K., & Setyaningsih, N. I. (2021). *Ilmu Pengetahuan Alam dan Sosial* (1st ed.). Pusat Kurikulum dan Perbukuan Kementerian Pendidikan Kebudayaan Riset dan Teknologi. <https://buku.kemdikbud.go.id/katalog/ipas-sd-kelas-iv>
  13. Fitria, R. (2022). *4 Fakta Ote-ote, Camilan Khas Porong yang Muncul di Film "Sayap-sayap Patah."* Food Detik. <https://food.detik.com/info-kuliner/d-6256077/4-fakta-ote-ote-camilan-khas-porong-yang-muncul-di-film-sayap-sayap-patah>
  14. Fredy, F., Tembang, Y., Bito, G. S., & Sholikhah, O. H. (2020). Exploration Ethnomathematics of the Malind Tribe for Character Building in Elementary Schools. *International Journal on Advanced Science, Education, and Religion*, 3(2), 9–20. <https://doi.org/10.33648/ijoaser.v3i2.58>
  15. Hartoyo, A., & Rahmadayanti, D. (2022). Potret Kurikulum Merdeka, Wujud Merdeka Belajar di Sekolah Dasar. *Jurnal Basicedu*, 5(4), 2247–2255. <https://jbasic.org/index.php/basicedu>
  16. Khoiridah, S., Ferriswara, D., Augustinah, F., Pramudiana, I. D., Cahyono, D., & Lestari, V. N. S. (2021). *Persembahan UNITOMO untuk Negeri* (Pertama). UNITOMO Press.
  17. Lidi, M. W., Ningsih, & Dhiki, Y. Y. (2020). Identifikasi Potensi Kearifan Lokal Masyarakat Golewa Kabupaten Ngada sebagai Upaya Pengembangan di Bidang Pendidikan. *OPTIKA: Jurnal Pendidikan Fisika*, 4(1). <https://doi.org/10.37478/optika.v4i1.332>
  18. Liyani, N. I., Salsabila, A., Gusnadi, D., & Karsiwi, R. R. M. (2021). Inovasi kue lumpur berbasis kurma bagi kesehatan. *E-Proceeding of Applied Science*, 7(5), 1494–1502. <https://openlibrarypublications.telkomuniversity.ac.id/index.php/appliedscience/article/view/15523>
  19. M.J.A., I., P.S., K., & R., N. (2022). *Ilmu Pengetahuan Alam dan Sosial* (F. Addana (ed.)). PT. Gelora Aksara Pratama.
  20. Moleong, L. (2017). *Metodelogi Penelitian Kualitatif*. Remaja Rosdakraya Offset.
  21. Muallifa, R. N. L. (2020). *Mencicipi Ote-ote Porong, Gorengan Unik dengan Isian Rumput Laut dan Tiram*. Merdeka. <https://www.merdeka.com/jatim/mencicipi-ote-ote-porong-gorengan-unik-dengan-isian-rumput-laut-dan-tiram.html>
  22. Nugraha, D. W. P., Firma, N. F., & Rusdinal, R. (2021). Pembentukan Karakter Siswa dalam pembelajaran sejarah melalui nilai kearifan lokal tradisi kenduri sko kabupaten kerinci. *Jurnal Pendidikan Tambusai*, 5(1), 92–94. <https://doi.org/10.31004/jptam.v5i1.911>
  23. Nurasiah, I., Marini, A., Nafiah, M., & Rachmawati, N. (2022). Nilai Kearifan Lokal: Proyek Paradigma Baru Program

- Sekolah Penggerak untuk Mewujudkan Profil Pelajar Pancasila. *Jurnal Basicedu*, 6(3), 3639–3648. <https://doi.org/10.31004/basicedu.v6i3.2727>
24. Oliver, M., McConney, A., & Woods-McConney, A. (2021). The Efficacy of Inquiry-Based Instruction in Science: a Comparative Analysis of Six Countries Using PISA 2015. *Research in Science Education*, 51, 595–616. <https://doi.org/10.1007/s11165-019-09901-0>
25. Pramadi, I. P. W. Y., Suastra, I. W., & Candiasa, I. M. (2013). Pengaruh Penggunaan Komik Berorientasi Kearifan Lokal Bali Terhadap Motivasi Belajar Dan Pemahaman Konsep Fisika. *E-Journal Program Pascasarjana Universitas Pendidikan Ganesha*, 3, 1–10. <https://doi.org/10.51878/educational.v1i1.60>
26. Purwandari, E. (2022). Pengembangan Modul IPA Berbasis Kearifan Lokal Batik Gajah Oling Banyuwangi Sebagai Penunjang pada Materi Klasifikasi Tumbuhan untuk Siswa SMP/MTs. In *Digital Library UIN KHAS Jember*. <http://digilib.uinkhas.ac.id/6284/>
27. Qorib, M., Akrim, & Gunawan. (2020). *Integrasi Etika dan Moral: Spirit dan Kedudukannya dalam Pendidikan Islam*. Universitas Muhammadiyah Sumatera Utara. <https://publication.umsu.ac.id/index.php/ht/article/view/124/109>
28. Rachmadyanti, P. (2017). Penguatan Pendidikan Karakter Bagi Siswa Sekolah Dasar Melalui Kearifan Lokal. *Jurnal Pendidikan Sekolah Dasar*, 3(2), 201. <https://doi.org/10.30870/jpsd.v3i2.2140>
29. Ramanta, H., & Samsuri, S. (2020). The Values of Local Wisdom of Minangkabau Culture in a Baralek Gadang Traditional Wedding. *Humaniora*, 11(3), 193–201. <https://doi.org/10.21512/humaniora.v11i3.6625>
30. Ramdani, A., Jufri, A. W., Gunawan, Fahrurrozi, M., & Yustiqvar, M. (2021). Analysis of students' critical thinking skills in terms of gender using science teaching materials based on the 5e learning cycle integrated with local wisdom. *Jurnal Pendidikan IPA Indonesia*, 10(2), 187–199. <https://doi.org/10.15294/jpii.v10i2.29956>
31. Rumilah, S., Nafisah, K. S., Arizamroni, M., Hikam, S. A., & Damayanti, S. A. (2021). Kearifan Lokal Masyarakat Jawa dalam Menghadapi Pandemi. *SULUK: Jurnal Bahasa, Sastra, Dan Budaya*, 2(2), 119–129. <https://doi.org/10.15642/suluk.2020.2.2.119-129>
32. Santika, I. W. E., & Sudarmawan, I. P. Y. (2022). Penguatan karakter Bangsa melalui integrasi nilai kearifan lokal Bali pada Pembelajaran Daring. *JPDK: Jurnal Pendidikan Dan Konseling*, 4(1), 434–446. <https://doi.org/10.31004/jpdk.v4i1.3747>
33. Setyorini, E. E. D., & Qomariah. (2018). Diversifikasi Sebagai Startegi Untuk Meningkatkan Potensi Kue Tradisional Klepon Di Kecamatan Gempol Pasuruan. *Jamswap; Jurnal Akuntansi Dan Manajemen*, 3(2), 57–62. <https://jurnal.stiegwalisongo.ac.id/index.php/JAMSWAP/article/view/93>
34. Sudirman, Mellawaty, Yaniwati, R. P., & Indrawan, R. (2020). Integrating local wisdom forms in augmented reality application: Impact attitudes, motivations and understanding of geometry of pre-service mathematics teachers'. *International Journal of Interactive Mobile Technologies*, 14(11), 91–106. <https://doi.org/10.3991/ijim.v14i11.12183>
35. Sulistio, A. (2021). Tari Simo Gringsing Sebuah Upaya Melestarikan Kearifan Lokal Sebagai MEDIA Pembelajaran Seni Tari di Kabupaten Batang. *Jurnal Inovasi Pendidikan Dan Pengajaran*, 1(1), 36–44. <https://doi.org/10.51878/educational.v1i1.60>
36. Sumarni, W., Sudarmin, S., Sumarti, S. S., & Kadarwati, S. (2022). Indigenous knowledge of Indonesian traditional medicines in science teaching and learning using a science–technology–engineering–mathematics (STEM) approach. In *Cultural Studies of Science Education* (Vol. 17, Issue 2). Springer Netherlands. <https://doi.org/10.1007/s11422-021-10067-3>
37. Widana, I. W., Sumandya, I. W., & Dini Prastanti, N. P. (2023). Implementasi Metode Star Untuk Meningkatkan Kemampuan Guru Mengembangkan Modul Projek Penguatan Profil Pelajar Pancasila. *Jurnal PkM Pengabdian Kepada Masyarakat*, 5(6), 696. <https://doi.org/10.30998/jurnalpkm.v5i6.15621>
38. Wiratmaja, I. N., Suacana, I. W. G., & Sudana, I. W. (2021). Penggalan Nilai-Nilai Pancasila Berbasis Kearifan Lokal

- Bali Dalam Rangka Penguatan Wawasan Kebangsaan. *POLITICOS: Jurnal Politik Dan Pemerintahan*, 1(1), 43–52. <https://doi.org/10.22225/politicos.1.1.3009.43-52>
39. Zahro, A. N., Sumarni, W., & Kurniawan, C. (2023). Tradition of Making Lontong Tuyuhan in Rembang Regency as a Science Learning Resource. *Jurnal Penelitian Pendidikan IPA*, 9(1), 207–215. <https://doi.org/10.29303/jppipa.v9i1.2197>
40. Žoldošová, K., & Matejovičová, I. (2010). Finding out how the elementary school children manipulate with empirical material and how they process the obtained information. *International Electronic Journal of Elementary Education*, 2(3), 327–347. <https://www.iejee.com/index.php/IEJEE/article/view/243>
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