Original Article

RECONSTRUCTION OF INDIGENOUS SCIENCE-SETS OF THE "DUMBEG" REMBANG'S UNIQUE CULTURE AS A SOURCE OF GREENPRENEURSHIP LEARNING

Mohammad Agus Prayitno[1,2], Sri Haryani[1], Sri Wardani[1], Nanik Wijayati[1], Sudarmin[1], Woro Sumarni[1]

[1]Department of Science Education, Universitas Negeri Semarang, Semarang, Indonesia

[2]Department of Chemistry Education, UIN Walisongo, Semarang, Indonesia

Abstract

This study aims to reconstruct original science into scientific knowledge on traditional foods and integrate it with the SETS perspective. The method used is descriptive qualitative through interviews, observation, and documentation. The focus of the research is the reconstruction of science in the manufacture of traditional dumplings from preparation to processing of ingredients. Data analysis techniques in this study include analysis, verification, and the process of reconstructing original knowledge into scientific knowledge. The results of the study concluded that culture-based learning that Ethno-SETS Learning can be used as a source of learning in green chemistry-based entrepreneurship courses (greenpreneurship). The process of making dumbeg traditional food can be reconstructed from genuine science to scientific science. The results of science construction can be integrated with the SETS point of view so that it can improve critical thinking skills and creative students. The results of reconstructing the scientific process of making traditional dumbeg food related to the Learning Outcomes of the Green Chemistry-Based Entrepreneurship Course in the cognitive domain (C.1), namely using the basic concepts of science to study chemistry, on the material solution, suspensions, colloids, additives, filtration, and carbohydrates.

Keywords: dumbeg, ethnoscience, greenpreneurship, indigenous science, SETS.

INTRODUCTION

IPA is a subject related to everyday phenomena. Science learning in schools should be directed at the benefits of science when it is related to society in the past, present or future (Sumarni et al., 2017). This is necessary to maintain a balance between scientific knowledge itself, with the generation of scientific attitudes and ethnoscientific values that exist and develop in society (Marks & Eilks, 2009). Local wisdom-based science learning is science learning through community knowledge (original science) about a culture that develops in a certain area. Local wisdom-based learning emphasizes three things (Sudarmin, 2014), namely 1) ethnoscience which emphasizes the culture of the social situation encountered. This research study shows symptoms about material that is considered important for society and how to organize these symptoms with the knowledge they have. 2) ethnoscience which emphasizes research in revealing the culture that exists in society in the form of values and norms that are prohibited or permitted as well as technological development. 3) ethnoscience which emphasizes culture as an event that can bring people together and influences daily behavior.

Address for correspondence: Mohammad Agus Prayitno
Department of Science Education, Universitas Negeri Semarang, Semarang, Indonesia
Email: mohammadagus@students.unnes.ac.id

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The third research study is the study most often used as material for research studies in the scientific community.

Ethnoscience-based science learning can be integrated with other disciplines, such as ethno-SETS integrated project-based learning. Ethno-SETS integrated learning is learning that links science and culture by paying attention to elements of the environment, technology, and society. This integrated learning is considered to be able to increase students' appreciation of the culture in their area, so that students are motivated to understand and apply scientific science in everyday life (Hikmawati & Khusniati, 2022; Shidiq, 2014) Science reconstruction is a means to synergize between original science and scientific science. Indigenous science is an indigenous culture that has been attached to a society that they maintain and trust from generation to generation. Scientific science is formal knowledge in the form of concepts, principles, theories, and laws that have been through scientific research. The process of translating original science concepts from the culture that develops in a society into scientific knowledge is called the reconstruction of original science into scientific science (Parmin et al., 2017). The process of reconstructing original science into scientific science is contextual learning.

Contextual learning is a learning concept that integrates subject matter with real-world situations that aim to increase students' motivation to make connections between the knowledge they acquire and the realities of life (Berns & Erickson, 2001). Contextual learning does not emphasize knowledge transfer but rather does and experiences, so that learning becomes more meaningful. Saripudin & Komalasari (2016) suggest that the implementation of contextual learning should pay attention to several things, including the learning carried out is a reflection of students' life experiences, education is carried out through local culture and wisdom, and the learning process can provide stimulation to apply students' moral knowledge in society. Implementation of contextual learning can be done by applying several learning models, including problem-based learning models, project-based learning, cooperative learning, work-based learning, and service learning (Berns & Erickson, 2001).

One of the project-based contextual learning is Ethno-SETS integrated project-based learning. Etno-SETS integrated project-based learning has an important role in the development of science. Etno-SETS integrated project-based learning provides opportunities for students to think actively. This is confirmed by (Cakir & Irez, 2006) who state that educators can provide opportunities for students to develop their own understanding so as to enable them to critically analyze the relationship between science, technology and society as scientific literacy. Through local culture, students not only learn about science that comes from the universal west, but also learn about their own indigenous knowledge which is contextual in nature, and has characteristics as their cultural heritage as easterners (Irzik, 1994). Learning science by developing local culture will foster a strong attitude of nationalism, can increase student achievement, strengthen students' perspectives on the universe, and produce inculturation (AIkenhead & Elliot, 2010) which increases students' thinking skills.

Contextual learning can be done through the reconstruction of science. The process of reconstructing original science into scientific science can be done through learning local culture. One of the cultural elements that occupies a central position is traditional food, such as "dumbeg" found in Rembang district. Dumbeg is a food made from rice flour, coconut and palm sugar wrapped in palm leaves from the siwalan tree (Kusdiwanggo et al., 2021). Dumbeg is a food that must be present on certain occasions, such as alms for the earth, alms for the sea, and wedding celebrations (Kusdiwanggo et al., 2021). Dumbeg is a type of food that needs to be preserved because it is classified as an endangered food. Based on this description, this research will examine the process of making "dumbeg" and reveal the existence of scientific knowledge contained therein. The purpose of this research is to reconstruct the original science regarding the process of making "dumbeg" into scientific science using the SETS approach, so that it can be used as a learning resource.

MATERIALS AND METHODS

This research is a qualitative research about a knowledge of culture that exists in society. Qualitative research for a study that is descriptive in nature is also called descriptive qualitative (Kim et al., 2004). The method used in this research is interview and observation. The object of this study is the traditional food typical of Rembang "dumbeg". The subjects of this research were Mr. Samadi who is a resident of Ngampo Village, Sridadi, Rembang and Mr. Edi Rianto who is a resident of Sugihan Village, Pulo, Rembang. Data collection techniques were carried out through observation and interviews. Data analysis techniques performed include data collection, reduction, presentation, and conclusion.

RESULTS

Based on the results of interviews with two informants regarding Rembang's traditional food "dumbeg", information was obtained in the form of respondents' knowledge about making dumbeg which was passed down from generation to generation. The results of the interviews from the two informants were summarized into one concluding answer and the reconstruction became scientific knowledge as described in Table 1.

Table 1. Reconstruction of Original Science into Scientific Science

No	Questions	Original Science	Scietific Science
1.	What does "Dumbeg" mean? 	Dumbeg is a food made from mashed rice and diluted with brown sugar or white sugar which is put in wurung then "dang"/steamed.	Dumbeg is a food made from rice flour. Rice flour is rich in carbohydrates. "Dumbeg" is formed due to the gelatinitation process. Gelatinitation is a physicochemical change that occurs due to heating of starch granules with excess air (Ratnayake & Jackson, 2009; Schirmer et al., 2015; Donmez et al., 2021). When a mixture of starch granules and excess water is heated to a temperature above the initial gelatinase temperature, the granules swell (Ratnayake & Jackson, 2009). The magnitude of the gelatinization transition is affected by the rate of heating, temperature and humidity (Bemiller, 2011). In aqueous media, starch is gelatinized at a temperature range of 60ºC - 80ºC (Liu et al., 2019).
2.	What does Wurung mean? 	Wurung is a cone-shaped "dumbeg" dough mold/ wrapper made of palm leaves.	Palm leaves are the leaves of the siwalan tree (Borassus flabelliefer). This tree is generally cultivated in South Asia and Southeast Asia (Lim, 2012). Borassus flabellifer is a multipurpose tree, because every part of this tree has high economic and social value (Kocak & Mistik, 2015; Singh et al., 2021).
3.	Why do dumbeg molds use ejection? 	Because the palm leaves are hard, they are not afraid to come off when steamed. Palm leaves also give a distinctive aroma to dumbeg. In addition, palm leaves are easy to find in the Rembang area.	The use of Borassus flabellifer leaves as dough wrappers is because the petioles have a strong texture with an abaxial leaf surface. Borassus flabellifer leaves can be used to make waterproof pails, hats, mats, baskets, umbrellas and fuel (Davis & Johnson, 1987; Bayton, 2007). Apart from the leaves, another part of the Borassus flabellifer tree that is useful is the flower sap, which can be used as a natural sweetener which is rich in minerals and vitamins (Hebbar et al., 2015), and has antioxidant activity (T. Singh et al., 2017). Borassus flabelliefer flower extract can lower glucose levels (Yoshikawa et al., 2007), as an anti-inflammatory agent, and has analgesic effects and antipretic activity (Paschapur et al., 2009).
4.	How is the Making Process of "Dumbeg" Make dumbeg dough by mixing rice flour, brown sugar stew, and coconut milk in a large bowl to make dough.  a. Mix the rice flour with the sugar boiled water and then	a. So that the flour does not clump.	Flour will absorb moisture from the surrounding air, if the flour is not mixed with water, it can coagulate, whereas if it is stirred, the flour and water can be mixed evenly. When flour is mixed with water, rice flour does not dissolve in water. Even though this mixture is stirred, a few moments later the wheat flour will separate (experience sedimentation). This mixture is called a suspension. Heterogeneous suspension, consisting of continuous and dispersed phases (Lidia & Kurniawan, 2017).

stir until it dissolves.		
b. Heat the coconut milk, and pour the coconut milk into the mixture and stir until smooth.	b. So coconut milk can last a long time	Coconut milk is a white, milky substance extracted from the flesh of old coconuts which contains a form of medium-chain triglyceride fatty acids that are easily digested without further processing (Tulashie et al., 2022). Coconut milk contains certain minerals and vitamins such as iron (potassium, calcium, magnesium and zinc), folate, amino acids (Vanga et al., 2016; Seow & Gwee, 1997). The purpose of boiling coconut milk is to reduce the number of harmful microorganisms, and extend the shelf life of coconut milk (Tulashie et al., 2022).
c. Dissolve the sugar into the dough	c. The addition of sugar aims to add a sweet taste to the dumbeg dough.	Sugar (sucrose) is a naturally occurring carbohydrate that produces a sweet taste, found in fruits, vegetables, and nuts (Toro et al., 2022). Plant-based foods provide complex carbohydrates such as starch and fiber which are needed to be broken down into sugars and their constituents (Berdanier, 2000).
d. Add/dissolve salt	d. The addition of salt in the dumbegs aims to make the dumbegs tasty.	Salt or sodium chloride (NaCl) is the largest component of dissolved solids found in seawater. Salt is usually used as a food preservative (Yim et al., 2020). The addition of NaCl also aims to increase the taste and juiciness of food (Ojangba et al., 2022; Lestari et al., 2022).
e. Put the dough into the wurung, then steam it. 	e. So that dumbeg has a distinctive aroma.	Steaming can cause the formation of starch granules which is commonly referred to as gelatinization. Gelatinization is the development of starch granules so that the granules cannot return to their original state. As for the steam function so that the aroma is more pronounced, this is because during the steaming process, the steam from the cooking of the ingredients condenses in the steam room. The process of cooking by steaming is better at maintaining nutritional content than boiling and frying (Liu et al., 2021).

DISCUSSION

Indonesia has a very diverse culture, one of which is regional traditional food. Food in Indonesia has been formed, developed and adhered to as values that are ingrained in society and passed down from one generation to the next (Wijaya, 2019). Traditional food is recognized as the identity and culture of a region (Bessiere, 1998). Each regional food has certain characteristics that show cultural elements and the identity of a society (du Rand et al., 2003). The culture of a region contains original knowledge that can be reconstructed into scientific knowledge. Knowledge reconstruction has a positive impact on the progress of culture-based learning (Hikmawati & Khusniati, 2022). Dumbeg is one of the traditional foods typical of Rembang, Indonesia which needs to be preserved. The process of making this traditional food can be reconstructed from original knowledge to scientific knowledge, so that it can add scientific insight to students or the community.

The process of making traditional dumbeg food is quite long, starting from choosing "wurung" to steaming it. The stages in the process of making this traditional food can be described scientifically. For example, why is dumbeg cooked in steam? Naturally the people answered that dumbeg had a distinctive taste (original knowledge). This answer can be reconstructed scientifically, namely by providing an explanation of the clumping process that occurs when the dumbeg is boiled. For example steaming can cause the formation of starch granules which is commonly referred to as gelatinization. Gelatinization is the development of starch granules so that the granules cannot return to their original state. As for the steaming function so that the aroma is more pronounced, this is because during the steaming process, the steam from the cooking of the ingredients condenses in the steam room. The process of cooking by steaming is better at maintaining nutritional

content than boiling and frying (Liu et al., 2021).

Science reconstruction can be integrated with SETS. The integration between scientific reconstruction and SETS is known as Ethno-SETS. Ethno-SETS comes from two words, namely Ethnosains which means science learning resources based on culture (local wisdom) and SETS is an interdisciplinary way of learning science, which includes science, technology, environment and society (Winarto et al., 2022; Chowdhury, 2016; Pedretti & Nazir, 2011). Through ethno-SETS-based learning, students can carry out critical social reconstruction, decision making, and sustainable action (Rosario, 2009). The results of scientific reconstructions that have been integrated with SETS are shown in Figure 1.

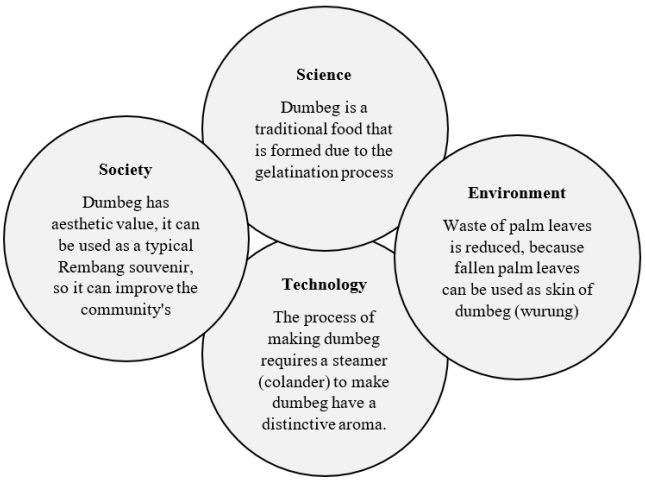

Figure 1. SETS in Dumbeg Making Process

Figure 1 shows that there is a link between scientific knowledge in the process of making traditional food and the environment, technology, and society. The relevance of SETS in the process of making traditional dumbeg food can be explained as follows. Science: Dumbeg is a food with the main ingredient of rice flour which is rich in carbohydrates. Dumbeg food is formed due to the gelatinization process. Gelatinization is a physicochemical change that occurs due to heating of starch granules with excess water (Ratnayake & Jackson, 2009; Schirmer et al., 2015; Donmez et al., 2021). When a mixture of starch granules and excess water is heated to a temperature above the initial gelatinase temperature, the granules swell (Ratnayake & Jackson, 2009). Environment: Traditional dumbeg food packaging made from palm leaves. The use of lontar leaves as packaging for traditional food "dumbeg" shows that the process of making this traditional food pays attention to environmentally friendly values. Palm leaves easily decompose in the soil so they do not cause soil pollution. In addition, dried palm leaves can be used as organic fertilizer (J. K. Singh et al., 2021). Technology: The process of cooking traditional dumbeg food is done by steaming. The steaming process in the manufacture of this food affects the taste of food and maintains the nutritional content contained in this food (Liu et al., 2021). Society: Traditional food is food that has regional characteristics that are not found in other regions. Traditional food can be produced and marketed at tourist spots or souvenir shops, so that it can increase the income of local people.

Based on the results of the reconstruction of original knowledge into scientific knowledge that has been carried out and integrated with the SETS perspective, it can be seen that in the process of making traditional food, dumbeg has a connection with green chemistry-based entrepreneurship courses (greenpreneurship). This course aims to equip students with basic knowledge, skills, and mental attitudes to become entrepreneurs who care about human health and environmental sustainability. The process of making dumbegs can be linked to the Learning Outcomes of the Greenpreneurship Course in the 2020 curriculum text. Based on this, culture in the original science of society can be integrated as a reference material for learning in tertiary institutions. The Learning Achievements of Green Chemistry-Based Entrepreneurship Courses (Greenpreneurship) are presented in Table 2.

Table 2. Learning Achievements in Green Chemistry-Based Entrepreneurship Courses (Greenpreneurship)

Learning Outcomes		Explanation
Attitude (A.8)	Internalize academic values, norms, and ethics.	Reconstruction of science from original science to scientific science can improve students' creative thinking skills. In addition, cultural-based learning that is integrated with the SETS (Ethno-SETS) perspective can remind students of the importance of respecting cultural values, obeying rules, and creating a comfortable academic climate through good behavior.
Attitude (A.10)	Internalize the spirit of independence, struggle and entrepreneurship.	The process of making traditional food requires quite a long time, starting from selecting the palm leaves to be used as wrappers, milling the rice into rice flour, making the dough, to the steaming process. Through the process of making dumbegs, students are invited to see the characteristics of an entrepreneur, such as the spirit of independence, never giving up, tenacity, patience, and the courage to take risks.
Attitude (A.12)	Able to adapt, work together, create, contribute, and innovate in applying knowledge to social life and have global insight in their role as citizens	Making dumbeg traditional food requires creativity and innovation. Dumbeg's traditional food has undergone innovation, including the addition of jackfruit topping to this traditional food. Through learning experiences, students can innovate to develop this traditional food to be even more

	of the world.	interesting but not to leave the characteristics of this traditional food. Dumbeg's special food is food that preserves nature because starting from the packaging and the materials used are environmentally friendly. However, in the process of selling this food, it still uses plastic packaging. For this reason, innovation is needed to change packaging from plastic to environmentally friendly packaging. For example, like the packaging on moci cake. Ethno-SETS learning broadens students' insight into understanding cultural values that exist in Indonesia.
Cognitive (C.1)	Using the basic concepts of science (mathematics/ physics/ computing/ biology) to study chemistry.	The concept of science in making traditional dumbeg food is: a. Gelatinization Gelatinization is a physicochemical change that occurs due to heating of starch granules with excess water (Ratnayake & Jackson, 2009; Schirmer et al., 2015; Donmez et al., 2021). When a mixture of starch granules and excess water is heated to a temperature above the initial gelatinase temperature, the granules swell (Ratnayake & Jackson, 2009). An example of the gelatinization process in ethno-science-based learning for making dumbegs is when steaming dumbegs. b. Solution A solution is a homogeneous mixture, meaning that it is a mixture of two or more substances with no visible differences. The solute particles cannot be seen directly or by using an electron microscope. The particles are very small and spread evenly even though they are left for a long time. An example of a solution in ethno-science-based learning for making dumbegs is when mixing sugar with water. Sugar that has dissolved in water is called a solution because the sugar particles have been mixed and cannot be distinguished. Sugar dissolved in water will appear as a stable phase, and does not leave residue when filtered. The solvent and solute in the sugar solution cannot be separated and remain in the filtrate. c. Suspension Suspension is a heterogeneous mixture, namely a heterogeneous mixture consisting of small solid particles in a liquid which, if left unchecked, will settle to the bottom. Suspension is a two-phase system that is not continuous. The suspended particles are larger than 10 nm, so they can be separated by filtration. An example of suspension in ethno-science-based learning in making dumbegs is when making dumbeg dough, namely when mixing rice flour with water. Rice flour with water when mixed will look mixed, but when left for a while, rice flour will experience sedimentation. d. Coloid A colloid is a mixture whose state lies between a solution and a suspension. Macroscopically colloids appear homogeneous, but microscopically colloids are heterogeneous. An example of colloid in ethno-science-based learning for making dumbegs is coconut milk which is used as a raw material for making dumbeggs. Coconut milk is a natural white milky oil-in-water emulsion extracted from old coconut meat either with or without the addition of water. Coconut milk has a liquid dispersed phase (oil) and a liquid dispersion medium (water). e. Additives Additives are ingredients that are added or mixed into food or drinks during the processing, storage and packaging processes. Examples of additives used in the manufacture of dumbeg are sugar and salt. Sugar (sucrose) and salt (sodium chloride). f. Filtration Filtration is the cleaning of solid particles from a fluid by passing them

		through a filtering medium or septum, where the solids are retained in the filter. The liquid that has gone through the filtering process is called the filtrate, while the solid that has accumulated in the filter is called the residue. Contoh filtrasi pada pembuatan dumbeg yaitu pemisahan santan dari kelapa. Filtrasi digunakan untuk memisahkan antara patikel kasar dengan partikel halus. g. Karbohidrat Carbohydrates are an example of a natural polymer. Carbohydrates come from plants and consist of the elements C, H, and O with the molecular formula Cn(H2O)n. Another name for carbohydrates is saccharide which means sugar. Based on the number of saccharides they contain, carbohydrates can be classified into monosaccharides, disaccharides and polysaccharides. Granulated sugar and fruits contain monosaccharides, cane sugar and milk contain disaccharides, while rice, corn, wheat, sweet potatoes, potatoes, cassava and cotton contain polysaccharides. An example of a source of carbohydrates in the manufacture of dumbeg is rice flour. Matsuda, (2019) suggested that the main component of rice is carbohydrates. An example of a second source of carbohydrates is sugar. Sugar is a natural carbohydrate that produces a sweet taste, found in fruits, vegetables and nuts (Toro et al., 2022). Palm sugar not only contains carbohydrates, but brown sugar can boost immunity because it contains antioxidants (Le et al., 2020). These antioxidants play an important role in protecting the body from damage caused by free radicals.
Cognitive (C.6)	Identify various chemical entrepreneurs and describe the relationship between entrepreneurship, Islam, and science as the embodiment of the paradigm of the unity of knowledge.	Through ethno-SETS learning, students can recognize and identify various cultures in Indonesia. In addition, students can also describe the relationship between science, entrepreneurship, and Islam as the embodiment of the scientific paradigm. An example of the link between science, entrepreneurship, and Islam in ethno-SETS-based learning for making dumbegs is that students can find out how to make dumbegs, reconstruct science from the process of making dumbegs, and can develop chemical entrepreneurship based on local wisdom.
Special Skill (SS.5)	Creating environmentally friendly chemical products.	Dumbeg traditional food is an example of environmentally friendly chemical production. Both in terms of the ingredients, the manufacturing process, the processing process, and the packaging process. Through Ethno-SETS-based learning, students can be inspired to develop an environmentally friendly entrepreneurial product. Starting from the processing, packaging, to marketing. Students do not only develop traditional food entrepreneurship, but students can develop entrepreneurship in other forms which are characteristic of their respective regions.

Ethno-SETS-based science reconstruction is a contextual learning process. Students are required to seek scientific knowledge through scientific reconstruction. Knowledge gained by students through the results of scientific reconstruction will be a very valuable experience. Learning based on experience will produce meaningful learning. Based on this, the relevance of learning chemistry in schools needs to consider several things, namely personal relevance, professional relevance, social relevance, and personal/social relevance (Holbrook & Rannikmae, 2009). Personal relevance, namely that science lessons require relevance from the student's science point of view. Professional relevance, namely learning science needs to provide insight into the possibility of a profession to be developed. Social relevance, namely providing insight into the role of science in human and social problems. Personal-social relevance means that science learning can assist students in forming responsible student character. Based on the above, chemistry learning through ethno-SETS reconstruction can be used as an alternative learning because it is in accordance with the relevance of the learning proposed.

CONCLUSION

Based on the research that has been done, it can be interpreted that Ethno-SETS Learning can be used as a source of learning in green chemistry-based entrepreneurship courses (greenpreneurship). The process of making dumbeg traditional food can be reconstructed from

genuine science to scientific science. The results of science construction can be integrated with the SETS point of view so that it can improve critical thinking skills and creative students. The results of reconstructing the scientific process of making traditional dumbeg food related to the Learning Outcomes of the Green Chemistry-Based Entrepreneurship Course in the cognitive domain (C.1), namely using the basic concepts of science to study chemistry, on the material solution, suspensions, colloids, additives, filtration, and carbohydrates. In addition, ethno-SETS learning is also in line with the objectives of the Course Learning Outcomes, namely cultivating an attitude of respect for cultural values, internalizing enthusiasm, independence, struggle, and entrepreneurship (A.10); able to adapt, work together, create, contribute, and update in applying knowledge to social life and have a global perspective in being adapted as a citizen of the world (A.12); identify various chemical entrepreneurs and describe the relationship between entrepreneurship, Islam, and science as an embodiment of the paradigm of the unity of knowledge (C.6); and creating environmentally friendly chemical products (SS.5).

REFERENCES

1. AIkenhead, G. S., & Elliot, D. (2010). An Emerging Decolonizing Science Education in Canada. Science: Philosophy, History, and Education, 10, 321–338.
2. Bayton, R. P. (2007). A revision of Borassus L. (Arecaceae). Kew Bulletin, 62(4), 561–585.
3. Bemiller, J. N. (2011). Pasting, paste, and gel properties of starch-hydrocolloid combinations. Carbohydrate Polymers, 86(2), 386–423. https://doi.org/10.1016/j.carbpol.2011.05.064
4. Berdanier, C. D. (2000). Advanced Nutrition: Macronutrients (Second Edi). CRC Press.
5. Berns, R., & Erickson, P. (2001). Contextual Teaching and Learning: Preparing Students for the New Economy. The Highlight Zone Research, 5, 1–8.
6. Bessiere, J. (1998). Local development and heritage: traditional food and cuisine as tourist attractions in rural areas. Sociologia Ruralis, 38(1), 21–34. https://doi.org/10.1111/1467-9523.00061
7. Cakir, M., & Irez, S. (2006). Creating a Reflective Learning Community : The Role of Infor- mation Technology in Genetics Learning. 1214–1218.
8. Chowdhury, M. A. (2016). Gifted education in science and chemistry: Perspectives and insights into teaching, pedagogies, assessments, and psychosocial skills development. Journal for the Education of Gifted Young Scientists, 4(1), 53–66. https://doi.org/10.17478/JEGYS.2018116581
9. Davis, T. A., & Johnson, D. V. (1987). Current utilization and further development of the palmyra palm (Borassus flabellifer L., Arecaceae) in Tamil Nadu state, India. Economic Botany, 41(2), 247–266.
10. Donmez, D., Pinho, L., Patel, B., Desam, P., & Campanella, O. H. (2021). Characterization of starch–water interactions and their effects on two key functional properties: starch gelatinization and retrogradation. Current Opinion in Food Science, 39, 103–109. https://doi.org/10.1016/j.cofs.2020.12.018
11. du Rand, G. E., Heath, E., & Alberts, N. (2003). The role of local and regional food in destination marketing. Journal of Travel and Tourism Marketing, 14(3–4), 97–112. https://doi.org/10.1300/J073v14n03_06
12. Hebbar, K. B., Arivalagan, M., Manikantan, M. R., Mathew, A. C., Thamban, C., & Chowdappa, G. V. T. and P. (2015). Coconut inflorescence sap and its value addition as sugar – collection techniques, yield, properties and market perspective. Current Science Association, 109(8), 1411–1417.
13. Hikmawati, K., & Khusniati, M. (2022). Kajian Etnosains dalam Proses Pembuatan Bubur Sumsum dalam Pembelajaran IPA. Proceeding Seminar Nasional IPA XII, 150–159.
14. Holbrook, J., & Rannikmae, M. (2009). The Meaning of Scientific Management. International Journal of Environmental & Science Education, 4(3), 275–288. https://doi.org/10.4324/9781003056584-3
15. Irzik, G. (1994). Universalism, Multiculturalism, and Science Education. Science Education, 78(4), 387–398.
16. Kim, H., Sefcik, J. S., & Bradway, C. (2004). Math Course Taking For CTE Concentrators: Evidence from Three Studies of the Impact of a Decade of Education Reform. Journal of Career and Technical Education, 21(1), 23–42. https://doi.org/10.21061/jcte.v21i1.647
17. Kocak, D., & Mistik, S. I. (2015). The use of palm leaf fibres as reinforcements in composites. Biofiber Reinforcements in Composite Materials, 273–281. https://doi.org/10.1533/9781782421276.2.273
18. Kusdiwanggo, S., Ginting, S. W., R, R. R., A, H., Lussetyowati, T., Hardiman, G., Saraswati, A. A. A. O., P, N. W., H, D. L., Koesmartadi, C., & Pratikno, P. (2021). Arsitektur Lasem yang Berjaya dan yang Runtuh. Pohon Cahaya.
19. Le, D. H. T., Lu, W. C., & Li, P. H. (2020). Sustainable processes and chemical characterization of natural food additives: Palmyra palm (Borassus flabellifer Linn.) granulated sugar. Sustainability (Switzerland), 12(7). https://doi.org/10.3390/su12072650
20. Lestari, W., Sudarmin, S., & Sumarni, W. (2022). Dumbeg Production Saintification in Rembang, Central Java, Indonesia: Local Culture Integration Efforts in Science Learning. Journal of Innovative …, 11(37), 222–235. https://journal.unnes.ac.id/sju/index.php/jise/article/view/52012%0Ahttps://journal.unnes.ac.id/sju/index.php/jise/article/download/52012/20760
21. Lidia, & Kurniawan, D. (2017). Penentuan Perbedaan Stabilitas Fisik Suspensi Kering Ampisilin Generik dan Nama Dagang Setelah Direkonstitusi dengan Air Suling. Jurnal Ilmiah Bakti Farmasi, 2(1), 1–14.
22. Lim, T. K. (2012). Edible Medicinal and Non-Medicinal Plants. Springer: Dordrecht, Netherlands.
23. Liu, Y., Li, Y., Ke, Y., Li, C., Zhang, Z., Liu, A., Luo, Q., Lin, B., He, J., & Wu, W. (2021). Processing of four different cooking methods of Oudemansiella radicata: Effects on in vitro bioaccessibility of nutrients and antioxidant activity. Food Chemistry, 337(March 2020), 1–7. https://doi.org/10.1016/j.foodchem.2020.128007
24. Liu, Y., Yu, J., Copeland, L., Wang, S., & Wang, S. (2019). Gelatinization behavior of starch: Reflecting beyond the endotherm measured by differential scanning calorimetry. Food Chemistry, 284(29), 53–59. https://doi.org/10.1016/j.foodchem.2019.01.095
25. Marks, R., & Eilks, I. (2009). Promoting scientific literacy using a sociocritical and problem-oriented approach to chemistry teaching: Concept, examples, experiences. International Journal of Environmental and Science Education, 4(3), 231–245.
26. Matsuda, T. (2019). Rice flour: A promising food material for Nutrition and Global Health. Journal of Nutritional Science and Vitaminology, 65, S13–S17. https://doi.org/10.3177/jnsv.65.S13
27. Ojangba, T., Boamah, S., Zhang, L., Wang, Z., & Osei, R. (2022). Effects of sodium chloride (NaCl) partial substitution by potassium chloride (KCl) in combination with high pressure on sensory and chemical properties of beef sausage during cold storage at 4°C. Journal of Food, 20(1), 412–420.
28. Parmin, Sajidan, Ashadi, & Sutikno. (2017). Etnosains: Kemandirian Kerja Ilmiah Dalam Merekonstruksi Pengetahuan Asli Masyarakat Menjadi Pengetahuan Ilmiah. CV. Swadaya Manunggal. CV. Swadaya Manunggal.
29. Paschapur, M. S., Patil, M. B., Kumar, R., & Patil, S. R. (2009). Influence of ethanolic extract of Borassus flabellifer L. male flowers (inflorescences) on chemically induced acute-inflammation and

poly arthritis in rats. International Journal of PharmTech Research, 1(3), 551–556.
30. Pedretti, E., & Nazir, J. (2011). Currents in STSE education: Mapping a complex field, 40 years on. Science Education, 95(4), 601–626. https://doi.org/10.1002/sce.20435
31. Ratnayake, W. S., & Jackson, D. S. (2009). Starch gelatinization. Advances in Food and Nutrition Research, 55, 221–268.
32. Rosario, B. I. (2009). Science, Technology, Society and Environment (STSE) Approach in Environmental Science for Nonscience Students in a Local Culture. Liceo Journal of Higher Education Research Science and Technology Section, 6(1), 2094–1064.
33. Saripudin, D., & Komalasari, K. (2016). Culture-Based Contextual Social Studies Learning for Development of Social and Cultural Values of Junior High School Students (pp. 5726–5731). http://docsdrive.com/pdfs/medwelljournals/sscience/2016/5726-5731.pdf
34. Schirmer, M., Jekle, M., & Becker, T. (2015). Starch gelatinization and its complexity for analysis. Starch/Staerke, 67(1–2), 30–41. https://doi.org/10.1002/star.201400071
35. Seow, C. C., & Gwee, C. N. (1997). Coconut milk: Chemistry and technology. International Journal of Food Science and Technology, 32(3), 189–201. https://doi.org/10.1046/j.1365-2621.1997.00400.x
36. Shidiq, A. S. (2014). Prestasi Belajar Siswa. Profesi Pendidikan Dasar, 1(1), 17–30.
37. Singh, J. K., Rout, A. K., & Kumari, K. (2021). A review on Borassus flabellifer lignocellulose fiber reinforced polymer composites. Carbohydrate Polymers, 262(February). https://doi.org/10.1016/j.carbpol.2021.117929
38. Singh, T., Verma, A. K., Haq, S. I. U., & Mounika, N. (2017). Evaluation and Determination of Antifungal Potentials of Sap of Borassus Flabellifer. American Journal of PharmTech Research, 7(2271), 111–113. http://www.ajptr.com/archive/volume-6/october-2016-issue-5.html
39. Sudarmin. (2014). Pendidikan Karakter, Etnosains, dan Kearifan Lokal: Konsep dan Penerapannya dalam Penelitian dan Pembelajaran Sains. Fakultas Matematika dan Ilmu Pengetahuan Alam.
40. Sumarni, W., Sudarmin, Wiyanto, Rusilowati, A., & Susilaningsih, E. (2017). Chemical literacy of teaching candidates studying the integrated food chemistry ethnosciences course. Journal of Turkish Science Education, 14(3), 60–72. https://doi.org/10.12973/tused.10204a
41. Toro, S. J. H., Gómez-Narváez, F., Contreras-Calderón, J., & Arisseto, A. P. (2022). Acrylamide in sugar products. Current Opinion in Food Science, 45.
42. Tulashie, S. K., Amenakpor, J., Atisey, S., Odai, R., & Akpari, E. E. A. (2022). Production of coconut milk: A sustainable alternative plant-based milk. Case Studies in Chemical and Environmental Engineering, 6.
43. Vanga, S. K., Singh, A., Kalkan, F., Gariepy, Y., Orsat, V., & Raghavan, V. (2016). Effect of Thermal and High Electric Fields on Secondary Structure of Peanut Protein. International Journal of Food Properties, 19(6), 1259–1271. https://doi.org/10.1080/10942912.2015.1071841
44. Wijaya, S. (2019). Indonesian food culture mapping: A starter contribution to promote Indonesian culinary tourism. Journal of Ethnic Foods, 6(1), 1–10. https://doi.org/10.1186/s42779-019-0009-3
45. Winarto, W., Cahyono, E., Sumarni, W., Sulhadi, S., Wahyuni, S., & Sarwi, S. (2022). Science Teaching Approach Ethno-Setsar to Improve Pre-Service Teachers’ Creative Thinking and Problem Solving Skills. Journal of Technology and Science Education, 12(2), 327–344. https://doi.org/10.3926/jotse.1367
46. Yim, D. G., Shin, D. J., Jo, C., & Nam, K. C. (2020). Effect of sodium-alternative curing salts on physicochemical properties during salami manufacture. Food Science of Animal Resources, 40(6), 946–956. https://doi.org/10.5851/KOSFA.2020.E65
47. Yoshikawa, M., Xu, F., Morikawa, T., Pongpiriyadacha, Y., Nakamura, S., Asao, Y., Kumahara, A., & Matsuda, H. (2007). New spirostane-type steroid saponins with antidiabetogenic activity from Borassus flabellifer. Chem Pharm Bull, 55(2), 308–316.