SPEKTRA: Jurnal Kajian Pendidikan Sains
Vol. 10, No. 2, 024, pp. 337-346
ISSN: 2548-642X, DOI: 10.32699/spektra.v10i2.8141

INSTANT NASI TUM INNOVATION WITH VARIATION MATERIAL TO IMPROVE CHEMICAL REACTION LEARNING PROCESS AND STUDENT PRENEURSHIP

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Article Info

Article history:
Received 31/10/2024
Accepted 12/12/2024
Published 20/12/2024

Keywords:
Nasi tum
Fast food
Innovation
Instant
Studentpreneur

ABSTRACT

Nasi tum is a traditional food that is a commodity for the Wadaslintang community. This product can be processed and innovated into fast food. The aim of this research is to understand the concept of chemical reaction rates through the symptoms that occur during the process of making instant nasi tum and developing it into a student entrepreneurial product. This research methods used a quantitative, using experiments, pretest and posttest, as well as product assessment methods involving experts. The results obtained are the creation of fast food nasi tum, innovation in the form of fast food nasi tum which is present to bridge the needs of a fast-paced lifestyle, making people tend to choose instant or fast food without sacrificing aspects of tradition and local wisdom, increasing students' understanding of chemical reaction pathways, as well as improving students' studentpreneur skills which is a strategic step to prepare them to face the challenges of the world of work and business in the future. The impact is that there is a nasi tum instant solution that is long-lasting and can be prepared and enjoyed at any time. Instant nasi tum is suitable for those who are busy and need fast food but still want to enjoy traditional tastes. Whether at home, the office or when traveling, instant rice tum can be a practical and filling food choice.

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1. INTRODUCTION

Rice is an important staple food in many cultures around the world, especially in Asia. It is typically made from rice grains that have been cooked to a soft, edible texture. Rice is a major source of carbohydrates in many societies, and is often times served as an accompaniment to other

dishes such as meat, vegetables, or soup dishes. The history of rice can be traced back thousands of years to prehistoric times.

Some countries in Asia also develop a culture of eating rice with hands, while in other countries, spoons or chopsticks are used as eating utensils. In addition to being an important source of energy, rice also plays a role in culture and ceremonies. In many Asian societies, rice has strong symbolism and is often considered sacred, for example in some traditional ceremonies, rice is used as part of offerings to ancestors or gods.

In the modern world, rice has become a popular food outside of Asia, especially in Asian restaurants or in popular dishes such as sushi. There are also many varieties of rice that have been developed, such as glutinous rice, brown rice, or fragrant rice, which provide variations in taste and texture. Rice also plays an important role in the food industry and economy of many countries. Rice production and rice commodities are closely related to farmers' livelihoods and agricultural development. This is because rice is one of the main commodities that forms inflation. The government has made various rice price stability policies so that rice prices remain within a certain limit that benefits farmers and consumers. The government must face a food price dilemma where on the one hand farmers want high rice prices, and on the other hand consumers want the opposite (Aryani, 2021). Various industries, such as the rice industry and rice-based processed foods, also contribute significantly to the economies of countries that rely on rice as a primary commodity. Overall, rice is a food rich in history and culture, and is an important food source for people around the world.

Wadaslintang is a sub-district located in the southernmost part of Wonosobo Regency, known as a community whose majority population are rice farmers. Most of the rice harvest is sold in the form of rice. The innovation of processed rice is nasi tum as the local wisdom of Wadaslintang. The disclosure of local wisdom through science learning has an important meaning to strengthen the application of the concepts that have been learned (Parmin, 2015). It is very easy to find this nasi tum in Wadaslintang. Changing the rich indigenous knowledge of the society, through this scientific research, works well in converting their indigenous knowledge into scientific knowledges which in turn to be appropriate to be used as learning material as modules and textbooks (Parmin, et al., 2015). Therefore, students of SMAN 1 Wadaslintang use nasi tum as a medium in learning, especially in the material on chemical reaction rates.

Chemistry subjects contain a lot of abstract learning materials that make it difficult for students to understand. Moreover, science is often considered a discipline that is more theoretical and less applicable (Sri Jumini, et al., (2022). Chemical reaction phenomena in nasi tum include the Maillard Reaction (Non-Enzymatic Browning) and Starch Gelatinization. The non-enzymatic browning process is caused by a browning reaction without the influence of enzymes, usually occurs during processing (Arsa, 2016). Starch gelatinization is a series of structural changes in starch granules due to the presence of water and heating (Parwiyanti, et al., 2016). Efforts to explain the phenomenon of chemical reactions by implementing practical activities in the laboratory have helped many students, but they are not yet optimal considering that chemical practicums in the laboratory require equipment and chemicals, most of which are not well known by students. Practical activities in the laboratory also have the potential to produce laboratory waste. The waste produced by educational laboratories is indeed small, but the accumulation of this waste is very threatening to human health and the environment. The dangers caused by

chemical waste are not felt directly and are not even realized (Redhana, 2014) in I Ketut Lasia, et al. (2020). It is necessary to design practical activities that are directly related to everyday life.

Nasi tum is a traditional food in Wadaslintang, has several specific names in several other areas, namely nasi pincuk, nasi bucu, nasi pendem, and is also known as nasi megono. Megono is served traditionally. As one of the traditional foods, preservation needs to be carried out so that it is not replaced by modern foods. Nasi tum consists of rice mixed with vegetables and urap sauce, wrapped in banana leaves so that it is practical to serve, even used as provisions for traveling. However, nasi tum does not last long so it cannot be stored for more than a day. Thus, this nasi tum can be used in learning as one of the uses of local wisdom. The use of local wisdom in learning, further emphasizes the importance of the humanistic approach as an approach to science learning (Parmin, et al., 2016).

The innovation of nasi tum in learning is expected to be able to foster studentpreneur character in students. Behavior that is accustomed through the project-based learning process will form entrepreneurial skills (Sri Jumini & Sutikno, 2019). Furthermore, students need to be given the freedom to work with maximum expression and given the freedom to work. Thus, their abilities and intelligence will develop according to their respective interests and talents. Students' creativity is channeled into positive things in the form of real work (Jumini, et al., 2022). The concept of studentpreneur can also occur because of hobbies and independence. A studentpreneur must have an interest and entrepreneurship. In addition, a studentpreneur must have the will to learn entrepreneurship, have an innovative and creative character (Roziana Ainul Hidayati, 2022).

2. METHOD

This study uses an experimental research method that is included in the quantitative research method. Through this design, research can provide empirical evidence regarding the effect of the intervention provided. The experimental method aims to test the effect of a variable on another variable or to test how the causal relationship between one variable and another variable. The experimental method was used to test the effect of using instant rice tum as a learning medium on increasing students' understanding in learning chemical reactions and developing entrepreneurial skills. This research was designed to identify the causal relationship between these two variables.

This study used 2 instruments, namely observations on the assessment of student activity and skills, as well as written pretest and posttest questions in the form of multiple choices in diagnostic assessment, formative assessment and summative assessment (Sugiarti, 2017). The results of the pre-test and post-test to measure the increase in understanding of the concept of chemical reactions, while qualitative data was collected through interviews and observations to assess students' abilities in working as a team, innovation, and simple market analysis. The pretest and posttest results are then analyzed by calculating the average value using the following equation.

$$Mean = \frac{\sum f_i x_i}{\sum f_i}$$

In quantitative research, the conclusion drawing process is deductive, namely concepts, variables to data. In a quantitative approach, the nature of the relationship between variables will then be analyzed using statistical test tools and using objective theories (I Made Laut Merta Jaya,

2020). This approach not only emphasizes understanding concepts but also practical applications that are relevant to everyday life, making learning more meaningful and applicable. The experimental results show that students who learn using the instant rice tum approach better understand the concept of chemical reactions, especially those related to physical and chemical changes. In addition, students are trained to develop creativity and entrepreneurial skills through marketing simulations for instant rice-tum products. These findings support that integration between experimental-based contextual learning and preneurship can improve the quality of learning holistically.

3. RESULTS AND DISCUSSION

In this learning practice, there are three elements that are the assessment materials, namely student activity during learning activities, skill scores in making instant nasi tum, and student assessments on reaction rate material. In the material aspect of reaction rate, the assessment includes an understanding of the concept as demonstrated through answers to the questions given, as well as students' ability to relate theory to practice. Assessment of packaged products includes taste quality and packaging design which has its appeal for each product, so that students not only hone academic skills but also practical skills and creativity in facing real challenges.

The choice of instant nasi tum as a medium for learning chemical reaction rates is based on efforts to bring the learning content closer to students' daily experiences. To connect these two conditions, a non-cognitive diagnostic assessment is first carried out which explores the depth of information on how far students are familiar with Nasi Tum, interested in Nasi Tum, the intensity of consuming Nasi Tum, and how big the opportunity is to use Nasi Tum as a medium for studying the material. chemistry lesson material.

Based on the results of the non-cognitive diagnostic assessment, student responses regarding nasi tum in relation to chemistry subjects are shown in Table 1**.**

Table 1**.** Results of non-cognitive diagnostic assessment of chemical reaction rate material

No	Indicator	Student responses
1	Do you like eating nasi tum/pincuk rice/megono rice?	70.6% likes
2	How often do you have breakfast or eat nasi tum/nasi pincuk/megono?	47.1% once a week
3	Are you interested and want to learn about traditional food products?	76.5% interested
4	Does chemistry have anything to do with food?	73.5% there is a correlation

Students of SMA N 1 Wadaslintang along with chemistry teachers as research supervisors have succeeded in developing a new innovation, namely instant nasi tum, where nasi tum is processed with a certain process so that it can be stored longer and is easy to serve. This project not only proves the students' creativity and tenacity but also represents a potential business opportunity because this product offers practicality while maintaining the authenticity of traditional flavors. The process of making this innovative product involves one of the topics in chemistry learning, namely reaction rates.

The traditional process of processing nasi tum in society in general cannot be directly linked to the rate of chemical reactions. There needs to be creativity and even innovation so that the process of making nasi tum can further strengthen understanding of the material of reaction rates. The interesting thing is that when the process of making nasi tum is related to the rate of chemical reactions, the most likely thing is that there are fast reaction processes and slow reaction processes. Turning rice, which usually has to be consumed immediately after cooking, into long-lasting instant rice requires a slow reaction. Meanwhile, instant nasi tum can be cooked quickly, requiring a fast reaction. This is the basic concept that is used as a reference for using instant nasi tum as a medium for learning chemical reaction rates.

So, the author conducted a best practice research by utilizing the instant rice tum innovation product as a learning medium in understanding fast and slow reactions and the factors that affect the reaction rate. The learning product is instant rice tum as a traditional food that can be enjoyed and can even be developed into an entrepreneurial product. In the results of the cognitive assessment, the average student pretest and posttest scores are shown in Table 2**.**

Table 2**.** Results of cognitive assessment of average pretest and posttest scores

Average pretest score	Average posttest score
49	87

The results showed a significant increase in students' understanding of chemical reaction rates. This is reflected in the pretest average score of 49, which indicates a low initial experience level, and the posttest average score which increased to 87. This increase suggests that the innovation of instant rice tum as a learning medium effectively increases students' understanding of chemical reaction rate material.

This increase in pretest to posttest scores can be attributed to several factors. First, the use of media that is contextual and relevant to everyday life, such as instant rice, makes it easier for students to understand concepts that were previously difficult to reach. Second, a more practical and fun approach can increase students' motivation to learn. In the context of chemical reaction rates, it is easier for students to understand concepts such as the effect of temperature, concentration and catalyst on reaction rates through demonstrations carried out in an easy-to-understand manner.

For the research product in the form of instant nasi tum, it will also be assessed using a competition model so that students will be motivated and enthusiastic about following the entire series of learning activities. The product assessment criteria are on the taste and appearance of the packaging by considering the costs required for packaging. Assessments that focus on the taste and appearance of the packaging provide space for students to be creative, both in terms of developing a unique nasi tum taste and packaging designs that are attractive and functional. These two components are very important to pay attention to. Sometimes consumers will tend to choose food products with attractive packaging, compared to products with plain or simple and unattractive packaging. From this, it can be seen that packaging is an important component for increasing sales (Rasa et al., 2023). Students are not only encouraged to produce quality products but are also given an understanding of the importance of product competitiveness in the market. The hope is that this instant rice tum product has the potential to be developed further so that it can be marketed widely, both on a small scale such as local markets and on a larger scale, as an

effort to support student creativity while encouraging an entrepreneurial spirit. Through this approach, learning becomes more comprehensive, optimally integrating students' cognitive, psychomotor and affective aspects.

According to Nizaar (2022), entrepreneurship encourages people to be progressive (advance) following trends and developments. Students need to be accustomed to thinking dynamically in looking at existing social facts so they can become agents of change in the environment where students are. This spirit needs to be integrated into the learning process to be able to keep up with the changes and progress of life. Furthermore, Sugiarto et al (2015) said that interest in entrepreneurship can be increased or influenced by providing education through entrepreneurship skills training to provide discourse, skills and a general overview of entrepreneurship so that they can move and take steps on the things that have been given, and can feel that they interested and what they want to develop.

Specifically for the final product competition, the jury involves: chemistry teachers, economics/entrepreneurship teachers and producers and sellers of nasi tum. Chemistry teachers are involved in assessing the scientific and technical aspects of the products being made. Economics or entrepreneurship teachers are tasked with assessing from a business and market perspective. As experienced business people, producers and sellers of nasi tum provide practical input based on market realities. Several students who are willing to taste the product will also be involved in the assessment. The results of the assessment of nasi tum are shown in Table 3.

Table 3. Results of Instant Nasi tum Product Competition Assessment

No	Group name	Jury 1		Jury 2		Jury 3		Average value
		Flavor	Design	Flavor	Design	Flavor	Design	
1	Ex 1	70	80	70	80	75	85	76
2	Group 2	80	80	75	85	75	80	79
3	Group 3	70	85	75	80	75	80	77
4	Group 4	70	80	80	85	80	85	80
5	Group 5	90	90	90	90	90	80	88
6	Ex 6	75	85	85	85	80	85	82

The Relation of Material to the Practice of Making Instant Nasi tum (Sriyanto, 2020):

a. The rate of a chemical reaction is the rate at which the concentration of a reactant decreases or the rate at which the concentration of a product increases per unit of time. The rate of a chemical reaction is either slow or fast.
   a. 1. Slow reaction
   The making of dried rice is done using *a food dehydrator* with a temperature of 50 ^{0}C for 20 hours to maintain the nutritional content and texture of the dried rice. This process shows an example of a slow reaction.
   a. 2. Quick reaction
   Once packaged, instant nasi tum is ready to be served, taking about 10 minutes by boiling the rice in boiling water at a temperature of 100 ^{0}C. This stage indicates a fast reaction process.

b. There are four factors that influence the rate of chemical reactions:

b. 1. Concentration

The process of soaking rice in water and boiling instant rice provides students with a learning experience about the concentration of substances. The higher the concentration, the faster the reaction rate.

b. 2. Temperature

Drying at 50ºC causes a slow reaction and boiling at 1000ºC causes a fast reaction. The higher the temperature, the faster the reaction occurs.

b. 3. Surface area

The rice grains are maintained in their shape until the drying process. With the solid granular shape of the intact rice grains, the surface area can be maintained. The larger the surface area, the faster the reaction.

b. 4. Catalyst

Catalysts play a role in lowering activation energy. In the process of making instant nasi tum, there is no addition of catalysts so that the process and products produced remain natural without food additives (BTP).

The source of local wealth in the form of nasi tum culture combined with a chemical reaction process and which can then be developed into an entrepreneurial idea is a series of meaningful learning activities that are very beneficial for students. In one flow of learning activities, students have the opportunity to learn three important elements in improving their personal competence, namely understanding the potential that exists in the surrounding environment, focusing on the subject matter, and being able to see business opportunities to be used as inspiration for entrepreneurial activities. The learning cycle is quite complex but effective in optimizing learning activities. These kinds of learning models are ultimately able to explore students' intelligence abilities and hone their soft skills so that they will be better prepared to develop themselves when they graduate from school and return to society.

The principle of making instant nasi tum is very simple with basic ingredients of rice and vegetables (cassava leaves and cabbage) which are easily obtained so that it is easy to do by students and teachers. Learning activities, practicums, and research based on local wealth and oriented towards environmentally friendly innovation products like this can continue to be developed so that they can provide meaningful experiences to students. Agreeing with this, Nurjanah (2024) explained that regional potential integrated science learning can develop students' critical thinking abilities because they gain direct experience and information which will increase understanding and make learning more meaningful. Apart from that, it can also increase sensitivity to the potential of the surrounding environment, and improve student achievement academically (improving student learning outcomes) and non-academically (innovative work results can be included in student research and innovation competitions).

The use of instant rice tum as a learning medium helps students to understand complex chemical concepts more simply. For example, the process of cooking instant nasi tum can be analogous to a chemical reaction involving factors such as temperature, concentration of ingredients, and time which influence the reaction rate. Observations made by students will strengthen their memories compared to just reading the theory. Students can directly relate their experience of cooking instant nasi tum to the changes that occur in chemical reactions.

The use of relevant and practical media such as instant nasi tum increases student involvement in the learning process. Students not only learn theoretically but are also involved in activities that require observation and discussion. This makes them more active and focused during learning, which in turn increases their absorption of the lesson material. Choosing relevant and practical learning media is something that needs special attention in learning. The reason is, that student learning outcomes can be improved through various kinds of efforts that can be carried out by teachers, one of which is by using learning media in each subject (Ekayani, 2017).

4. CONCLUSION

Students are able to make instant nasi tum with optimal composition, temperature, and time to produce delicious instant nasi tum. Students are able to understand fast and slow reactions clearly because the experiment was carried out using everyday ingredients and provided meaningful experiences. Students can understand the factors that affect the rate of chemical reactions with direct experience when making instant nasi tum so that they will get a deeper learning experience. Students can apply the material on chemical reaction rates in everyday life and produce innovative products that have commercial opportunities. Traditional food products can be a source of inspiration to be developed into innovative products that have higher selling value. Students have played a role in preserving local culture and fostering a sense of love for the wisdom of the nation's culture (character profile of Pancasila students). The raw materials used are materials that are in the surrounding environment and the resulting products can also be utilized so as to reduce laboratory waste. Inspire the entrepreneurial spirit of students / studentpreneurs.

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