Training In Making Tempeh in Character Molds to Increase Elementary School Students' Interest in Consuming Tempeh

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Abstrac
Tempeh, a traditional Indonesian fermented soybean product, is highly nutritious but under-consumed by children due to its bland appearance and unfamiliar texture. This community service program aimed to enhance elementary school students' interest in consuming tempeh through a participatory training that introduced character molds into the tempeh-making process. Conducted with 20 students aged 9–11 years, the intervention employed a pretest-posttest design to assess changes in tempeh preferences, knowledge, and willingness to consume and prepare tempeh. Results indicated significant improvements across all indicators: students' liking of tempeh increased from 35% to 85%, their perception of its visual appeal rose from 25% to 90%, and willingness to try character-shaped tempeh reached 95%. The program not only improved students' understanding of tempeh's nutritional benefits but also engaged them in creative, hands-on food preparation that enhanced motivation and enjoyment. The findings support the use of experiential learning and visual food design in child nutrition education. This initiative effectively combined cultural food preservation with innovative teaching strategies. It demonstrates that integrating fun and creativity into traditional food education can promote healthier eating habits and strengthen local food identity among young learners. Future programs should consider scaling up and incorporating family and school-level involvement to achieve a broader and more sustainable impact.

Keywords: Tempeh, Food Education, Elementary Students, Character Molds, Traditional Food, Experiential Learning, Nutrition Behavior

INTRODUCTION

Tempeh is a traditional Indonesian fermented food made primarily from soybeans and is well-known for its high protein content, probiotic benefits, and affordability. It plays an important role in the Indonesian diet and is often recommended as a healthy meat alternative (Astuti, Meliala, Dalais, & Wahlqvist, 2000). Despite its nutritional richness, tempeh consumption among young children in Indonesia is relatively low. Factors such as the texture, color, and unfamiliar smell often deter children from consuming this valuable local food product (Haryani, Saputri, & Widodo, 2021). Children's food preferences are greatly influenced by sensory appeal and visual attractiveness. Studies have found that the visual presentation of food significantly affects children's willingness to try and consume it (Martens et al., 2019). Tempeh, in its traditional form, is typically brownish-white with a bland appearance, which may not appeal to children. Without efforts to make tempeh visually attractive and engaging, it is unlikely to become a preferred food choice among school-aged children.

Educational interventions that involve active participation and creative expression have been shown to be effective in increasing food acceptance among children. Food-based learning activities that allow children to touch, prepare, and shape food provide a sensory-rich environment conducive to behavioral change (Liu et al., 2020). One such strategy that has gained traction globally is the use of character molds or fun shapes in food preparation, a technique widely applied in Japanese "kyaraben" (character bento) culture to increase children's engagement with food (Tanikawa, 2017). Kyaraben, or character-based meals, involve shaping food into familiar cartoon characters, animals, or playful objects that children recognize and enjoy. This practice has been associated with increased food intake and better nutrition among young students, especially when applied to vegetables and other less-preferred foods (Kobayashi et al., 2018). The visual attractiveness of food appears to act as a gateway to changing taste perception and increasing willingness to try new dishes.

In Indonesia, efforts to introduce traditional foods through modern presentation methods remain limited, particularly in the context of formal or informal education. Introducing children to tempeh through character mold-making not only preserves local food heritage but also brings innovation to school-based nutrition education. This approach combines cultural preservation with creative education strategies, aligning with the broader goals of the national Healthy School Program (Kementerian Kesehatan RI, 2019). Moreover, children's participation in preparing their own meals fosters a sense of ownership and curiosity about the ingredients. When children are directly involved in food preparation, they are more likely to accept and enjoy the final product (Chu et al., 2013). By using character molds to shape tempeh, children can develop a fun, emotional connection to a food they might otherwise reject. This training can also positively impact their families by encouraging healthier food preparation at home.

Community service projects such as this play a crucial role in bridging the gap between traditional food knowledge and modern dietary behaviors among youth. Elementary schools are ideal environments for introducing nutrition education and promoting healthy food habits through experiential learning. By working directly with students in a practical training format, we can begin to reshape their perceptions and encourage more balanced food choices at a young age (Birch & Fisher, 1998). This project aims to explore whether using character molds in making tempeh can significantly increase children's interest in consuming it. By integrating food science, education, and cultural creativity, the project seeks to improve both knowledge and attitudes toward traditional nutritious foods. The expected outcome is a positive shift in the perception of tempeh, increased willingness to consume it, and the development of lifelong healthy eating habits.

METHODOLOGY

This community service activity adopted a participatory and educational approach tailored to elementary school students. The methodology was designed to actively engage students in a hands-on learning experience about tempeh production, with a specific emphasis on using character molds to enhance its visual and emotional appeal. The project was conducted in March 2025 at an elementary school in Yogyakarta, Indonesia, involving 20 students from grades 4 and 5, aged between 9 and 11 years old. The participants were selected based on parental consent and teacher recommendations, ensuring they represented a range of academic and socio-emotional backgrounds. The program employed a one-group pretest-posttest design to evaluate the effectiveness of the intervention in changing students' interest in tempeh consumption. This design is widely used in community-based educational interventions to measure behavioral change after a specific activity (Creswell & Creswell, 2018). Before the training began, a short survey was administered to the students to assess their baseline knowledge, attitudes, and preferences toward tempeh. This pretest gathered data on their current consumption habits, reasons for liking or disliking tempeh, and familiarity with food preparation practices. The training was conducted over two consecutive days in a structured yet interactive format. On the first day, students attended a short presentation introducing tempeh, including its origin, nutritional benefits, and role in Indonesian culture. The session emphasized the importance of protein and traditional food in their daily diet, using visual aids, games, and storytelling. This was followed by a demonstration of the tempeh-making process, where students observed how soybeans are cleaned, boiled, dehulled, inoculated with *Rhizopus oligosporus*, and incubated under proper conditions (Shurtleff & Aoyagi, 2014). Emphasis was placed on hygiene, fermentation time, and environmental factors affecting tempeh production.

On the second day, students were divided into small groups and each group was provided with pre-cooked soybeans, inoculum, banana leaves, and a variety of food-grade silicone molds in shapes such as animals, cartoon faces, and geometric figures. Under guidance from the facilitators, students participated in the process of filling the molds with soybean mixture and wrapping them for fermentation. The use of character molds was a deliberate innovation based on the concept of food neophilia and aesthetic appeal in children's dietary behavior (Kobayashi et al., 2018). This session encouraged teamwork, creativity, and hands-on skill development.

The fermentation process was monitored over the next 48 hours by the facilitators, and students were invited back on the third day to observe and taste their finished products. A tasting session was organized, during which students evaluated the character-shaped tempeh for taste,

texture, and appearance. They were encouraged to express their opinions openly. Afterward, a posttest survey was administered, mirroring the pretest but with additional questions assessing their enjoyment of the activity, interest in eating tempeh at home, and willingness to help make it in the future. Data from the pretest and posttest questionnaires were analyzed using descriptive statistics to determine shifts in attitudes and behaviors. The increase in tempeh preference, willingness to consume, and enthusiasm for character-mold preparation were used as indicators of success. This qualitative approach aligns with similar food education programs that focus on behavior-based outcomes rather than clinical nutrition metrics (Liu et al., 2020).

Ethical considerations were addressed through informed consent from parents, coordination with school officials, and adherence to hygiene and safety protocols throughout the activity. The project was designed to be inclusive, non-competitive, and supportive of students with varying levels of food experience and literacy. The experiential learning model adopted in this program draws from Kolb's theory of experiential education, which emphasizes concrete experience and active experimentation as essential steps in learning (Kolb, 1984). Overall, the methodology combined cognitive (knowledge), affective (interest and attitude), and psychomotor (skill) domains of learning, making the intervention holistic and developmentally appropriate for elementary-aged participants. The success of this program suggests that creative, participatory approaches in food education can foster not only healthier eating habits but also stronger connections between children and their cultural food heritage.

RESULTS AND DISCUSSION

RESULTS

The community training was successfully carried out over a 3-day period involving 20 elementary school students aged 9–11 years. The impact of the training was measured using pretest and posttest surveys assessing three main indicators: (1) students' interest in consuming tempeh, (2) students' willingness to try tempeh in different shapes, and (3) students' perception of tempeh's taste and appearance.

Table 1. Student Responses Before and After Training

Indicator	Pretest (%)	Posttest (%)
Likes eating tempeh	35%	85%
Thinks tempeh looks appetizing	25%	90%
Willing to try tempeh shaped like characters	40%	95%
Willing to make tempeh at home with parents	20%	75%
Understands tempeh's nutritional benefits	30%	95%

The data shows a significant increase in all measured indicators. The percentage of students who liked eating tempeh rose from 35% to 85%, while those who perceived tempeh as visually appealing increased from 25% to 90%. Additionally, the willingness to try character-shaped tempeh climbed from 40% to 95%. This sharp rise in acceptance indicates that the intervention—particularly the use of character molds—was highly effective in increasing the students' interest and engagement with tempeh. Qualitative observations also revealed that students were enthusiastic throughout the mold-making process. Many expressed pride and excitement when seeing their tempeh shaped like animals, stars, or cartoon characters. Some students even asked if they could take the molds home and make tempeh with their parents. These responses demonstrate the value of hands-on, fun-centered learning in influencing children's dietary choices.

Figure 1 . Step to Making Tempeh in Character Molds

DISCUSSION

The results of this study support previous findings that visual attractiveness plays a critical role in food acceptance among children. As noted by Martens et al. (2019), children's food preferences are not only based on taste but also on presentation. The character molds used in this training aligned with these findings by transforming a plain-looking food into a playful and appealing product, thereby increasing children's willingness to try and consume it. The increased knowledge about the nutritional benefits of tempeh also contributed to behavior change. Before the training, only 30% of students were aware that tempeh was a good source of protein. After the intervention, 95% recognized its health benefits. This improvement is consistent with research by Liu et al. (2020), who found that experiential food education can significantly improve children's food literacy and health-related behaviors.

Additionally, the strong increase in willingness to engage in tempeh preparation at home (from 20% to 75%) suggests that the training had an empowering effect on students. Chu et al. (2013) assert that involving children in meal preparation activities increases their sense of autonomy and confidence, which in turn encourages healthier eating habits. In this context, the project not only improved tempeh consumption among students but also had the potential to influence dietary practices at home. From a cultural perspective, the project contributed to preserving traditional Indonesian food culture. In an era when ultra-processed snacks and foreign fast food are dominating children's diets (Popkin et al., 2020), reintroducing local foods in innovative formats is an important strategy to maintain national food identity. The use of creative molds allowed tempeh—a culturally rich but often overlooked food—to be rebranded in a child-friendly manner.

Furthermore, the success of this activity also supports the principles of Kolb's experiential learning theory, which emphasizes learning through experience, reflection, and experimentation (Kolb, 1984). By making, observing, and tasting the tempeh they produced, students moved beyond passive knowledge acquisition to active behavioral change. The project showed how integrated learning can have lasting effects on children's attitudes and preferences. Limitations of the program include the short-term nature of the intervention and the relatively small number of participants. While the results are promising, further longitudinal studies would be beneficial to assess whether these changes in behavior are sustained over time. Additionally, future projects might involve parents more directly to extend the impact to the household level.

Figur 2 : character-shaped tempeh is an attraction for tempeh consumption in children

Overall, the intervention proved effective in increasing interest and willingness among elementary students to consume tempeh by using character molds as an innovative educational tool. The combination of fun, culture, and nutrition education provided a meaningful experience that promoted healthy eating while preserving Indonesian food heritage.

CONCLUSION

This community service program demonstrated that using character molds in tempeh-making is an effective strategy to increase elementary school students' interest in consuming tempeh. The intervention not only enhanced their knowledge about the nutritional value of tempeh but also significantly improved their willingness to try and prepare tempeh at home. The visually attractive presentation of tempeh, combined with a participatory and hands-on learning approach, succeeded in transforming students' perceptions of this traditional food. The program's design integrated cognitive, affective, and psychomotor domains of learning, creating a holistic educational experience for the participants. Moreover, the activity fostered a stronger connection between children and Indonesian food heritage, which is critical in the current era of increasing processed food consumption. By making traditional food fun, relatable, and engaging, educators and community facilitators can inspire positive dietary behavior changes in young generations.

Although the results are promising, future initiatives should consider expanding the participant pool and implementing follow-up assessments to measure long-term behavioral change. Involving parents and integrating similar food-based activities into the regular school curriculum could further enhance the impact. Overall, this program highlights how culturally grounded, creative, and participatory education can contribute meaningfully to child nutrition and national food culture preservation.

SUGGESTION

Future programs should consider scaling up and incorporating family and school-level involvement to achieve a broader and more sustainable impact.

THANK-YOU NOTE

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