p-ISSN 2614-8250, e-ISSN 2614-5677
https://journal.uniku.ac.id/index.php/IJLI

p-ISSN: 2614-8250 e-ISSN: 2614-5677
Indonesian Journal of Learning & Instruction
Sekolah Pascasarjana Universitas Kuningan, Indonesia

THE EFFECT OF USING EXPERIMENTAL LKPD ON IMPROVING THE ABILITY TO OBSERVE AND BEHAVIOR IN CHOOSING SNACKS IN STUDENTS OF SMP NEGERI 1 GEMPOL

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APA Citation: Veronica, A., Abidin, Z., & Hindriana, A. F. (2025). The effect of using experimental LKPD on improving the ability to observe and behavior in choosing snacks in students of SMP Negeri 1 Gempol. *Indonesian Journal Learning and Instruction*, *8*(1), 33-40. 10.25134/ijli.v8i1.11921

Received: 11-01-2025 Accepted: 17-02-2025 Published: 30-04-2025

Abstract: This research aims to analyze the effect of using the Student Worksheet (LKPD) for food additive content experiments on enhancing observation skills and healthy snack selection behavior of eighth-grade students at SMP Negeri 1 Gempol. The research employed a quantitative approach with pre-test post-test control group design, supported by a Mixed Methods concurrent embedded approach where qualitative data deepened the understanding of quantitative results. The experimental LKPD was developed using the ADDIE model. Data were collected through observation skills tests, healthy snack selection behavior questionnaires, and semi-structured interview. Statistical analysis included N-Gain scores and Mann-Whitney U tests. The results indicate that the experimental LKPD significantly improved students' observation skills ($p < 0.05$, N-Gain 0.45). While the LKPD also positively influenced healthy snack selection behavior (N-Gain 0.14), the correlation between observation skills and behavior was weak and not statistically significant ($r=0.207$, $p=0.148$). This suggests that while cognitive skills improved, behavioral change is influenced by more complex factors. The study highlights the effectiveness of experimental LKPD with Diagram Vee in fostering scientific process skills and conceptual understanding, but also point to the need for holistic interventions to drive consistent behavioral changes related to food safety.
Keywords: *experimental LKPD, observation skills, healthy snack selection behavior, diagram vee*

INTRODUCTION

Students' habit of purchasing snacks at school canteens is a common phenomenon among students (Yasir, 2024). However, concerns about food safety, particularly the threat of hazardous additives in school snacks, are growing. For students who do not eat breakfast, snacks often become their first intake of the day. Unfortunately, many snacks sold are unhygienic and contain food additives that do not comply with regulations, which can harm health (Pribadi et al., 2022). A concerning 2020 BPOM report indicated that 6% of 10,681 food samples tested contained borax, a dangerous substance often found in snacks (BPOM RI, 2021), a concerning finding giveb students' snacking habits at school and the potential health risks the face.

Students decisions in choosing snacks are influenced not only by the charecteristics of the food itself but also by internal factors such as knowledge, feelings, and thoughts, as well as external factors like social and economic environment (Shepherd, 1999). A lack of nutritional knowledge (Notoatmodjo, 2014) can makes it difficult for students to differentiate between healthy and unhealthy snacks, compounded by peer influence or advertisements that often promote less healthy snacks. This situation further exacerbates food safety issues in the school environment.

To investigate food safety issues in the school environment more deeply, preliminary data collection was conducted through a survey of students. Based on initial data collected over the past two months (October to December 2024) from 100 ninth-grade students revealed that 5% of students did not pay attention to expiration dates on packaged foods, 45% of students had insufficient knowledge regarding healthy snacks, and 10 % of students had a negative attitude because they still consumed snacks with striking colors and flavors. These findings highlight the need for effective aducational interventions to raise students' awarness of the dangers of food additives.had limited knowledge about healthy snacks, and 10% exhibited negative atitudes by consumsing snacks with unnatural colors and flavors. These findings underscore the urgen need for effective educational interventions to increase student awareness of the dangeres of food additives.

Science education, especially biology, play a crucial role in shaping scientific thinking and students' ability to understand natural phenomena around them. Ideally, biology learning should not only focus on memorizing concepts but also involve direct experiences that strengthen theoretical understanding and develop scientific process skill (Wadu et al., 2024). One of the learning methods proven effective in facilitating these direct experiences is practical work. Practical work allows students to be actively involved in the scientific process, observe phenomena, test hypotheses, and draw their own conclusions, thereby improving material comprehension and experimental skills (Lufri et al., 2020; Rismawati et al., 2016)

However, the reality in the field shows that the implementation of practical work in schools still faces various challenges, especially related to the availability and quality of Student Worksheet (LKPD). Many conventional LKPDs are still found to contain only summaries of material and exercise questions that emhasize memorization, without emphasizing the application of contexts (Istiqomah, 2021). This leads to students' shallow understanding of theory and less relevance to daily life. Partical activities in the laboratoty or calssroom are sometimes not connected to students' experiences outside the school environment, because LKPDs do not explicitly bridge the gap between theory learned and practice performed (Lestari et al., 2018). Research (Prabandari et al., 2020) also shows that many LKPDs do not meet good standards, including in terms of usage instructions, practical steps, and questions that stimulate problem-solving. As a result, students have difficulty understanding the connection between, their learning motivation decreases, and ultimately hinders their analytical, critical, and creative abilities in solving daily problems.

This situation indicated the need for the development of more innovative LKPDs, one of which is through activity-based learning such as the use of experimental/practical LKPDs. A good LKPD can make practical work a meaningful learning activity, facilitating students in building knowledge, value, and skill. Educational step sre needed to raise awaeness and prepare for the dangers of food additives (borax, formalin, and rhodamine B) found in school snack, one way is to underdtand methods for identifying them. Understanding the content of substances in food and their health effects is crucial, and for that, effective learning methods are needed. one solution to evercome these problems is to design LKPD (student Worksheet) that emphasize practical activities relevant to students' lives. Ekpsrimen-based learning encourages students to actively seek information, experiment, and solve problems related to real life, so it is hoped that the use of experimental LKPD can be more effective in connecting theory and practice.

Various previous studies have developed approaches to improve the effectiveness of LKPD in education, which are relevant to the development of this experimental LKPD: (1) socio-scientific approach, has proven effectives in learning material to contextual issues in students' environments (Putriana et al., 2020). (2) Guided inquiry-based LKPDs is consideres valid and effective in improving student learning outcomes in practical activities (Masdi & Pratama, 2022;Efendi & Ahyanuardi, 2021). (3) Constuctivist-based LKPD in thematic learning improves critical thinking skills with high validity and practicality (Septian et al., 2019).

The use LKPD based on the Vee diagram (Hindriana, A.F., 2023) has the potential to help in developing biological valuation, knowledge internalization, perception, scientific processes, as well as transformation and analysis skill. This is supported by Hindriana (2020), who showed that the Vee Diagram can minimaze student errors in designing experiments due to clear conceptual and methodological stage guidance. Furthermore, Rahmadatillah et al., (2021) also highlighted the positive impact of well-designed LKPD on student learning outcomes, including increased engagment and concept mastery.

p-ISSN 2614-8250, e-ISSN 2614-5677
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Various approaches undertaken by these researchers have shown effectiveness in linking theory with practice. These approaches not only improve academic skills such as literacy and numeracy but also critical thingking skills in problem-solving. The integration of technology in LKPD can also increase students' interest and learning outcomes. Therefore, it is specifically necessary to develop experimental LPKD by integrating the Vee Diagram as its reference. This approach is expected to improve scientific process skills, especially observation skills, and also shange negative behavipr instudents in choosing snack at school based on experiences gained from learning activities through practical work, an area not widely explored in previous research regarding concrete behavioral changes.

Base on the description of the background problem above, the following problems can be identified: (1) How effective is the use of experimental LKPD on food additive content in improving observation skills and healthy snack selection behaviour of eighth-grade students at SMP Negeri 1 Gempol. (2) Is there an influence of experimental LKPD on food additive content on improving observation skills and healthy snack selection behavior of eighth-grade students at SMP Negeri 1 Gempol. (3) What is the response of eighth-grade students at SMP Negeri 1 gempol to the use of experimetal LKPD on food additive content?

METHOD

The research was conducted in the eighth grade at SMP Negeri 1 Gempol, Cirebon. The research was carried out from December 2024 to May 2025, covering the proposal submission stage to the report writing stage. The research adopts a Mixed Methods Concurrent Embedded approach, where quantitative and qualitative data are collected simultaneously. Quantitative data seves to deepen and explain the understanding of quantitative results. The main research design used is the Pretest-Posttest Control Group Design, aiming to test the effect examine the effect of using experimental student worksheets (LKPD) on food additives on observation skills and healthy snack-choosing behavior of students.

The development of the experimental LKPD, which is the main intervention this research was carried out using the ADDIE development model (Analysis, Design, Develop, Implement, Evaluate). The ADDIE model was developed by Dick and Cary (1966) and Smith & ragab (1999) to design learning systems. In this research, ADDIE model ensures the structured and systematic development of LKPD, from needs analysis to product evaluation and its effectiveness.

The stage og LKPD development using the ADDIE model include: (a) analysis, this stage involves observations and interviews with eighth-grade science teachers, as well as curriculum analysis (teacher books, student books, and Learning outcome) to identify needs and characteristics. the focus is on finding weaknesses of conventional LKPDs and the need for more practical and relevant material. (b) Design, based on the analysis results, this design stage focuses designing the framework of the experimental LKPD, emphasizing scientific values and real-life relevance. The LKPD is designed using digital platfoms such as Canva. (3) Development, at this stage, the initial LKPD product is created based on the designed framework, including the integration of the Vee diagram as a reference. Assessment instruments (observation skills test and healthy snack selection behavior questionnaire) and teaching module are also developed. These products then undergo content validation by language experts, material experts, and peer reviewers to ensure their suitability and quality (with expert validation score of 90.67-94 % indicating an "excellent" category). Feedback from validation is used to revise the LKPD.

To ensure the reability of the instruments, a pilot study was conducted on a group of students who were not the main research subjects. The reliability test results show that the observation skill test instrument (24 item) has a Cronbach Alpha of 0.839, indicating very good reliability. The healthy selection behaviour (20 item) has a Cronbach's Alpha value of 0.740, indicating good reliability.

(4) Implementation, after revision based on the small-scale trial, the experimental LKPD was implemented in a large-scale trial involving 50 eighth-grade students at SMP Negeri 1 gempol. Student were randomly divided into an experimental group (using the experimental LKPD) and a control group (using conventional learning methods). The independent variable was the use of LKPD, while the dependent variables were students' observation skills (measured by tests) and healthy snack selection behavior 9measured by questionnaires). Both instruments were administered as pre-test and post-test. In the rendomization process, although students were randomly assigned, significant differences in pre-test score were found between the experimental and control group for observation skills (mean pre-

test of experimental group 53.40, control 41.60). Although randomization was performed, the authors acknowledge the potential for initial section bias. To control for this baseline difference in post-test anaysis, N-gain score analysis was used, and the use of ANCOVA will also considered in-depth analysis to futher control this covariate. (5) Evaluation, quantitative and qualitative data are integrated during the evaluation and interpretation phase. Quantitative data are analyzed using statistical tests, while qualitative data (from semi-structured interviews with a purposive sample from the experimental group) undergo thematic analysis. This integration aims to provide a more comprehensive picture. Where qualitative data explains and elaborates on quantitative findings, for example by identifying factor contibuting to skill improvement or issues during implementation. This methodolgy ensures valid, reliable, and-depth data collection to answer research questations comprehensively.

RESULTS AND DISCUSSION

The research results indicated an increase in both observation skills and healthy snack selection behaviour in both grouph, with a more significant improvement observed in the experimental group. A comparsion of pre-test and post-test scores, as well as N-Gain values for both variables.

Table 1. *Comparison of observation ability of control and experimental classes*

Observation skills	Pre-test	Post-test	N-Gain
Experimen	53.40	75.20	0.45
Control	41.60	62.40	0.33

It shows that although the average pre—test observation skill score in the experimental group was slightly higher than the control group, both group experienced an increase after the intervention. The experimental group showed a greater improvement, reaching an average post-test score of 75.20, significantly surpassing the control group which reached 62.40. this improvement is further comfirmed by the N-Gain analysis, where the experimental group showed an N-Gain value of 0.45, while the control group showed 0.33.

Table 2. *Comparison of snack selection behavior of control and experimental groups*

Behavior	Pre-test	Post-test	N-Gain
Esperimen	34.00	43.68	0.14
Control	38. 16	41.16	0.05

Regarding snack selection behavior, the experimental group showed a slinghtly lower pre-test score compared to the control group. However, post-test intervantion, the experimental group's score significantly increased to 43.68, surpassing the control group (41.16). The n-Gain value for snack behavior was also in the experimental group (0.14) then the control (0.05) although both improvements were still categorized as low.

Based on the implications of the normality and homogeneity test findings (which indicated that parametric assumption were not met or ideal), further statistical analysis to compare post-test data between the experimental and control classes, for both observation skills and healthy snack selection behaviour, was conducted using the Mann-Whitney u test. This non-parametric test was shosen because it is suittable for comparing two independent group when are not normally distributed or the sample size is not large, and to control for potential bias due baseline differences in the pre-test that were previously identified.

Table 3. *Results of Menn-Whitney U observation ability*

Test Statistics[a]	
	Study result
Mann-Whitney U	174.500
Wilcoxon W	499.500
Z	-2.693
Asymp. Sig. (2-tailed)	.007
a. Grouping Variable: Class	

The analysis result Indicate that the experimental Student Worksheets (LKPD) had a significant impact on students' observational skills and healthy snack-choosing behavior. Amman-whitney U test on the pos-test for observational skills revealed a statistically significant difference (p= 0.007 < 0.005). suggesting that the experimental group demonstrated notably better observational abilities after the intervention.

Table 4. *Result of Menn-Whitney U post-test behavior of choosing healthy snack*

Test Statistics[a]	
	Choosing snacks behaviour
Mann-Whitney U	199.500
Wilcoxon W	524.500
Z	-2.202
Asymp. Sig. (2-tailed)	-.028
a. Grouping Variable: Class	

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Similary, for health snack-choosing behavior, the Mann Whitney U test ahowed a significant difference (p=0.028 <0.05), confirming that the treatment with the experimental LKPD led to significant positive changes in student behaviour.

Table 5. *Results of correlation test (Spearman's) of experimental group and control group*

Correlations					
			Observing skill	behavior	Class
Spearman's rho	Observing skill	Correlation Coefficient	1.000	.207	.331*
		Sig. (2-tailed)	.	.148	.019
		N	50	50	50
	Behavior	Correlation Coefficient	.207	1.000	.333*
		Sig. (2-tailed)	.148	.	.018
		N	50	50	50
	Group	Correlation Coefficient	.331*	.333*	1.000
		Sig. (2-tailed)	.019	.018	.
		N	50	50	50

*. Correlation is significant at the 0.05 level (2-tailed).

The positive correlation between the increased healthy snack selection behaviour and the improved ability to observe foods suspected of containing hazaedous food additives, particularly in the experimental group, indicates that the experimental LKPD intervention, which focused on enhancing the ability to observe food additives, contributed to changes in students healthy snack selection behavior. However, the observed correlation coefficien (r=0.207) was weak and not statistically significant (p=0.148>0.05).

The implication of this weak correlation is that while experimental LKPD is effective in improving observation skills as a cognitive prerequisite, achieving more comprehensive behavioral changes requires a more holistic intervention involving various supporting factors in the student's environment. This may include continuous education, supportive school policies, and active involvement from parents and community.

When linked to the domain of snack selection behavior accrording to Irwan (2017), which includes knowledge, attitudes, and practices, it can be explained that:

Increased knowledge (implicit) and attitudes; the improved ability to observe hazardous food additives in the experimental group implicitly indicates an increase in students' knowledge regarding the characteristics of unhealthy snacks. The increase in students' positive attitudes towards healthy snack choices in the experimental group also demonstrates a change in the effective dinebsion. This is highly relevant to efforts to enhance food safety in the school environment, one of which is ensuring students possess sufficient knowledge to make safe food choices (Sodimu & Okafor,2023; Peng et al.,2021)

Limited practice change; although there was an endication of a change in students' practice of selecting and consuming snacks (positive N-Giain value), the weak correlation with observation skills suggests that the translation from knowledge/attitude to practice is not yet optimal. This highlights the challenges in altering established behaviors that are influenced by naby variables.

Nuanced support for Irwan's behavioral, the experimental LKPD intervention suessfully enhanced students' knowledge and attitides regarding the potential dangers of food additives. However, to actieve more ssignificant practical changes. A more comprehensive intervention is required that not only focusses on the cognitive domain but also addresses barriers from predisposing, enambling, and reinforcing factors.

Within the context of Maslow's hierarchy of needs theory, several needs play a role snack selection, namely.

Physiological needs (hunger); the experimental LKPD does not directly alter students' hunger, but it influences the type of snacks they choose when hungry, promoting healthier options that align with the definition of food safety (Diplock et al., 2019).

Social needs, as highlighted by Widianingtyas & Dinda, (2022) peer influence is significant. The increased knowledge in the experimental group could impact group discussions and norms regarding healthy snack choices, fostering an environment where healthy options become socially accepted. However, this social influence can also hinder progress if group norms still favor less healthy choices.

Esteem and self-actualization need (implicit), as knowledge and healthy awareness increase, students may begin to value healthy snack choices as a form responsibility (esteem) and part of a healthy lifestyle (self-actualization). However, these values often compete with more pressing

needs such as social acceptance or instant gratification.

Categorized snack selection factors into internal and external (Notoatmodjo, 2003).. This study primarily focused on internal factors (students' knowledge through improved observation skills and attitudes), which then correlated with behavioral changes. Although external factors (peer influence, family culture, or avilablility of healthy snacks at school) were not manipulated, increased students' awareness (internal factor) potentially influences how they respond to these external factors, for example, becoming more resistants to temptations to buy unhealthy snacks. However, qualitative data also showed that external factors like visual appeal and availability still strongly influence choices, explaining why the correlation between observation and behavior was not very strong.

The urgency of intervention is underscored by the detrimental effects of hazatdous food additives like borax, formalin, and rhodamine B, as discussed in the literature (Kusuma et al., 2023) education through experimental LKPD is crucial for raising students awareness of these dangers, especially given the prevalence of ready to eat foods in schools (Yamin, 2020) and health issues associated with ultra -pocessed food consumption (Arrieta et al., 2014). Therefore, enhancing the ability to observe hazardous additive characteristics directly supports food safety objectives and encourages students to choose safer snacks, although additional interventions are needed to bridge the knowledge-pactice gap.

Students' qualitative responses to the esperimental LKPD indicated enhanced awareness and ability to observe hazardous food characteristics (color, smell, texture, shelf life), along with a basic understanding of additives like borax and formalin. This also prompted behavioral changes such as increased caution and selectivity in snack choices. However, students' snack shoices remain strongly influenced by external factors like common snack types, visual appeal, and availability, while nutritional content seems to be a less dominant cinsideration.

The imlementation of experimental LKPD on food additive content achieved an axcellent average of 88 % execution, consisntent with students' positive responses, who found the experimental activities anjoyable and helpful for understanding food additives. this LKPD effectively fostered active student angagement in constructing their understanding through structured learning phases, including problem orientation (94%), investigation (88%), and analysis / evaluation (85%). This effectiveness aligns with socio-scientific (Putriana et al., 2020) guided inquiry (Masdi & Pratama, 2022); Efendi & Ahyanuardi, 2021), and constructivist (Septian et al., 2019) approaches. Futhermore, it is supported by literature highlighting the advantages of experimental LKPD in facilitating direct observation and understanding of hazardous additive dangers (Arabi et al.,2020); Hasanah, 2022), including environmental awerness through green chemistry.

CONCLUSION

This study concludes that the experimental Student Worksheets (LKPD), designed with scientific principles and the Diagram vee approach, is highly effectives in enhancing the observation skills of dangerous food additives in eighth-grade students at SMP Negeri 1 Gempol. This improvement is reflected in a statistically significant difference in post-test observation abilities and higher N-Gain values in the experimental group. Futhermore, this LKPD also positively contributed to changes in healthy snack selection attitudes (experimental group N-Gain 0.14 vs. control 0.05), alrhough the direct correlation between abservation skills and snack selection behavior was not statistically stong ($r=0.207$, $p=0.148$), suggesting that snack behavior is a more complex phenomenon influenced by various mediating factors. The effectiveness of this approach is consistently supported by empirical findings aligned with relevant literature, including scientific learning principles, the crucial role of practical work, the advantages of Diagram Vee-integrated LKPD, Science Process Skills, behavioral theory, and food safety urgency, thus making experimental LKPD a hihly recomemmended initial step for fostering essesential awareness and skills in science education.

To enhance teaching quality , it is recommended to encourage the use of experimental LKPD, especially those integrated with the Vee Diagram, in science education for food additive topics or other subjects relevant to practical work and observation skills. This also necessitates providing adequate laboratory facilities and infrastructure. Futhermore, the use of Vee Diagram-based experimental LKPD should be explored for ather science topics and subjects to test the generalizability and scalability of the entervention, while considering cost/time analysis for replication in various contexts.

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Collection methods (beyond just questionnaires) and conducting longtudinal studies are advisable to track the development of students' behavior over time. Finally, it's suggested to utilize stonger reasearch design (e.g., experimental designs with strict control) and extend the duration of interventions ti minimze potential bias and observe the long-term effects on students' observational skills and healthy snack-choosing behavior.

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