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Using fat secret application to foster student critical nutrition habits

Afifi Mutiarani, Juju Juwita, Ari Widodo*

Master of Biology Education Study Program, Universitas Pendidikan Indonesia, Dr. Setiabudi street No.229, Isola, Sukasari, Bandung City, West Java, indonesia 40154

*Corresponding author: widodo@upi.edu



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ABSTRACT

Obesity is a global health problem that requires education-based solutions. This study aims to provide students with critical habits in choosing food through biology learning based on the FatSecret application on digestive system material. The research method used a pre-experimental approach with a one-group pretest-posttest design, involving 29 grade XI students. The research instrument was a questionnaire of students' awareness of healthy eating patterns, which is based on eight points of recommendations from the Ministry of Health, as well as a questionnaire of students' responses to learning. The results showed that the majority of students experienced positive changes in healthy eating habits after learning, with 50.6% of students showing an increase in critical awareness. The FatSecret app proved effective in helping students record and analyze daily food consumption data. A total of 62% of students stated that the learning helped them plan a healthy diet, while 75.9% felt more aware of their food consumption. However, there were challenges such as students' difficulty in developing realistic action steps and limited understanding of nutrition. This activity confirms that technology integration in biology learning can foster students' critical habits in choosing food, with recommendations for improvement in action planning assistance and strengthening understanding of nutrition concepts.



INTRODUCTION

Obesity has become an increasingly pressing global health problem. The main causes of obesity are unhealthy diet, lack of physical activity, and environmental factors that influence eating habits (Anagnostopoulou, 2023; Nury et al., 2022). Research shows that obesity not only leads to a reduced quality of life but also increases the risk of various chronic diseases such as heart disease and diabetes (Medeiros et al., 2022). In addition, obesity can worsen health conditions in individuals with congenital heart disease, adding to the burden on the global health system (Anagnostopoulou, 2023).

In Indonesia, the prevalence of obesity in adolescents continues to increase. Riset Kesehatan Dasar (Riskesdas) data shows that the prevalence of obesity in adolescents increased from 7.5% in 2013 to 9.5% in 2018 (Badan Penelitian dan Pengembangan Kesehatan, 2018). This condition increases the risk of chronic diseases such as diabetes mellitus, hypertension, and coronary heart disease (Josephine et al., 2023). Various innovations have been implemented to tackle obesity, such as public health campaigns, the use of calorie-tracking apps, and government policies that support healthy eating (Medeiros et al., 2022).

In Indonesia, the government through the ministry of health has launched programs such as the 'Gerakan Masyarakat Hidup Sehat (Germas)' and 'Isi Piringku' to reduce obesity rates by educating about healthy eating and active lifestyles (Direktorat Jenderal Pencegahan dan Pengendalian Penyakit, 2021; Pemerintah Indonesia, 2014, 2017). There are eight main points related to a healthy diet a habit of consuming balanced nutritious food to maintain a healthy body, prevent disease, and fulfill daily nutritional needs. The eight points include (1) eating nutritious foods: it is important to consume five food groups, namely staple foods, side dishes, vegetables, fruits, and beverages; (2) reducing sugar, salt, and oil, limiting consumption of these ingredients prevents health risks such as obesity and cardiovascular disease; (3) make breakfast a habit: breakfast meets 15-30% of daily nutritional needs and increases productivity; (4) meet body fluid needs: drink at least 8 glasses of water a day to maintain hydration; (5) increase protein intake: important for the formation of body tissues and can help with weight loss; (6) consume good fats: unsaturated fats are beneficial for heart health and reduce the risk of stroke; (7) choose complex carbohydrates: an energy source rich in fibre, vitamins, and minerals; (8) consume milk and dairy products: rich in calcium and probiotics to support digestive health (Pemerintah Indonesia, 2014).

Understanding aspects such as balanced nutrition consumption, sugar and salt restriction, and complex carbohydrate selection, students are expected to develop critical habits that support decision-making on food consumption. However, the implementation of programs such as 'Germas' faces various challenges, including limited resources, policy support, and changes in community behaviour, especially in terms of fostering a critical culture in determining the food consumed (Arif et al., 2020; Manurung et al., 2024; Nurchandani et al., 2024).

One of the steps to fostering a critical habit of eating can be through education. Based on research, biology education in the future must fulfil several aspects, namely being able to solve problems that students feel (problem-based), meaningful (reasoning), related to technology, problems originating from the student's environment (local), and collaboration (partnership). Obesity as a global issue can be facilitated through learning that meets these criteria. With this approach, students can be guided to understand and overcome the problem of obesity, while developing healthy eating habits and critical thinking in choosing food (Andrews et al., 2023; Gardner & Belland, 2017; Harahap et al., 2023; Julita et al., 2022; Suwono et al., 2017).

Content about food substances and nutrition is part of the biology learning material of the digestive system (BSKAP, 2022). The existence of this content can be one of the means to foster a deep and critical understanding of food for students. However, this material often focuses on theory and provides less space for students to practice their understanding of choosing healthy food. Based on confirmation with students and teachers, it is known that previously teachers did not relate directly to students' diets, so it did not generate high curiosity and interest from

students. Research shows that personal interest, curiosity, and the inner need to acquire knowledge are the main drivers of engagement in certain activities (Nikolić-Vesković, 2023).

This fact raises the need for learning that contains aspects of future learning. One of the things that can be done as an effort to foster student awareness related to critical habits of choosing food consumed is to teach content about food substances and nutrients while involving students in daily food consumption recording activities. Many studies have shown that experiential learning approaches have proven effective in increasing students' awareness of the importance of a healthy diet (Allirot et al., 2018; Doumit et al., 2016; Medeiros et al., 2022; Nury et al., 2022; Ulfa & Perdana, 2022).

However, recording and analyzing food consumption independently is often constrained because students have difficulty calculating and recording nutritional values accurately (Vitale et al., 2023). So support is needed to make it easier for students to record the food consumed. Research shows that application-based nutrition education has the potential to increase student awareness of healthy eating patterns (Habibie et al., 2022). One application that can be used is the FatSecret application. This FatSecret application facilitates students in collecting data related to food consumption and nutrients in their food. The data collected can be data that is then analyzed by students. However, research related to the use of this application in biology learning, especially fostering critical habits in nutrition consumed by students is still limited. That is the background of this study which aims to foster critical habits on the nutrients consumed by students through FatSecret application-based learning in Digestive System content.

METHODS

This study used a pre-experimental one-group pretest-posttest design approach. This study aims to foster critical habits in nutrition consumed by students through FatSecret application-based learning in Digestive System content. The research sample was 29 students of class XI. This sample size is close to the average sample size recommended for simulation-based education research, which is 30 students, with a minimum recommendation of 24 participants (Besekar et al., 2024).

The instrument used to measure students' critical habits in choosing food consumed is a student awareness questionnaire, compiled based on eight points of healthy eating recommendations from the Kementerian Kesehatan RI. This questionnaire is designed to evaluate the extent to which students understand and apply the principles of a healthy diet, including the consumption of nutritionally balanced foods, the restriction of sugar, salt, and fat, as well as the habit of consuming foods that support the health of the body, this questionnaire is filled in by students a week after the implementation of learning. Research revealed that to reliably classify individuals based on nutrient intake, seven days of record-keeping is required (Hartman et al., 1990). In addition, a student response questionnaire to the implementation of biology learning using the FatSecret application was also used to measure the success of learning activities to foster critical habits in students in choosing food filled in by students after the learning was completed. The data obtained is processed by calculating the percentage change in student categories based on the given indicators.

RESULTS AND DISCUSSION

Changes in students' critical habits in determining the food consumed were obtained from the Student Awareness of Healthy Eating Questionnaire. This questionnaire was assessed one week after the lesson was conducted. The data was then processed to see the percentage of categories of students who experienced changes in habits. The results can be seen in Figure 1.

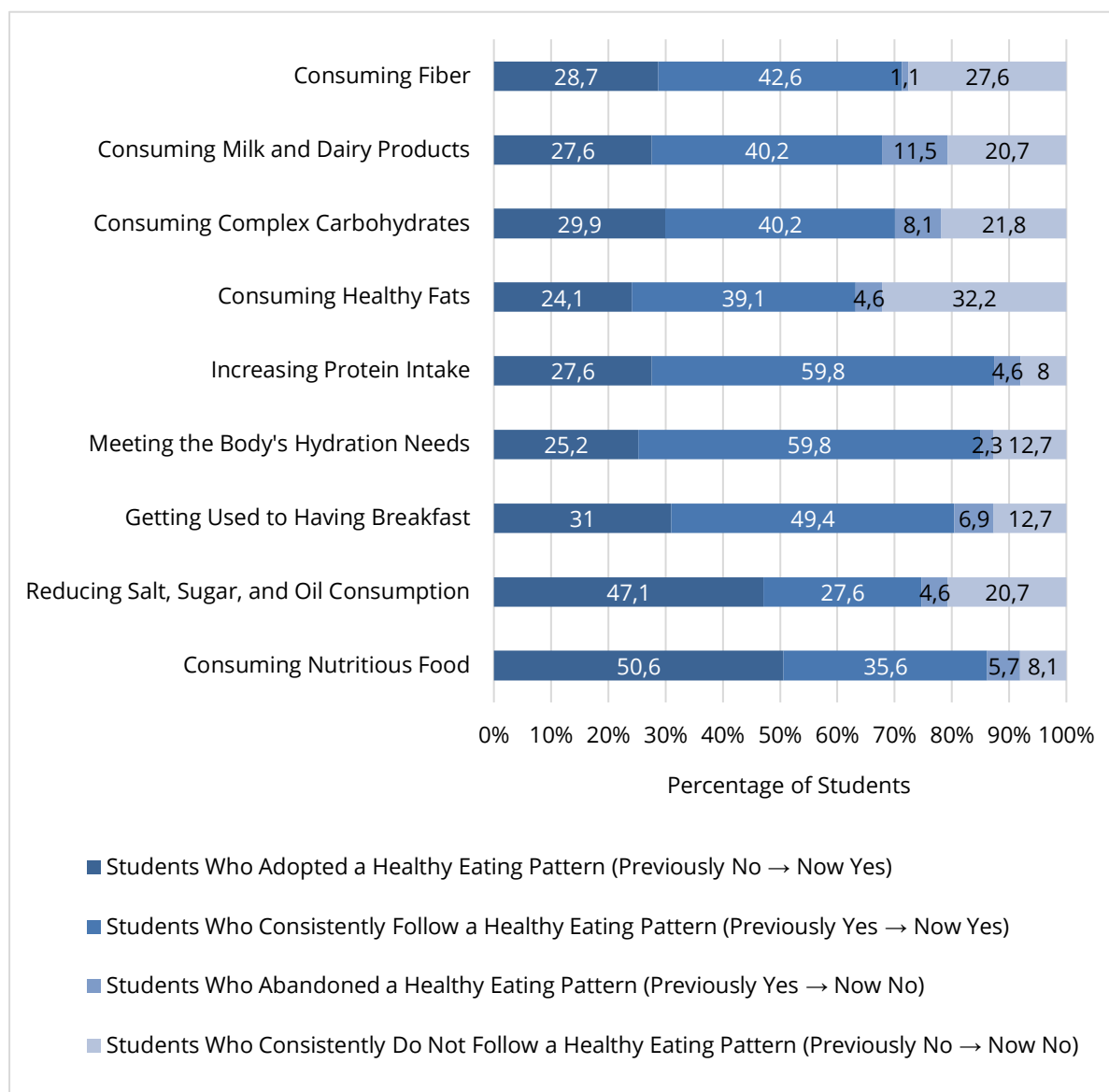


Figure 1. Comparison of categories of students who practice healthy eating habits according to the Kementerian Kesehatan RI's recommended indicators

Successful learning

The results of the data analysis show that the majority of students do and consistently perform healthy eating habits after participating in FatSecret app-based learning. Based on the results of the analysis, most students showed positive changes in healthy eating habits after participating in FatSecret app-based learning. A total of 50.6% of students showed positive changes in healthy eating habits. This group shows the direct impact of learning. The meal analysis activity encourages students to be more critical of the importance of consuming nutritious food. Figure 2 shows that 62% of students strongly agreed that the lesson helped them plan a healthier diet

based on data analysis and 75.9% of students strongly agreed that the lesson helped them be more aware of their diet. The majority of students showed positive results indicating the success of this approach in improving critical food choice habits. The increased awareness can occur because students feel directly involved in the learning process, which is not only theoretical but also practical. By recording, monitoring and analyzing their diet using the FatSecret app, students gain hands-on experience that motivates them to evaluate their daily diet.

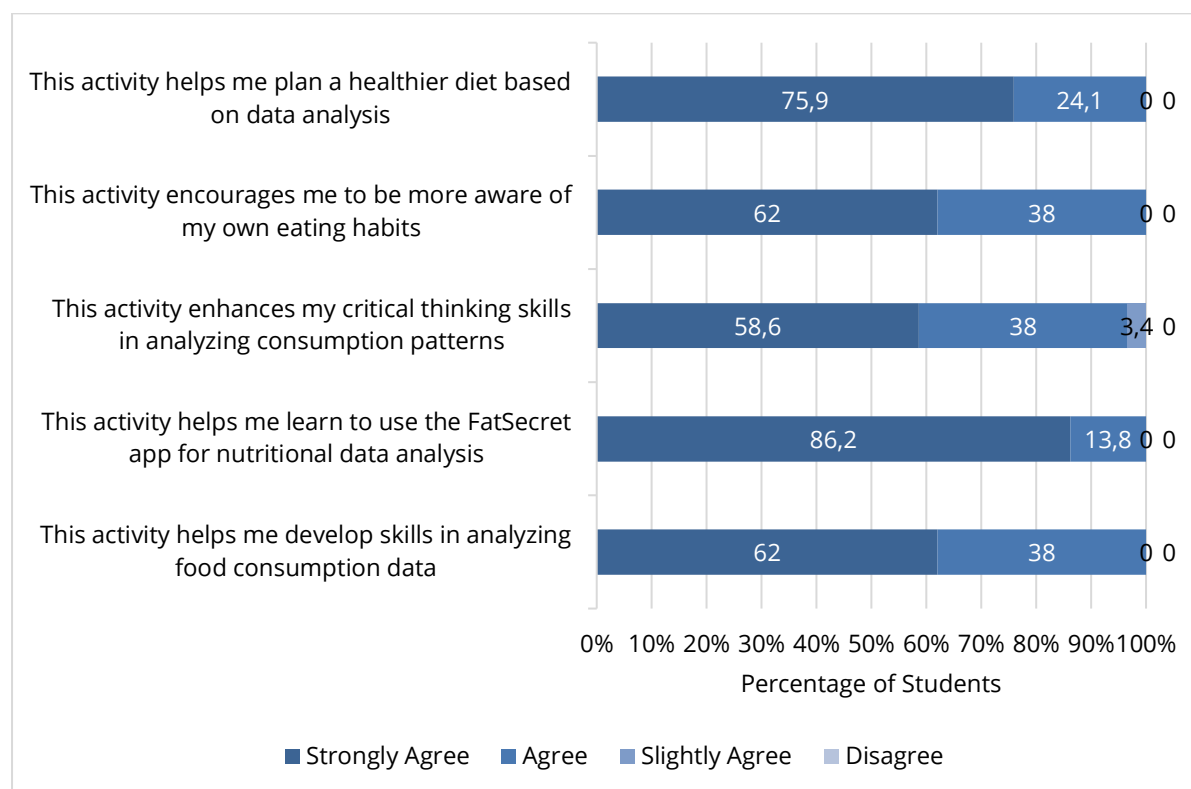


Figure 2. Student response questionnaire on the implementation of biology learning

The use of the FatSecret application is an innovation that makes students more interested and involved in the learning process compared to traditional learning methods. Previously, teachers only used simple technology such as PowerPoint in classroom learning, so the introduction of a new application was an interesting experience for students. Figure 2 shows that 86.2% of students agree that this activity helped them learn to use the FatSecret application to analyze daily nutritional data.

By recording, monitoring, and analyzing their diet using the FatSecret application, students gain first-hand experience that motivates them to evaluate their daily diet. These findings are in line with research that states that the use of gadgets in the educational process can increase students' motivation to learn, encourage involvement in creative activities, and increase interest and honesty in completing assignments (Gniezdilova, 2021). The use of the FatSecret application in biology learning, which students had never done before, provided new challenges that fostered students' interest in learning and activeness during the learning process.

This application also makes it easier for students to analyze their daily journals. Based on the results of the daily journal in Figure 3, students are best at analyzing their carbohydrate, fat, and protein consumption patterns. This is thought to be because the FatSecret application presents carbohydrate, fat, and protein consumption data in the form of graphs, tables, or numbers that are easy to read and understand.

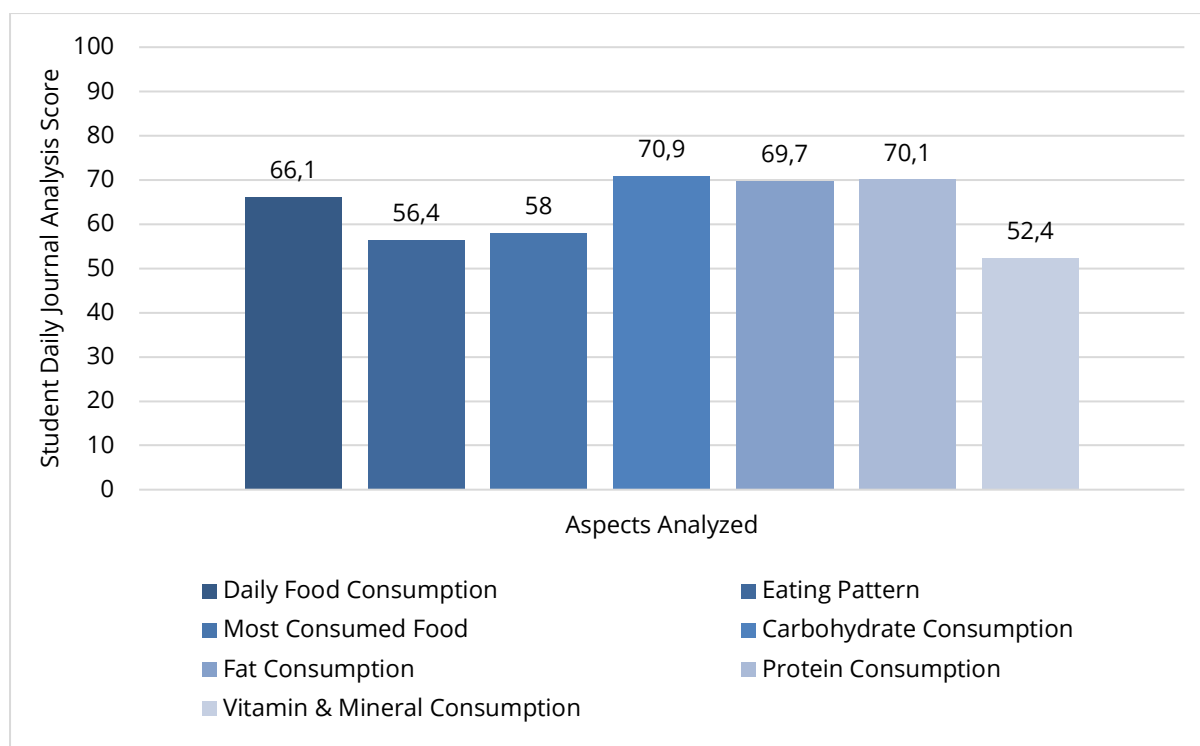


Figure 3. Student response questionnaire on the implementation of biology learning

The graphs, tables, or numbers on the fat secret application shown in Figure 4 make it easy for students to connect data from the application with the knowledge they have already learned.



Figure 4. Display of nutritional information of food consumed

Research shows that data visualization can improve students' understanding and analytical skills by presenting information graphically, which facilitates data interpretation and analysis (Harsh et al., 2019; Hsu et al., 2022). This finding shows that the use of digital tools such as FatSecret can improve students' analytical skills, especially in the context of macronutrients. This is also supported by the statement that 62% of students admit that this learning helps students develop the skills to analyze their food consumption data. With an easy-to-understand visual display, this application can be an effective tool for introducing critical thinking skills in analyzing food consumption data.

The improvement in the critical habit of choosing food is also because students feel directly involved through the skill of analyzing food consumption data. The fact that 58.6% of students stated that this learning activity helped students think critically in analyzing food consumption patterns is proof that learning with nutritional analysis strengthens students' critical habits in choosing food. In addition, this is also reinforced by the follow-up of developing an action plan based on problems found in the diet analysis. Research shows that involving students in developing action plans can foster critical thinking habits in food choices (Medeiros et al., 2022; Nury et al., 2022; Ulfa & Perdana, 2022). Figure 5 shows the implementation of the action plan designed by students in learning.

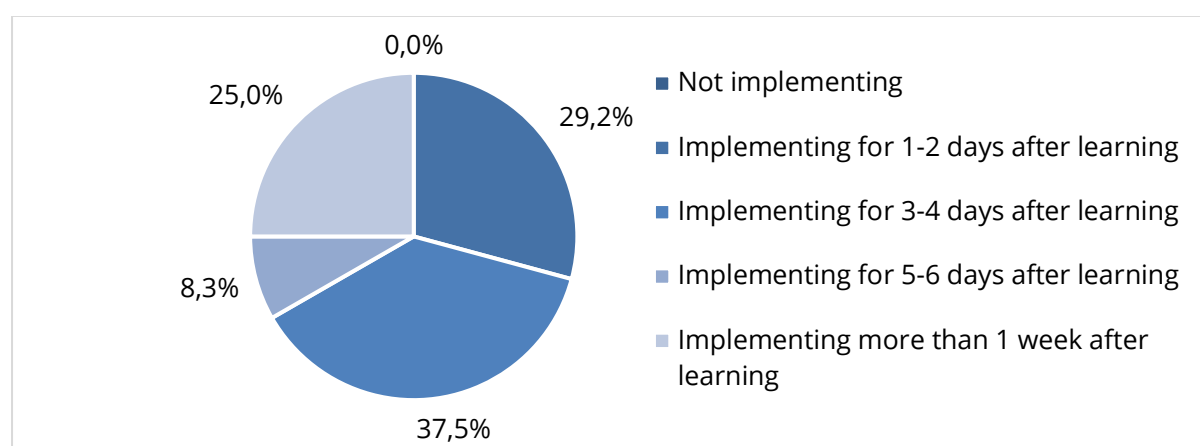


Figure 5. Display of nutritional information of food consumed

Based on Figure 5, shows that even though the intensity of implementing the action plan is different for each student, all students still carry out the action plan. This reflects that this learning is not only theoretical but also practical, because it can encourage students to apply what they have learned in their daily lives. This is also supported by the fact that 63% of students strongly agree that this learning encourages students to be more aware of a healthier diet. The follow-up actions taken by students to improve their diet based on the analysis they conducted during the learning process further reinforced the positive changes in their habits.

The growing awareness after this learning encourages students to think critically about food choices while building a commitment to consistently implement a healthy diet. Learning directly related to students' diets arouses curiosity and high interest from students. This is also demonstrated by the many questions during the learning. This phenomenon is in line with research that states that personal interest, curiosity, and the inner need for knowledge are the main drivers of involvement in certain activities (Nikolić-Vesković, 2023).

A total of 35.6% of students consistently eat a healthy diet. Students in this category show the sustainability of healthy habits that may have been formed previously. The FatSecret application helps them to stay consistent by providing reminders and nutritional information in real time. This is following the statement of students who still use the FatSecret application to monitor their calories. Figure 6 shows that 20% of students still use the FatSecret application. Students who still use this application are part of the group that consistently eats a healthy diet.

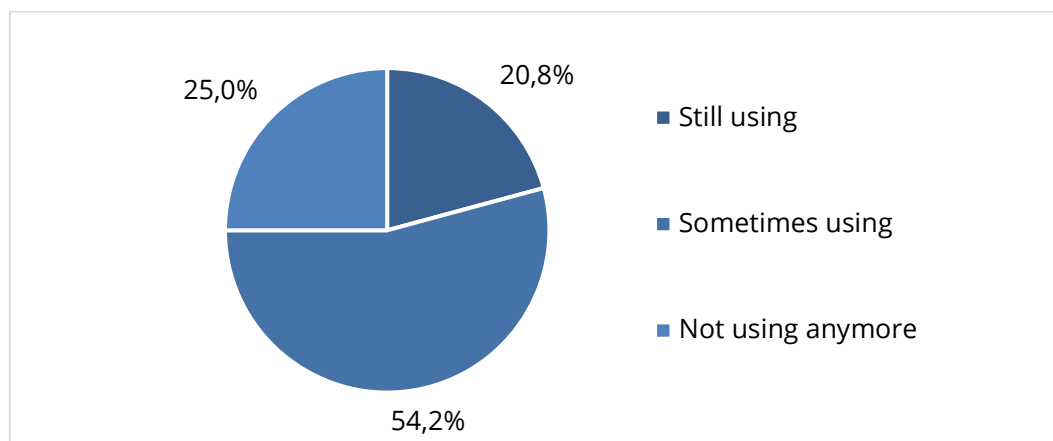


Figure 6. Students who still use the Fat Secret application

On the whole, these positive results reflect that a technology-based approach such as the use of the FatSecret application can be a tool that can foster students' critical thinking habits in choosing food and encourage the implementation of a healthy diet.

Challenges in Learning

On the other hand, 4.6% of students abandoned healthy habits (used to do → now don't), and 8.1% of students still do not engage in healthy habits (didn't use to → now don't). This negative trend indicates obstacles that need attention. Based on previous findings, several challenges are expected to have contributed to these results. Learning with FatSecret involves students in designing concrete actions to improve their diet. However, the results show that students often find it difficult to design action steps that are realistic and relevant to their conditions. Figure 7 shows the depth of students' answers in analyzing and designing an action plan.

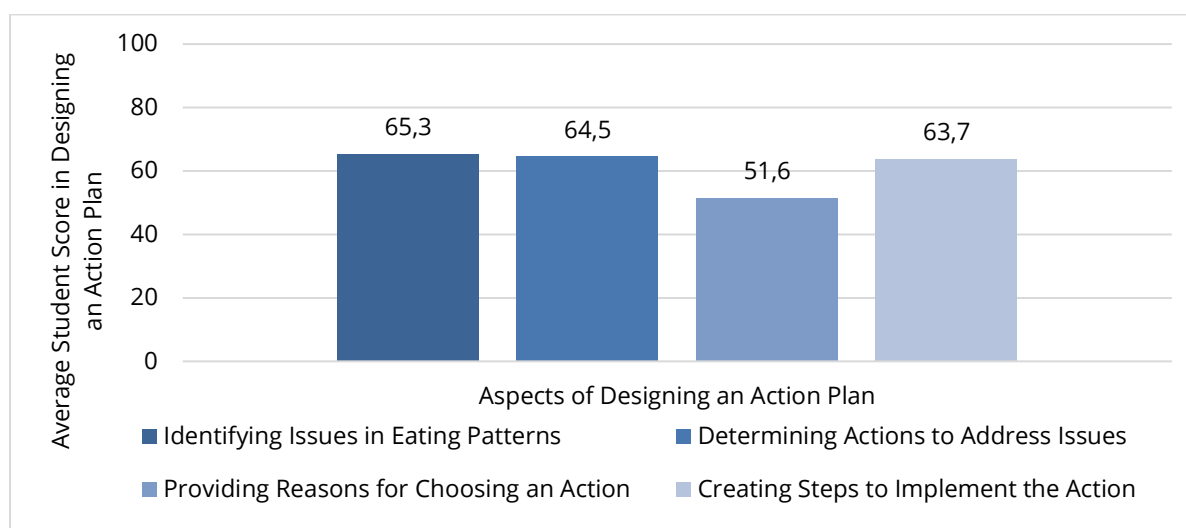


Figure 7. Results of students' ability to design an action plan

Students show the lowest ability in the aspect of providing reasons for choosing an action. This indicator requires in-depth analytical skills, including relating food consumption data to nutritional knowledge and understanding the impact of the action. This ability is at the level of evaluation or decision-making in Bloom's taxonomy, which is more complex than simply identifying problems or formulating action steps. According to research, instilling analytical thinking skills in biology learning can improve students' ability to make rational decisions, but it is

necessary to balance the teaching of material with the development of thinking skills (Sukma et al., 2021). Giving reasons requires a deep understanding of nutritional concepts, including the role of macro and micronutrients in the body, as well as the long-term impact of certain eating patterns. If this understanding is lacking, students are likely to have difficulty explaining the reasons behind their choice of action.

Students' diets are not entirely under their control. Some of the students' statements addressed the obstacles encountered during the implementation of the action plan, including:

"The obstacle may be the difficulty of consistently carrying out these actions, then food ingredients that contain enough protein, fat and others are not always available."

"The enthusiasm or desire to implement the plan is reduced."

"Too much expense to provide for daily needs."

These statements from students indicate that there are external factors that influence students' eating patterns. Factors such as family habits, access to healthy food, and food preferences can also influence these results. Studies show that adolescent students' diets are influenced by family factors (such as parental education and family support), social factors (such as peer and media pressure), environmental factors (such as food availability and school policies), and individual factors (such as busyness to taste preferences) (Abraham et al., 2018; Dalky et al., 2017; Liu et al., 2021).

Connection with FatSecret Learning

Learning with FatSecret provides a practical framework for students to analyze their diets. However, the full implementation of this learning still needs some improvement, especially in:

1. Action Plan Assistance

Guide students in developing more concrete and realistic plans. Research shows that making choices, remembering choices, and seeing others make choices can encourage individuals to think more analytically (Savani et al., 2017). Critical thinking, especially in explaining reasons, is a skill that needs to be explicitly trained. If this exercise is not given systematically, students will have difficulty articulating the reasons behind their decisions.

2. Strengthening Nutritional Understanding

Although FatSecret can help provide nutrition information, students may still have difficulty understanding basic concepts, such as the importance of macronutrient balance or the impact of sugar and saturated fat consumption. This is reinforced by the results of the analysis of students' daily journals, which on average range from 52 to 71. This score is still less than half of the maximum score for journal analysis. This indicates that some students need reinforcement in understanding the basic concepts of macro- and micronutrients, as well as the impact of their consumption. This lack of understanding can also affect students' ability to analyze their diet. This statement is also supported by research that shows nutritional literacy significantly predicts healthy eating behavior in college students, mediated by factors such as background, interpersonal, environmental, and macrosystem factors (Lai et al., 2021). Another study also showed that, after attending the lecture series, adherence to guidelines regarding fruits and vegetables increased significantly, as did awareness of healthy nutrition and the percentage of students with low-risk lifestyle habits (Helbach et al., 2023).

CONCLUSION

This study shows that learning to analyze daily food journals with the help of the FatSecret application can foster critical habits in students when choosing what to eat. This is evidenced by the fact that the majority of students showed positive changes by starting to develop healthy eating habits and consistently following them after participating in the learning program.

The existence of groups that abandon a healthy and consistent diet shows the need for another approach to increase students' awareness of critical thinking in food choices. Researchers can consider implementing learning strategies that can help students improve their ability to provide reasons for choosing an action. For example, there needs to be an understanding of the reasons behind the chosen action, such as conducting group discussions. In addition, teachers can provide more data-based exercises, such as using food journals or daily consumption charts to make logical and measurable reasons.

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Authors' Note

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