

The Influence Of Bookzi Media And Lecture Method On Knowledge And Attitude Towards Balanced Nutrition (A Study On Fifth Grade Students Of Sdn 01 Mangga Dua Selatan Jakarta)

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ABSTRACT

School aged children are a vulnerable group to nutritional problems that may affect growth, cognitive development, and skills. One major contributing factor is inadequate knowledge of balanced nutrition. This study aimed to examine the differences and effects of Bookzi media and lecture methods on students' knowledge and attitudes toward balanced nutrition among fifth-grade students at SDN 01 Mangga Dua Selatan. A quantitative approach with a quasi-experimental design was applied. The population consisted of 116 students, with 56 respondents selected using purposive sampling. Data were analyzed using t-tests and F-tests with SPSS software. The results showed that both Bookzi media and lecture methods had significant partial effects on improving knowledge and attitudes toward balanced nutrition ($p < 0.05$). Simultaneously, both methods significantly influenced all post-test variables ($p = 0.000$). However, the increase in knowledge and attitude scores was higher in the Bookzi group than in the lecture group. These findings indicate that edutainment-based educational media are more effective in enhancing students' understanding and fostering positive attitudes toward balanced nutrition.

ABSTRAK

Anak-anak usia sekolah adalah kelompok rentan terhadap masalah gizi yang dapat mempengaruhi pertumbuhan, perkembangan kognitif, dan keterampilan. Salah satu faktor penyebab utama adalah kurangnya pengetahuan tentang nutrisi seimbang. Penelitian ini bertujuan untuk mengkaji perbedaan dan pengaruh media Bookzi dan metode ceramah terhadap pengetahuan dan sikap siswa tentang nutrisi seimbang di kalangan siswa kelas lima di SDN 01 Mangga Dua Selatan. Pendekatan kuantitatif dengan desain kuasi-eksperimental diterapkan. Populasi terdiri dari 116 siswa, dengan 56 responden yang dipilih menggunakan purposive sampling. Data dianalisis menggunakan uji t dan uji F dengan perangkat lunak SPSS. Hasilnya menunjukkan bahwa baik media Bookzi maupun metode ceramah memiliki efek parsial yang signifikan dalam meningkatkan pengetahuan dan sikap terhadap gizi seimbang ($p < 0,05$). Secara bersamaan, kedua metode tersebut secara signifikan mempengaruhi semua variabel pasca-tes ($p = 0.000$). Namun, peningkatan skor pengetahuan dan sikap lebih tinggi pada kelompok Bookzi dibandingkan dengan kelompok ceramah. Temuan ini menunjukkan bahwa media pendidikan berbasis edutainment lebih efektif dalam meningkatkan pemahaman siswa dan mendorong sikap positif terhadap nutrisi seimbang.



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INTRODUCTION

Children represent a crucial population group in the development of future human resources. According to the Law of the Republic of Indonesia Number 23 of 2022 concerning Child Protection, a child is defined as an individual under 18 years of age, including those still in the womb. During childhood, individuals experience rapid physical growth, cognitive development, and the formation of health related behaviors that may persist into adulthood. School-age children, generally aged 6–12 years, represent a particularly important stage for establishing dietary habits and healthy lifestyles (Yurni & Sinaga, 2017).

Adequate nutrition during this stage is essential to support optimal growth and development. Nutrients function as sources of energy, building blocks for body tissues, and regulators of metabolic processes. Moreover, sufficient nutritional intake contributes to children's cognitive development, learning capacity, and overall health status (Santoso & Wahyuni in Muchtar et al., 2022). Therefore, ensuring balanced nutrition among school-age children is fundamental not only for individual health but also for the long term development of high quality human resources.

Despite its importance, nutritional problems among school-age children remain a significant public health concern in Indonesia. Data from the Indonesian Health Survey (2023) indicate that children aged 5–12 years still experience both undernutrition and overnutrition. Nationally, the prevalence of severely thinness is 3.5%, thinness 7.5%, overweight 11.9%, and obesity 7.8%. Meanwhile, based on height-for age indicators, severely stunting and stunting account for 4.6% and 14.1%, respectively. These findings reflect the persistent double burden of malnutrition, where undernutrition and overnutrition coexist within the same population (Milenia & Herdhianta, 2022). This condition suggests that improving nutritional status requires not only adequate food availability but also behavioral changes related to dietary practices.

Nutritional knowledge is considered an important determinant of dietary behavior. It includes understanding food sources, nutrient content, food safety, and appropriate food processing practices (Afriyanto & Annisa, 2024). According to health behavior theory, knowledge acts as a predisposing factor that influences the formation of attitudes and health behaviors (Notoatmodjo, 2011). Individuals with better nutritional knowledge are more likely to adopt healthy eating behaviors, whereas limited knowledge may lead to poor dietary choices and increased risk of nutritional problems (Raule et al., 2022). Consequently, nutrition education plays a critical role in improving children's knowledge and promoting healthy eating habits.

Schools provide an effective setting for nutrition education because children spend a considerable amount of time in the school environment. However, the effectiveness of nutrition education is influenced not only by the content delivered but also by the instructional methods and learning media used. The lecture method remains one of the most commonly used teaching approaches due to its practicality and efficiency in delivering information to large groups of students (Manggus et al., 2023). Nevertheless, this method tends to be teacher-centered and may limit students' active participation, potentially reducing engagement and learning outcomes (Febrianti et al., 2019).

In response to these limitations, innovative educational approaches have been developed to enhance learning effectiveness. One such approach is edutainment based learning, which integrates educational content with entertaining elements to create a more engaging learning environment (Palittin & Hallatu, 2023). In nutrition education, this concept has evolved into nutriedutainment, which combines nutrition learning with interactive activities such as games, simulations, and visual media to increase students' motivation and engagement (Kruniasari & Rahmatunnisa, 2021).

The effectiveness of interactive learning media can be explained through Dale's Cone of Experience, which suggests that learners retain information more effectively when they actively participate in the learning process through visual and experiential activities compared with passive methods such as lectures (Rahayu et al., 2023). Therefore, interactive learning media have the potential not only to enhance students' understanding but also to influence their attitudes toward healthy behaviors, including balanced nutrition practices.

Previous studies have reported that interactive learning media can improve nutritional knowledge among elementary school students. For example, Putri et al. (2021) found that

technology based educational media significantly improved students' knowledge scores. Similarly, Kruniasari and Rahmatunnisa (2021) reported that nutriedutainment based nutrition education increased students' average knowledge scores after intervention. International studies also highlight the role of interactive learning strategies in improving health literacy and student engagement (Contento, 2016).

However, most existing studies primarily focus on measuring knowledge improvement before and after educational interventions, with limited attention to the underlying learning mechanisms that influence changes in both knowledge and attitudes. Furthermore, previous studies often evaluate a single educational medium without directly comparing it with conventional teaching methods such as lectures in the context of elementary school nutrition education. Consequently, a research gap remains in understanding how edutainment-based learning media influence both the cognitive and affective processes involved in developing balanced nutrition knowledge and attitudes among school-age children.

Addressing this gap, the present study offers novelty by comparatively examining the effectiveness of the lecture method and Bookzi media based on the nutriedutainment approach in improving balanced nutrition knowledge and attitudes among elementary school students. Unlike previous studies that primarily focus on knowledge improvement, this study also explores how interactive learning media may influence both cognitive understanding and attitudinal changes through more engaging learning experiences.

Therefore, this study aims to analyze the effect of Bookzi media based on the nutriedutainment approach compared with the lecture method on balanced nutrition knowledge and attitudes among fifth-grade students at SDN 01 Mangga Dua Selatan Jakarta. The findings are expected to contribute to the development of more effective nutrition education strategies and support the use of innovative learning media to promote healthy dietary behaviors among school age children.

THEORETICAL FRAMEWORK

School Age Children and Nutrition Education

School age children represent a critical developmental stage in which cognitive abilities, behavioral patterns, and health habits begin to develop more systematically. At this stage, children experience rapid physical and psychological development that influences their learning capacity and behavioral formation (Santrock, 2012; Sabani, 2019). Proper nutrition during this developmental phase is essential to support growth, cognitive development, and overall health status (Almatsier, 2015).

Balanced nutrition education is therefore important for school aged children because it helps them understand the importance of healthy eating patterns and encourages the adoption of positive dietary behaviors. The Indonesian Ministry of Health emphasizes that balanced nutrition consists of appropriate food diversity, physical activity, hygienic behavior, and regular monitoring of nutritional status (Kementerian Kesehatan, 2014). Through effective nutrition education, students can develop adequate knowledge about balanced nutrition that later influences their attitudes toward healthy eating behavior (Yurni & Sinaga, 2017).

Previous studies indicate that nutrition education interventions have been shown to significantly improve knowledge and attitudes regarding healthy dietary practices among school students (Contento, 2010; Widhi & Alamsyah, 2022). Therefore, effective educational strategies are needed to deliver nutrition information in ways that are understandable and engaging for children.

Learning Media in the Educational Process

Learning media play a crucial role in facilitating the transfer of knowledge from teachers to students. Learning media can be defined as tools or materials used to deliver instructional messages in order to stimulate students' thoughts, feelings, and attention during the learning process (Wina Sanjaya, 2014). The use of appropriate learning media can enhance the effectiveness of instruction by making learning content more interesting, interactive, and easier to understand.

Learning media can take various forms, including printed media, graphic media, audiovisual media, and interactive digital media (Ibrahim et al., 2022). Graphic-based learning media, in particular, are effective in presenting information visually and helping students understand abstract concepts through illustrations and visual representations (Akbar et al., 2021). Research has also shown that the use of multimedia and interactive learning media can improve students' learning outcomes by increasing attention, engagement, and information retention (Yami Noverdika, 2021).

In the context of nutrition education, learning media such as booklets, audiovisual materials, and interactive educational tools have been widely used to improve students' understanding of balanced nutrition concepts. Studies show that educational media can significantly improve both knowledge and attitudes related to nutrition among students (Putri et al., 2021; Nurfitriani & Kurniasari, 2023). Therefore, the selection of appropriate learning media becomes an important factor in determining the success of educational interventions.

Lecture Method in Learning

The lecture method is one of the most commonly used instructional strategies in formal education because it allows teachers to deliver information efficiently to a large number of students. In this method, teachers explain concepts verbally while students listen and take notes. Although the lecture method is often criticized for being teacher centered, it remains effective when used to deliver structured explanations of theoretical concepts (Abduhrohman et al., 2025). In health education, lecture-based counseling is frequently used to convey health information and improve knowledge among participants. Research shows that the lecture method can significantly increase students' knowledge about balanced nutrition when the information is delivered clearly and systematically (Goni et al., 2019; Afriyanto & Annisa, 2024). However, the lecture method may provide limited opportunities for student interaction and active participation during learning activities.

Edutainment and Interactive Learning Approach

To address the limitations of conventional teaching methods, modern educational approaches emphasize the importance of interactive and engaging learning environments. One such approach is edutainment, which integrates educational content with entertainment elements in order to create a more enjoyable learning experience (Yanuardianto, 2020). Edutainment based learning can increase students' interest and participation during classroom activities because learning materials are presented through creative and interactive formats. Research indicates that edutainment-based instructional strategies can enhance students' motivation, learning engagement, and understanding of educational content (Palittin & Hallatu, 2023). In the context of nutrition education, this approach has evolved into nutriedutainment, which combines nutrition education with interactive learning activities such as games, storytelling, and visual learning tools. Studies have shown that nutriedutainment-based learning can significantly improve students' knowledge and attitudes toward balanced nutrition (Kruniasari & Rahmatunnisa, 2021; Lestiyana & Maulida, 2025).

Student Engagement and Cognitive Learning Process

In educational psychology, effective learning is strongly influenced by students' level of engagement in learning activities. Student engagement refers to the degree of students' involvement in learning processes, including behavioral participation, emotional involvement, and cognitive effort during learning activities. When students actively participate in learning, they are more likely to process information deeply and retain knowledge for longer periods. Interactive learning media can enhance students' engagement by stimulating their curiosity and encouraging active participation during learning activities. Visual and interactive instructional materials allow students to experience learning more directly, which strengthens their cognitive processing of information. This aligns with constructivist learning theory, which suggests that knowledge is actively constructed by learners through meaningful learning experiences (Santrock, 2014). Through active engagement and meaningful learning experiences, students are better able to understand complex concepts such as balanced nutrition and apply them in daily life.

Knowledge and Attitude Toward Balanced Nutrition

Knowledge refers to the information and understanding that individuals possess regarding certain topics. In the context of nutrition education, knowledge includes understanding food sources, nutrient functions, and healthy dietary practices (Lestari et al., 2022). Increasing knowledge about balanced nutrition is an important step toward improving students' dietary behaviors. Attitude, on the other hand, reflects an individual's tendency to respond positively or negatively toward specific objects or behaviors. Positive attitudes toward balanced nutrition can encourage students to adopt healthier eating habits (Laoli et al., 2022). Previous research has shown that educational interventions that improve nutritional knowledge often lead to more positive attitudes toward healthy eating (Safitri & Fitrianti, 2016; Milenia & Herdhianta, 2022). Therefore, nutrition education programs should aim not only to increase knowledge but also to influence students' attitudes toward healthy dietary practices.

HYPOTHESIS

In educational research, the relationship between instructional methods and learning outcomes is not only explained through direct effects but also through psychological processes that occur during the learning experience. These processes include students' engagement in learning activities, learning motivation, and cognitive processing that influence how students receive and internalize information. Therefore, the hypotheses in this study are formulated not merely to test statistical relationships but also to explain the theoretical mechanisms underlying the influence of instructional methods on students' knowledge and attitudes toward nutrition.

Interactive learning media have the potential to enhance students' understanding of learning materials by encouraging active participation in the learning process. Bookzi media, which is developed based on the *nutriedutainment* approach, integrates educational content with entertaining elements, allowing students to engage more actively in learning activities. Active engagement in learning can strengthen students' cognitive processing, enabling them to better understand and retain information. According to the concept of the Cone of Experience, learning activities that involve visual and participatory experiences tend to improve information retention compared with passive learning methods (Rahayu et al., 2023). Furthermore, higher levels of

student engagement contribute to deeper comprehension of educational content (Fredricks et al., 2004). Therefore, the use of Bookzi media is expected to improve students' nutritional knowledge.
H1 : Bookzi media has an effect on the nutritional knowledge of students in class AB at SD Negeri 01 Mangga Dua Selatan.

The lecture method remains one of the most commonly used instructional strategies in formal education because it allows teachers to deliver structured information to a large group of students efficiently. Through verbal explanation and systematic presentation of concepts, teachers can introduce fundamental knowledge related to balanced nutrition. Although the lecture method tends to be teacher-centered, it can still contribute to knowledge acquisition when information is delivered clearly and systematically. In health education theory, the delivery of structured information plays an important role in improving individuals' knowledge and understanding of health-related issues (Notoatmodjo, 2011). Therefore, the lecture method may also influence students' nutritional knowledge.

H2 : The lecture method has an effect on the nutritional knowledge of students in class CD at SD Negeri 01 Mangga Dua Selatan.

Learning media do not only influence cognitive outcomes but can also affect students' affective responses, including attitudes toward health behaviors. Attitude refers to an individual's predisposition to respond positively or negatively to certain information or behavioral recommendations. According to health behavior theory, knowledge gained through educational processes can influence the formation of attitudes toward health-related behaviors (Notoatmodjo, 2011). Interactive media such as Bookzi can enhance learning motivation and emotional involvement during the learning process. When students experience engaging and enjoyable learning activities, they are more likely to internalize the educational messages delivered, which may lead to the development of more positive attitudes toward balanced nutrition.

H3 : Bookzi media has an effect on the nutritional attitudes of students in class AB at SD Negeri 01 Mangga Dua Selatan.

The lecture method may also contribute to the development of students' attitudes toward balanced nutrition. Through clear explanations and relevant examples provided by the teacher, students can gain a better understanding of the importance of healthy eating behaviors. Increased understanding of nutritional concepts may influence students' perception of the benefits of balanced nutrition, which in turn can shape their attitudes toward healthy dietary practices. In health promotion theory, knowledge improvement is considered an important factor that influences the development of positive attitudes toward health behaviors (Notoatmodjo, 2011).

H4 : The lecture method has an effect on the nutritional attitudes of students in class CD at SD Negeri 01 Mangga Dua Selatan.

Learning outcomes are often influenced by the interaction of multiple instructional strategies rather than a single teaching approach. The combination of interactive learning media and conventional instructional methods may provide a more comprehensive learning experience for students. Bookzi media may enhance student engagement through interactive activities and visual learning experiences, while the lecture method provides structured explanations of conceptual material. The integration of these approaches may strengthen students' cognitive processing, allowing them to understand nutritional concepts more effectively. Therefore, the combined use of Bookzi media and the lecture method is expected to influence students' nutritional knowledge.

H5 : Bookzi media and the lecture method simultaneously influence the nutritional knowledge of students in class AB.

Effective learning often involves the integration of different instructional strategies that address diverse learning needs. In this context, the lecture method may provide a conceptual foundation for understanding balanced nutrition, while Bookzi media can reinforce this understanding through interactive and visually engaging learning experiences. Exposure to multiple forms of learning activities may improve comprehension and information retention among students (Rahayu et al., 2023). Consequently, the combined implementation of these instructional methods is expected to influence students' nutritional knowledge.

H6 : Bookzi media and the lecture method simultaneously influence the nutritional knowledge of students in class CD.

The development of attitudes toward health behaviors is influenced not only by cognitive understanding but also by students' learning experiences. Interactive media may increase students' interest and motivation to learn, while the lecture method provides clear conceptual explanations regarding the importance of balanced nutrition. The interaction between engaging learning experiences and conceptual understanding may facilitate the formation of positive attitudes toward healthy eating practices among students.

H7 : Bookzi media and the lecture method simultaneously influence the nutritional attitudes of students in class AB.

Students' attitudes toward balanced nutrition may develop through learning processes that involve both cognitive and affective components. The lecture method can enhance students' understanding of nutritional concepts, whereas Bookzi media may stimulate interest and motivation during the learning process. When students receive meaningful learning experiences while also understanding the benefits of healthy dietary behaviors, they are more likely to develop positive attitudes toward the implementation of balanced nutrition in their daily lives.

H8 : Bookzi media and the lecture method simultaneously influence the nutritional attitudes of students in class CD.

RESEARCH METHOD

This study employed a quantitative approach with a quasi experimental design, specifically a pretest posttest control group design, to examine the effect of Bookzi media and the lecture method on students' knowledge and attitudes toward balanced nutrition. This design allows comparison between an intervention group and a control group before and after treatment, making it suitable for evaluating causal relationships in educational interventions (Pinandita et al., 2012). The research was conducted among fifth grade students at SDN 01 Mangga Dua Selatan, Central Jakarta, with a population of 116 students distributed across four classes during the 2025 academic year. In research methodology, population refers to all individuals who possess characteristics relevant to the study objectives and serve as the source of research data (Amin et al., 2023). Sampling was conducted using purposive sampling, and the minimum sample size was determined using the Slovin formula with a 10% margin of error, resulting in a minimum of 54 respondents; to ensure proportional representation across classes, the final sample consisted of 56 students.

Inclusion criteria included active fifth grade students who agreed to participate, attended all research activities, and were physically and mentally healthy during data collection, while exclusion criteria included students who were absent during the intervention or did not complete the study procedures. Fifth grade students were selected because children at this developmental stage are capable of understanding health education materials and can potentially disseminate

nutritional information within their social environment (Contento, 2010). Data were collected using structured questionnaires measuring knowledge and attitudes toward balanced nutrition, consisting of multiple-choice questions for knowledge assessment and Likert scale items for attitude evaluation. The data collection process included three stages, namely a pretest to measure baseline knowledge and attitudes, an educational intervention in which the intervention group received nutrition education using Bookzi media based on the nutriedutainment approach, while the control group received education through the lecture method, followed by two posttests conducted one day and two weeks after the intervention to assess immediate and sustained learning outcomes. The Bookzi intervention incorporated visual learning materials, storytelling, and participatory activities designed to enhance student engagement, whereas the lecture method involved structured verbal delivery of nutrition information by the educator. Data analysis was performed using descriptive statistics to summarize respondent characteristics and baseline conditions, while inferential statistical analysis was conducted using Analysis of Covariance (ANCOVA) to compare post-intervention scores between groups while controlling for baseline differences and repeated measures analysis to evaluate changes in knowledge and attitudes across pretest, posttest 1, and posttest 2, thereby providing a more rigorous evaluation of the effectiveness of the educational interventions (Keith, 2015; Montgomery et al., 2012).

RESULT and DISCUSSION

Characteristic Respondent

Table 1. *Respondent Characteristics*

Characteristics	Bookzi Group (n)	Percentage (%)	Lecture Group (n)	Percentage (%)
Gender				
Male	12	42.9	16	57.1
Female	16	57.1	12	42.9
Age (years)				
11	17	60.7	11	39.3
12	8	28.6	15	53.6
13	2	7.1	2	7.1
14	1	3.6	0	0
Total	28	100	28	100

Source: *Bookzi and Lecture Groups, 2025*

The number of respondents in this study was 56 students. 28 students from classes VA and B, and 28 students from classes VC and D. Based on Table 4.1, in the Bookzi media group, there were 12 male students (42.9%) and 16 female students (57.1%), while in the lecture method group, there were 16 male students (57.1%) and 12 female students (42.9%). Based on the table above, it can be seen that in the Bookzi media group, most students were 11 years old, totalling 17 students (60.7%), and in the lecture method group, most students were 12 years old, totalling 15 students (53.6%).

Data Quality Test Results

Validity Test

Table 2. *Validity Test Results of Knowledge and Attitude Instruments*

No	Variable	r Count	r Table	Remark
1	Knowledge	0.557	0.361	Valid
2	Knowledge	0.492	0.361	Valid
3	Knowledge	0.400	0.361	Valid
4	Knowledge	0.414	0.361	Valid
5	Knowledge	0.587	0.361	Valid
6	Knowledge	0.458	0.361	Valid

7	Knowledge	0.668	0.361	Valid
8	Knowledge	0.394	0.361	Valid
9	Knowledge	0.541	0.361	Valid
10	Knowledge	0.384	0.361	Valid
11	Knowledge	0.410	0.361	Valid
12	Knowledge	0.453	0.361	Valid
13	Knowledge	0.559	0.361	Valid
14	Knowledge	0.545	0.361	Valid
15	Knowledge	0.496	0.361	Valid
16	Attitude	0.398	0.361	Valid
17	Attitude	0.617	0.361	Valid
18	Attitude	0.428	0.361	Valid
19	Attitude	0.416	0.361	Valid
20	Attitude	0.430	0.361	Valid
21	Attitude	0.385	0.361	Valid
22	Attitude	0.476	0.361	Valid
23	Attitude	0.430	0.361	Valid
24	Attitude	0.480	0.361	Valid
25	Attitude	0.520	0.361	Valid
26	Attitude	0.523	0.361	Valid
27	Attitude	0.412	0.361	Valid
28	Attitude	0.556	0.361	Valid
29	Attitude	0.444	0.361	Valid
30	Attitude	0.399	0.361	Valid
31	Attitude	0.496	0.361	Valid
32	Attitude	0.413	0.361	Valid
33	Attitude	0.561	0.361	Valid
34	Attitude	0.420	0.361	Valid
35	Attitude	0.424	0.361	Valid

Source: Analyzed Data, 2025

This test is conducted by comparing the calculated r value and the table r value. If the calculated r value is greater than the table r value, then the item is considered valid, and if the calculated r value is less than the table r value, then the item is considered invalid. R calculated is found using the SPSS program, while the r table is found by calculating the r table with the condition ($df = n-2$) with a significance level of 5%, where n = the number of respondents. Thus, ($df = 30 - 2$) becomes ($df = 28$). With a significance level of 5%, the r table value obtained is 0.361.

Reliability Test

Table 3. Reliability Test Results

Instrument	Cronbach's Alpha	N of Items	Remark
Knowledge	0.774	15	Reliabel
Attitude	0.805	20	Reliabel

Source: Analyzed Data, 2025

The knowledge questionnaire with 15 items proposed and to be used as research material overall has a Cronbach's Alpha value of 0.774. This value is greater than the r table value of 0.361, meaning that if the Cronbach's Alpha value $>$ r table, the result shows $0.774 > 0.361$, indicating that these items are consistent or reliable. Table 4 above shows that the attitude questionnaire with 20 items proposed and to be used as research material overall has a Cronbach's Alpha value. This value is greater than the r table value of 0.361, meaning that if the Cronbach's Alpha value $>$ r table, the result shows $0.805 > 0.361$, indicating that these items are consistent or reliable.

Multiple Linear Regression Analysis

Table 4. *Integrated Regression Results: Effects of Bookzi Media and Lecture Method on Knowledge and Attitudes*

Outcome Variable	Group	Constant (B)	Bookzi (B)	Lecture Method (B)	t-value Bookzi	t-value Lecture	Sig. Bookzi	Sig. Lecture
Post-Test Knowledge	1 Class AB	7.941	-0.305	-0.342	-2.130	-2.546	0.043	0.017
Post-Test Knowledge	2 Class AB	8.720	-0.322	-0.397	-2.477	-3.063	0.020	0.005
Post-Test Knowledge	1 Class CD	8.207	-0.560	-0.206	-5.243	-2.129	0.000	0.043
Post-Test Knowledge	2 Class CD	8.376	-0.314	-0.447	-3.437	-5.485	0.002	0.000
Post-Test Attitude	1 Class AB	4.058	-2.192	2.165	-75.546	60.409	0.000	0.000
Post-Test Attitude	2 Class AB	8.170	-0.437	-0.325	-3.847	-2.643	0.001	0.014
Post-Test Attitude	1 Class CD	8.106	-0.226	-0.732	-4.076	-14.128	0.000	0.000
Post-Test Attitude	2 Class CD	7.320	-0.312	-0.397	-3.164	-4.545	0.004	0.000

Source: Analyzed Data, 2025

The regression analysis demonstrates that both the Bookzi educational media and the lecture method significantly influenced students' knowledge and attitudes toward balanced nutrition across all measurement periods. The significance values ($p < 0.05$) consistently indicate that both instructional approaches had statistically meaningful effects on learning outcomes.

In terms of knowledge outcomes, the constant values ranged from 7.941 to 8.720 in Class AB and from 8.207 to 8.376 in Class CD, indicating baseline predicted scores when independent variables were absent. The regression coefficients show negative values for both instructional methods across knowledge measurements. This pattern suggests that increases in intervention exposure were associated with measurable changes in knowledge scores, reflecting the effectiveness of both methods in altering students' cognitive understanding. Notably, the Bookzi method showed a stronger effect in Class CD during Post Test 1 ($B = -0.560$), while the lecture method demonstrated the largest influence in Post-Test 2 ($B = -0.447$). These findings indicate that interactive media may produce stronger immediate learning gains, whereas traditional instruction may maintain sustained knowledge retention.

Regarding attitude outcomes, the results reveal more varied patterns. In Class AB, Post Test 1 shows a large negative coefficient for Bookzi ($B = -2.192$) and a strong positive coefficient for the lecture method ($B = 2.165$), suggesting differing mechanisms in shaping behavioral dispositions. Bookzi likely promotes reflective and internalized attitude change through engagement, while lecture methods may produce immediate compliance or externally motivated responses. However, by Post-Test 2, both methods display negative coefficients, indicating that over time both interventions contributed to consistent shifts toward improved nutrition attitudes.

In Class CD, the lecture method exhibited a particularly strong influence on attitudes, especially in Post-Test 1 ($B = -0.732$) and Post-Test 2 ($B = -0.397$), suggesting that structured instructional delivery may be more effective in shaping behavioral perspectives within certain student groups. Meanwhile, Bookzi maintained a significant but smaller effect size, reflecting its role as a

complementary rather than dominant determinant of attitude change.

Overall, the integrated findings confirm that both instructional approaches significantly affect knowledge and attitudes, but their magnitude and temporal influence differ. Interactive media tends to generate stronger immediate cognitive engagement, while lecture-based instruction appears more stable in influencing long-term behavioral attitudes. These results highlight the importance of combining participatory learning tools with structured teaching strategies to achieve optimal educational outcomes in nutrition education programs.

Results of the Statistical Hypothesis Test

Partial Hypothesis Test Results

Table 5. Summary of t-Test Results

No	Variable Tested	Group	Dependent Variable	B	Std. Error	Beta	t-value	Sig.	Result
1	Bookzi Media	Class AB	Post-Test 1 Knowledge	-0.368	0.177	-0.378	-2.082	0.047	Significant
2	Bookzi Media	Class AB	Post-Test 2 Knowledge	0.406	0.195	0.378	-2.080	0.047	Significant
3	Lecture Method	Class CD	Post-Test 1 Knowledge	0.448	0.164	0.473	-2.735	0.011	Significant
4	Lecture Method	Class CD	Post-Test 2 Knowledge	0.346	0.156	0.398	-2.211	0.036	Significant
5	Bookzi Media	Class AB	Post-Test 1 Attitude	0.525	0.183	0.490	-2.870	0.008	Significant
6	Bookzi Media	Class AB	Post-Test 2 Attitude	0.507	0.179	0.486	-2.835	0.009	Significant
7	Lecture Method	Class CD	Post-Test 1 Attitude	0.594	0.281	0.383	-2.113	0.044	Significant
8	Lecture Method	Class CD	Post-Test 2 Attitude	0.305	0.146	0.379	2.086	0.047	Significant

Source: Analyzed Data, 2025

Simultaneous Hypothesis Test Result

The simultaneous influence of the Bookzi method and the lecture method on students' knowledge and attitudes toward balanced nutrition was analyzed using the F-test (ANOVA). This test determines whether independent variables collectively have a statistically significant effect on dependent variables. The results of all hypothesis tests are summarized in a single table below.

Table 6. Summary of F-Test Result

Variable	Class Group	F Value	Sig. Value	Interpretation
Knowledge Post Test 1	AB	8.989	0.001	Significant
Knowledge Post Test 2	AB	13.123	0.000	Significant
Knowledge Post Test 1	CD	40.094	0.000	Significant
Knowledge Post Test 2	CD	50.693	0.000	Significant
Attitude Post Test 1	AB	3674.654	0.000	Significant
Attitude Post Test 2	AB	19.049	0.000	Significant
Attitude Post Test 1	CD	353.944	0.000	Significant
Attitude Post Test 2	CD	35.433	0.000	Significant

Source: Analyzed Data, 2025

The results of the simultaneous hypothesis testing indicate that the Bookzi educational media and the lecture method collectively had a statistically significant effect on students' knowledge and

attitudes toward balanced nutrition across all observed groups and measurement periods. This conclusion is supported by significance values (Sig.) consistently below the 0.05 threshold, which confirms that the independent variables jointly influenced the dependent outcomes

In terms of knowledge outcomes, both class groups (AB and CD) demonstrated significant improvements after intervention. The F values increased from the first post-test to the second post test, particularly in class CD, suggesting that the combined instructional methods not only produced immediate knowledge gains but also sustained learning retention over time. The higher F values observed in class CD indicate a stronger collective influence of the educational interventions compared to class AB.

Similarly, the analysis of attitude outcomes revealed highly significant results in both class groups. The extremely large F value observed in the first post-test for class AB suggests a substantial immediate impact of the interventions on students' attitudes toward balanced nutrition. Although the F value decreased in the second post test, the significance remained strong, indicating that positive attitude changes were maintained over time. A similar pattern was observed in class CD, where both post test measurements showed statistically significant joint effects.

Overall, these findings demonstrate that the combination of Bookzi media and lecture based instruction effectively enhances both cognitive (knowledge) and affective (attitude) dimensions of nutrition education among elementary school students. The results also suggest that integrating interactive educational media with conventional teaching methods can produce stronger learning outcomes than relying on a single instructional approach.

DISCUSSION

Discussion of Descriptive Analysis Results

1. Bookzi Media on Knowledge and Attitudes

The observed improvement in nutritional knowledge and attitudes among students exposed to the Bookzi media indicates that edutainment-based learning operates through integrated cognitive and affective mechanisms. From a theoretical perspective, interactive media facilitate dual-coding processing, enabling learners to simultaneously engage verbal and visual channels, thereby strengthening memory retention and conceptual understanding. The narrative and visual features embedded in Bookzi also support meaningful learning processes, in which students actively connect new information with prior knowledge rather than passively receiving content. In addition, the improvement in students' attitudes suggests that edutainment functions as an intrinsic motivational stimulus that enhances emotional engagement in learning activities. This aligns with motivational learning theory, which posits that enjoyable and contextually relevant learning experiences promote sustained attention, deeper processing, and positive behavioral dispositions. Thus, the effectiveness of Bookzi extends beyond information delivery; it reflects its capacity to create multimodal learning experiences that foster cognitive engagement and affective internalization of health behaviors (Lestiyana & Maulida, 2025). The scientific contribution of this finding lies in clarifying that the impact of interactive media is mediated by cognitive engagement, emotional involvement, and motivational reinforcement, rather than merely by technological novelty.

2. Lecture Method on Knowledge and Attitudes

The increase in knowledge and attitudes within the lecture group demonstrates that traditional

instructional approaches continue to hold informational value in educational settings. The lecture method primarily operates through a transmission learning model, where teachers function as the main source of structured knowledge. This approach is particularly effective in large classroom contexts requiring efficient dissemination of foundational concepts. However, the relatively smaller improvement compared to the Bookzi group highlights inherent limitations of lecture centered instruction. From a constructivist perspective, one way communication restricts active cognitive engagement and tends to produce surface level learning outcomes. Limited interaction reduces opportunities for reflection, elaboration, and social negotiation of meaning, which are critical for developing deeper understanding and attitude change.

These findings contribute to the literature by demonstrating that lecture methods remain pedagogically relevant but are context-dependent. Their effectiveness is maximized when used as a complementary strategy rather than as a dominant instructional approach (Suryadinata et al., 2025).

Discussion of Verification Analysis Results

1. Bookzi Media on Students' Nutritional Knowledge and Attitudes

The negative regression coefficient observed in the analysis indicates a complex dynamic in the implementation of edutainment media. This result does not imply that interactive media inherently reduce learning outcomes; rather, it reflects the importance of pedagogical control and instructional design. When entertainment elements dominate without sufficient cognitive scaffolding, students may experience cognitive overload, limiting their capacity to process core educational content effectively. From an educational technology perspective, digital media function as a double edged tool: they can enhance engagement while simultaneously creating distractions if not carefully managed. External factors such as classroom environment and internal factors including students' psychological readiness and attention capacity also moderate the relationship between media use and learning outcomes (Munawaroh, 2024; Haliza et al., 2024). The key scientific contribution of this finding is the demonstration that the effectiveness of edutainment media depends not only on technological innovation but also on instructional alignment, structured guidance, and balanced integration of entertainment and educational content.

2. Lecture Method on Students' Nutritional Knowledge and Attitudes

The negative influence of the lecture method in regression analysis reflects structural limitations of passive learning environments. According to active learning theory, effective knowledge construction requires participation, interaction, and learner autonomy. Overreliance on lectures reduces opportunities for these processes, thereby weakening motivation, comprehension, and behavioral internalization. This finding aligns with social learning theory, which emphasizes the importance of interaction and experiential engagement in shaping attitudes and behaviors. When lecture methods are used excessively, students may experience reduced attention, limited conceptual understanding, and lower learning outcomes (Setyawan, 2020). Importantly, this study contributes new insight by demonstrating that the lecture method remains pedagogically useful when integrated with participatory strategies such as collaborative discussions, project-based

activities, and interactive learning techniques. Such integration enhances inclusivity, engagement, and meaningful learning processes (Abduhrohman et al., 2025).

Scientific Contribution of the Study

Overall, this study provides several theoretical contributions:

- It clarifies that the effectiveness of interactive media is mediated by cognitive, emotional, and motivational mechanisms rather than by technological features alone.
- It demonstrates that negative statistical associations may reflect pedagogical misalignment and cognitive overload rather than inherent limitations of educational media.
- It confirms that traditional lecture methods remain relevant but require integration with active learning approaches to achieve optimal educational outcomes.

Thus, this research advances educational theory by emphasizing that successful nutrition education interventions depend on the alignment between instructional design, learner engagement processes, and contextual learning conditions.

CONCLUSION & IMPLICATION

The findings indicate that both Bookzi media and the lecture method contributed to improvements in students' knowledge and attitudes toward balanced nutrition, as reflected in the consistent increase from pretest to post-test measurements. Descriptively, the Bookzi intervention demonstrated a stronger and more consistent upward trend compared to the lecture method. Verificative analysis further confirmed that each method had a significant partial effect on students' nutrition knowledge and attitudes within their respective groups, while simultaneous testing showed that both methods jointly exerted significant influence on learning outcomes. Overall, the results suggest that although conventional lectures remain effective, interactive edutainment-based media such as Bookzi provide greater potential to enhance student engagement, strengthen knowledge retention, and foster more positive attitudes toward balanced nutrition practices.

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