



# Digital Literacy Learning Module Improves Knowledge of Healthy Food in Indonesian PAUD Students

Siti Aisyah<sup>1\*</sup>, Dian Novita<sup>2</sup>, Trini Prastati<sup>3</sup>, Titi Chandrawati<sup>4</sup>, Anita Chandra Dewi Sagala<sup>5</sup> 

<sup>1,2,4</sup>PGPAUD, Universitas Terbuka, Tangerang Selatan, Indonesia

<sup>3</sup>Teknologi Pendidikan, Universitas Terbuka, Tangerang Selatan, Indonesia

<sup>5</sup>PGPAUD, UPGRIS, Semarang, Indonesia

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## ABSTRAK

Saat ini anak-anak cukup aktif dalam kegiatan online, terutama di media sosial. Hal ini menyebabkan kebutuhan mendesak untuk meningkatkan literasi digital sejak usia dini dalam upaya meminimalkan risiko bahaya online. Penelitian ini bertujuan untuk menganalisis efektivitas modul literasi digital dan media pembelajaran di era pandemi COVID-19 dengan menggunakan sumber belajar digital seperti video dan buku elektronik. Jenis penelitian ini yaitu kuantitatif. Metode yang digunakan adalah metode deskriptif dengan pendekatan kuantitatif. Sampel dalam penelitian ini berjumlah 219 orang, yaitu anak usia dini 5–6 tahun, guru, dan orang tua. Teknik pengumpulan data penelitian ini menggunakan pre-test dan post-test serta angket dengan skala Likert. Teknik analisis data yang digunakan adalah paired t-test. Hasil penelitian menunjukkan relevansi dan penerapan modul e-learning dalam hal konten dan struktur untuk digunakan dengan anak-anak, khususnya dalam mengembangkan kesadaran tentang makanan sehat. Disimpulkan modul dan media pembelajaran literasi digital cukup efektif dan memudahkan siswa dalam menyerap materi pembelajaran yang disampaikan oleh gurunya dengan latar belakang dan kemampuan yang beragam.

## ABSTRACT

Children are active in online activities, especially on social media. It leads to an urgent need to increase digital literacy early to minimize the risks of online harm. This study analyzes the effectiveness of digital literacy modules and learning media in the COVID-19 pandemic by using digital learning resources such as videos and electronic books. This type of research is quantitative. The method used is a descriptive method with a quantitative approach. The sample in this study was 219 people, namely early childhood 5-6 years, teachers, and parents. The data collection technique for this research used a pre-test and post-test and a questionnaire with a Likert scale. The data analysis technique used is paired t-test. The study results demonstrate the relevance and applicability of e-learning modules in content and structure for children, particularly in developing awareness about healthy eating. It was concluded that digital literacy learning modules and media were quite effective and made it easier for students to absorb learning material from teachers with diverse backgrounds and abilities.

## 1. INTRODUCTION

The flow of information and media technology has grown substantially. With the fast-expanding media technologies, it is now possible to receive such information, including children. The media bombard children from an early age, many as early as the first year of life (Safar et al., 2016; Sert & Boynueğri, 2017). Children are also quite active online, particularly on social media. Many children maintain many social media profiles for entertainment, communication, and education (Moon et al., 2019; Susilowati & Azzasyofia, 2020). It means an urgent need to increase digital literacy from an early age to minimize the risk of online harm, equip future voters and consumers with the skills and understanding they need to assume those roles, and maximize meaningful use of the internet (Silamut & Petsangsri, 2020; Spante et al., 2018; Supriyadi et al., 2020). Improving children's digital literacy Siti Aisyah can help them do better on this

\*Corresponding author.

E-mail addresses: [siti89@gmail.com](mailto:siti89@gmail.com) (Siti Aisyah)

indicator. Digital literacy is also important because it opens the door to employment opportunities and facilitates the mastery of other essential skills (Nani Pratiwi & Nola Pritanova, 2017; Wusqo et al., 2021).

Digital literacy is the capacity to access, navigate, comprehend, and participate in the digital information economy (Saputra & Salim, 2020; Yanti, 2016). These are the skills required to participate in a world dominated by the Internet. Due to the interactive nature of many digital technologies, digital literacy also requires skills beyond the ability to comprehend digital media messages (Nudiati, 2020; Rizki, 2019; Yanti, 2016). To be digitally literate, a person must know how to use modern digital technologies to access information, how to navigate the complex web of information made available by digital technologies, how to "read" and understand digital-media, and how to contribute to the digital information economy by using digital technology. Digital literacy skills also give students the ability to thrive in this dynamic digital environment (Hanik, 2020; N. Kurnia & Astuti, 2017; Putri, 2020). Children who receive correct information about healthy food from their teachers and access to a canteen or snack bar that serves nutritious food will develop a healthy eating pattern.

A growing number of studies demonstrated how multimedia could positively impact learning when certain multimedia design principles were followed (Hyoung Jai Kim & Kim, 2018; Nusir et al., 2013; Ranieri, 2019). However, the impact of digital technologies on learning does not consist of improving learning in and of itself, but rather of shifting the individual's relationship with knowledge and information. Additionally, the most common applications of technology serve more as information tools than as learning tools, reshaping individuals, particularly students, with information to convey (Bus et al., 2015; Molina et al., 2018; Moniaga et al., 2019). The objective of employing audio-visual media is to enhance cognitive abilities by giving stimuli in the form of moving images, sounds, and messages that will alter children's attitudes and emotions (Indrawan et al., 2019; Novita & Novianty, 2020; Widiatmika et al., 2017). The advantages of integrating audio-visual media in the learning process include: first, attracting students' attention when delivering instructional materials. Second, increasing motivation to learn (Alphian, 2018; Isdayanti, 2020). Third, providing a learning experience by ending learning from a video given (Handayani et al., 2017; Sulfemi & Mayasari, 2019).

The main problem remains. How to engage students by delivering information for better concept understanding (Arif, 2020; Rahayu, 2019; Zeptyani & Wiarta, 2020). Each application has its own focus, characteristics, target age, advantages and disadvantages. The taxonomy and component synthesis for the development of the multimedia application need to be extensively investigated (Abdulrahman et al., 2020; Munawaroh et al., 2020). Some multimedia solutions were deployed, tested, and successful, while others were not. In the various articles reviewed, attitudes and beliefs toward the use of technology in education, lack of teachers' confidence and resistance to change, lack of basic knowledge and ICT skills, lack of technical, administrative, and financial supports, and lack of physical environment were identified as some of the barriers to multimedia use in teaching and learning (Munawaroh et al., 2020; Widyatmojo & Muhtadi, 2017; Wulandari & Ambara, 2021). The integration of multimedia in education is affected by these barriers. Technology interventions to alter people's behavior toward becoming healthier. Technology-based behavioural health interventions involve the delivery of evidence-based practices via text messaging, apps, social media and multiple health components, through platforms such as computer, mobile phones or wearable sensors. Due to rapidly growing evidence of their effectiveness and efficiency, technology-based behavioural health interventions are gaining traction as therapeutic resources, both as stand alone technology or as multi component interventions. Reflecting on this trend, there are reviews on the efficacy of stand-alone technology apps intervention or multicomponent intervention on healthy lifestyles (Lim et al., 2021).

This study will investigate the effectiveness of digital literacy learning modules and media by leveraging digital learning materials such as videos and electronic books. Previous research findings reveal that instructional media can increase digital literacy (Masitoh, 2018; Sahidillah & Miftahurrisqi, 2019). Other findings also state that digital literacy is very important for everyone (Aspari, 2020; Rastati, 2018; Safitri et al., 2020). In this research, the novelty that can be raised in early childhood education the use of media is very crucial, but digital media in the learning process is an interesting thing for young children, especially in strengthening knowledge about healthy food. Technology integration is known to be useful in various aspects, but finding from studies on the efficacy of technology integration to improve healthy food consumption and purchase have largely been inconsistent, therefore, we aimed to examine the efficacy of interventions that use technology apps to improve healthy food purchasing and consumption in early childhood. Overall, technology apps are convenient and user-friendly tools to encourage a change in healthy food purchase and consumption early childhood. children will prefer learning through digital media, so it is hoped that children's knowledge about healthy food will increase.

## 2. METHOD

This research uses a quantitative approach with a quasi-experimental method with a pre-test-post-test design or initial test and final test. The research sample is carried out with an initial test (pre-test) before learning, and a final test (post-test) after the module learning process ends—one or more groups without a control group (Arikunto, 2016). To reduce the bias in this study, including the characteristics of children, parents, teachers, and schools, the number of groups in this study was increased. This study selected a sample of 15 schools, with each school representing a sample of students meeting the study's age criteria. The design of this study was adapted from the model one group pre-test-post-test design. The population for this study was drawn from schools and included students, parents, and teachers. There are 219 children aged 5-6 years and their parents and 16 teachers from 15 schools located in Semarang City and Cianjur Regency.

The data collection process for this research is separated into two steps, which are as follows: (1) Pre-Collection of Data Stage. A week prior to the learning process and data gathering. At this step, the researcher establishes the study's sample, including the location of the module test, training for teachers on learning module of digital literacy, and teaching for children, parents, and teachers on data collecting. Before initiating the learning process, researchers ensure that teachers are familiar with and understand the subject. This way, these teachers were invited to serve as enumerators throughout the data collection stage of this study; (2) Data Collection Stage. This study's methodology involved the completion of many questionnaires by children, parents, and teachers. Among the questionnaires in question are the following. First, children's questionnaire: questionnaires that children must complete independently on their understanding of healthy food literacy, in the form of a pre-test and a post-test (before and after the learning process. Second, parent's questionnaire: the child's parent/guardian must address the child's characteristics, family characteristics, and school environment. Third, teacher's questionnaire: teachers must complete two questionnaires: (i) Questionnaire 3A, which focuses on teachers' perceptions of the learning process, particularly about digital literacy learning modules, as well as teacher teaching competencies; and (ii) Questionnaire 3B, which focuses on the developmental competence of the children sampled in this study.

The children's questionnaire consisted of a pre-test and a post-test administered to children in their classrooms at the indicated times. In comparison, the parents' and teachers' questionnaires were collected using Google Forms. Apart from being time and cost-effective, this streamlined the process for researchers and respondents while assisting the government's health protocol program during the COVID-19 pandemic. Testing the validity and reliability of the questionnaire was carried out before being used in this study, especially on the children's questionnaire and the teacher's questionnaire. Test results showed that all instruments have a Cronbach-Alpha value is above 0.700, which means that the instrument is suitable for use in this study. The results of the reliability test of each of the questionnaires showed in Table 1.

**Table 1. Results of Test Reliability and Validity Instrument**

Instrument	Item	Cronbach-Alpha	Description
Pre-test	10	0.784	Reliable
Post-test	10	0.804	Reliable
Digital Literacy Modules and Media Learning	6	0.936	Reliable
Teacher Teaching Competence	17	0.769	Reliable
Children's Competencies	18	0.967	Reliable

After the data is collected, the following step is the process of data cleaning, coding, and data processing using MS. Excel 2019 and SPSS 26.0 perform several descriptive and inferential statistical tests and analyses, including testing the pre-test and post-test results from the learning process of digital literacy modules and media, validity and reliability tests, different tests, normality tests, and effectiveness.

## 3. RESULTS AND DISCUSSION

### Result

The results section consists of children's characteristics, family characteristics, school environment, children's competencies, teacher teaching competencies, teachers' perceptions of digital literacy learning modules, comparison of results pre-test and post-test, as well as different tests of results pre-test and post-test children's, before and after following the learning related to "four healthy five perfect" healthy food. The discussion for each section will be described as follows.

First, children's characteristics. The majority of the child respondents in the study were male (51%) with an age range of 5-6 years and an average age of 6 years, a height of about 112 cm, and a weight of about 19.5 kg. Almost three-quarters of children (73%) use smartphones belonging to their mother, 12 percent use smartphones belonging to their father, and 8% use strings belonging to themselves and their siblings. According to parental information, 84 percent of parents stated that their children use the internet for less than 2 hours per day on average, 14 percent of parents stated that their children use the internet for 2-4 hours, and only 3 percent of parents do not limit their child's internet access. Furthermore, 38 percent of children are first children, and 35 percent are second children; the remainder ranges from first to sixth children; 78.6 percent are primarily cared for by their fathers, and 14.3 percent are solely cared for by their mothers.

Second, Family's Characteristics. Characteristics were gleaned from questionnaires provided to parents, and it was discovered that while 74% of families had easy access to the internet, only 22.1 percent had wifi installed in their houses. 47.3 percent of households have at least one child under the age of five, while 32.6 percent do not / do not have a child under the age of five in their home at this moment. Furthermore, 60.5 percent of fathers have a high school diploma or the equivalent up to college. In comparison, 60.1 percent of moms hold a high school diploma or the equivalent of a college diploma. The others include junior high and elementary school graduates and 0.4 percent who do not attend school at all. The father's age ranged from 21 to 64 years old, with an average of 37 years, and the mother's age ranged from 23 to 47 years old, with an average of 34 years. The average family's income is IDR 3,535,338.98, with values ranging from IDR 0.00 to IDR 30,000,000.00.

Third, School's Characteristics. Teachers and parents answered various yes or no questions about cleaning facilities, PHBS programs, healthy food, and school rules regarding street vendors entering the school area. As illustrated in Figure 2, most teachers and parents think schools should provide appropriate playing areas for kids, a supportive learning environment, and adequate handwashing facilities for students. When asked whether schools have a policy prohibiting traveling salespeople from entering the school area, 82% of teachers responded affirmatively, whereas parents were less likely to respond affirmatively (78 percent). It suggests that approximately 2-3 responding schools continue to allow mobile salespeople access to the school area. Opinions of parents and teachers on school characteristics showed in figure 1.

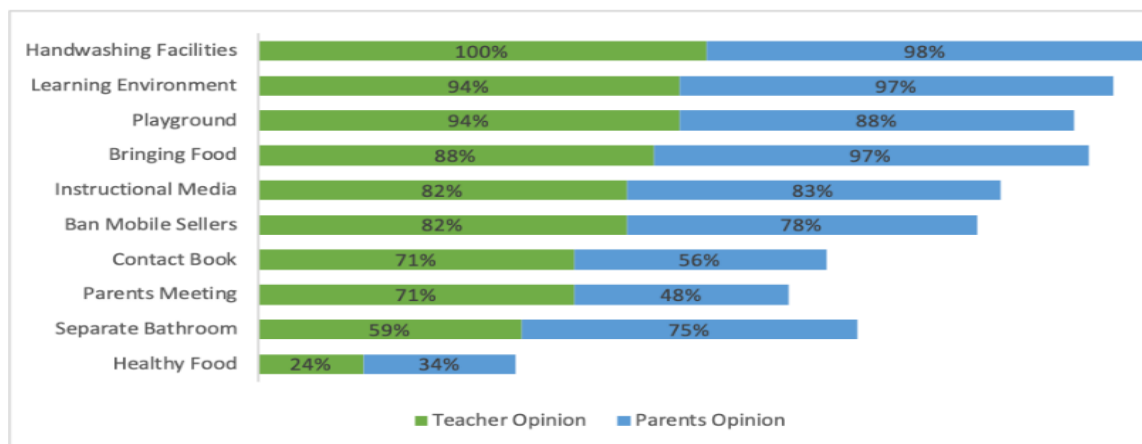


Figure 1. Opinions of Parents and Teachers on School Characteristics

More than two-thirds of parents reported that their child's school had an adequate number of PHBS-related learning materials (83 percent) and separate restrooms for boys and girls (75 percent). Only 59% of teachers said that their school had male and female toilets. It demonstrates that school facilities have not consistently enforced the laws regarding separate restrooms or that schools lack proper bathroom facilities. Furthermore, 56% of parents reported that their school maintains a daily student liaison book between instructors and parents, and more than half of respondents' parents reported that their school does not hold monthly parent meetings. Also, parents said that the school permitted pupils to bring their food and beverages (97 percent). It could be because 76% of schools do not give healthy food to pupils daily.

Fourth, Children's Competencies. Teacher evaluations provided data on children's competencies. Teachers are prompted to respond to many statements regarding their pupils' skills. Figure 3 illustrates how these competencies are attained. It demonstrates that the majority of children develop in accordance with expectations in all areas, except for the statements "Children dare to express their opinions and thoughts," "Children believe they can make the right decisions," and "Children can retell the story or explanation given by the teacher," which are less than or equal to half. Additionally, Figure 3 demonstrates

that children can eat and drink independently (78 percent), are accustomed to washing their hands before and after eating (76 percent), can finish the food given (71 percent), can clean up utensils or containers after eating or drinking (71 percent), can follow lessons enthusiastically, calmly, and attentively (70 percent), and can dispose of garbage in its proper location (70 percent).

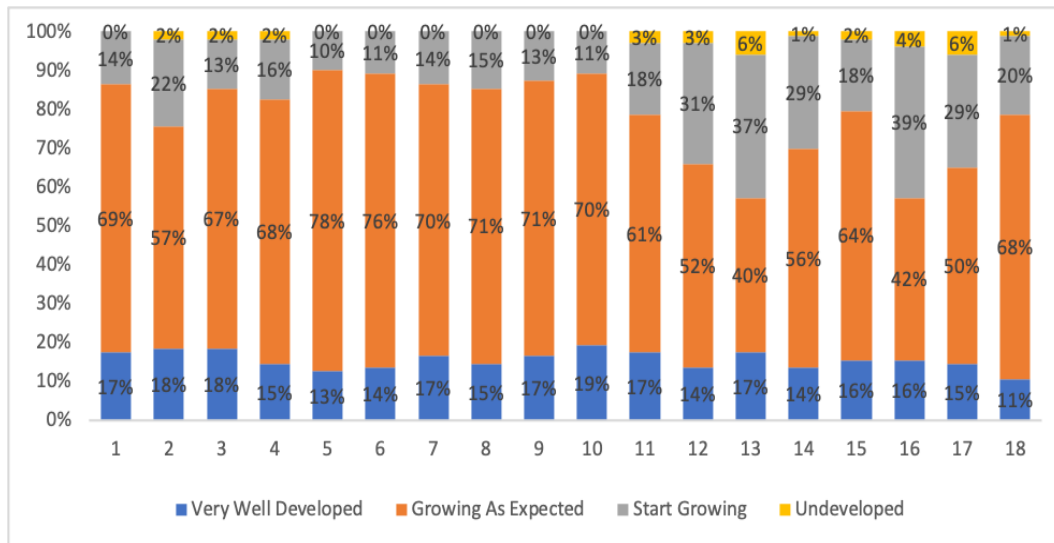


Figure 3. Percentage of Children's Competencies

Notes; first, before and after meals, children can say prayers. (2) After eating their meals, children can express gratitude. (3) Children desire to share what they have in terms of food and drink. (4) Children are capable of making sound food and beverage choices. (5) children are capable of eating and drinking on their own. (6) Children are accustomed to handing cleaning prior to and following meals. (7) Children are enthused about peacefully and attentively attending lessons. (8) Children are capable of finishing the meal that has been provided. (9) After eating and drinking, children can clean the tools or containers. (10) Children may discard trash in its stead. (11) Children might tell stories or instructor explanations when they are questioned again. (12) Children are capable of posing valid and appropriate questions. (13) Children are courageous in expressing their viewpoints and ideas. (14) Children can conduct investigations through a variety of media and activities. (15) Children are capable of comprehending the game's rules. (16) Children believe in their ability to make sound judgments. (17) Children can recount teacher-provided stories or explanations. (18) Children can use the media supplied to complete easy tasks.

Fifth, Teacher's Teaching Competence. Teachers' competency data is derived from teachers' opinions of the teaching and learning processes they have regularly used in the classroom, such as assessing digital literacy learning modules on healthy food for their students. Figure 4 shows how well a teacher is able to teach from the start of the teaching and learning process to the end.

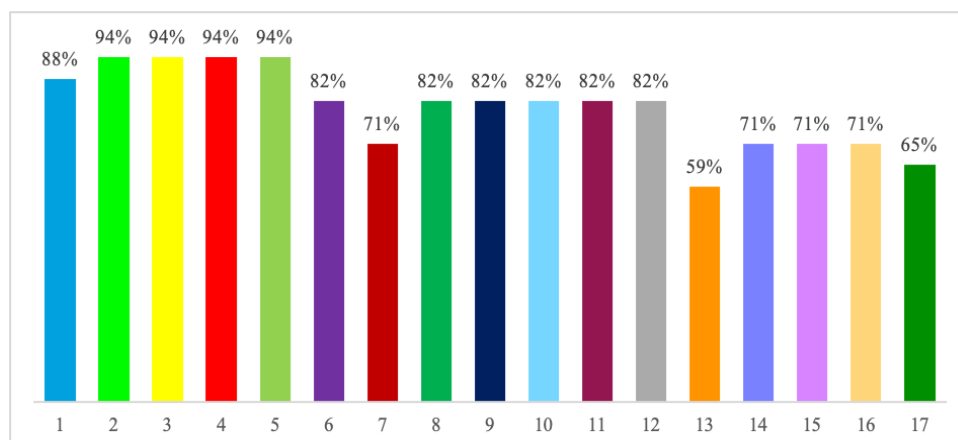


Figure 4. Percentage of Teacher Competence in Teaching

Notes: (1) Before students begin learning, prepare them physically and intellectually. (2) Provide an energizer/icebreaker to engage students in nearly every learning process, such as clapping, singing, and so on. (3) Always establish a connection between the child's prior knowledge and the topic under study through questions and answers, conversation, or allowing students to share their daily experiences relating to the topic under study. (4) Constantly communicate the learning objectives. (5) Delivers the important parts of the topic consistently and thoroughly discusses the issue and media use (such as storybooks, pictures, or objects). (6) Mastering the material in a systematic, cohesive, and developmentally appropriate manner. (7) Through various play activities, contextual/related to daily life exercises are provided and an introduction to the life/culture of the child's environment. (8) Encourage children to engage in direct experience activities such as observing/conducting experiments, inviting children to interact, identifying parts/characteristics, stimulating students' capacity for higher-order thinking, and fostering joy. (9) Familiarize children with discipline and collaboration, encourage them to express their thoughts and ask questions, teach students to communicate nicely, and give appropriate and proportionate praise. (10) Always employ instruments and media that encourage active participation in learning activities, enhance students' knowledge, and capture their attention.

(11) Constantly monitor students' learning progress, inquire about their accomplishments, motivate students to reach higher development levels, and conduct process assessments according to plan. (12) Skilled in guiding students classically, in groups, and individually, the classroom remains conducive, teachers consistently provide reinforcement and motivation, teachers can attract children's attention to keep them focused on activities, teachers' mobility in the classroom serves a purpose, and eye contact with children is maintained. (13) Using easy-to-understand and straightforward sentences, difficult-to-understand choices, monotonous intonation, and a word or greeting sentence volume that is too loud/too weak for the voice. (14) Demonstrate empathy for students, take care of their needs, take care of the surroundings, and be receptive to changes in students' circumstances. (15) Have an open attitude (saying thank you/sorry in the appropriate circumstances; demonstrating friendly gestures (body attitude); gracefully admitting errors/lack of ability; appearing neat, clean, and polite; and enthusiastic). (16) Conduct assessments following the objectives, conduct outcomes assessments by the plan, assess using rubrics and monitor assessment results throughout the learning process. (17) Conduct reflection by incorporating students, communicating moral messages, offering follow-up, and communicating the following day's activity plans.

According to [Figure 4](#), 94 percent of teachers always communicate learning objectives, always connect the child's prior knowledge to the topic being studied through questions and answers, conversing with students, or asking students to share their daily experiences related to the topic being studied, always convey the main points of the material in a coherent and precise manner through discussion of themes using media (such as storybooks, pictures, or objects), and always provide energizers or icebreakers. Before they started teaching, 88 percent of teachers said that they made sure their students were physically and mentally ready before they started. Additionally, 82% of teachers stated that they mastered the material in a systematic, coherent, and developmentally appropriate manner, encouraging students to engage in direct experience activities such as observing and conducting experiments, inviting students to interact with activities, and identifying teacher parts and characteristics, stimulates students' ability to think at a higher level, fosters joy, teaches students to be disciplined and cooperative, encourages students to express their opinions or ask questions, teaches students to communicate politely and appropriately, always using concrete tools and media that promote active participation in learning activities, understanding students, and also attracts students' attention, always going around monitoring

Besides that, [Figure 4](#) data indicates that 71% of teachers provide a variety of play activities that are contextual/related to daily life exercises as well as an introduction to life/culture in the child's environment, demonstrate empathy for students, care about students' needs, care about environmental conditions, are open to differences in students' conditions, and have an open attitude (e.g., saying thank you/sorry in the appropriate circumstances; demonstrating friendly gestures/body language in the appropriate situations). Moreover, 65% of teachers claimed to have conducted reflections by integrating students, imparting moral messages, offering follow-ups, and communicating plans for the following day's activities. Only 59% claimed to have used clear and easy-to-understand words and challenging choices, appropriate intonation and tone of voice, an apparent volume of voice, words or sentences that do not have SARA and bullying; words or sentences that do not call the child with your words, not yours; and words or sentences that do not have SARA and bullying.

Sixth, Digital Literacy Learning Process. Because this is a pilot study of the use of learning modules and digital literacy media, the retrieval process is carried out by carrying out the learning process in accordance with the module's requirements. Table 2 describes the learning procedure that was used. Day-1, learning process; Praying to start learning, Singing and dancing, Breakfast, Talking about discussing the

characteristics of healthy children drinking, Discussion about the benefits of eating and drinking, Working on a worksheet to classify foods that taste salty, sweet, and bitter, The picture story "Yum...yum...nyam. Recognizes the importance of food for the body - Part 1, Project: Making healthy food Puppets Coloring, Strengthen knowledge and experience gained by students on the first day, and Closing. Day-2. learning process; Praying to start learning, Singing and dancing, Conversing about four healthy five perfect, Food Discussion about four healthy five perfect food, The teacher explains about four healthy five perfect food (PPT) and food pyramid four healthy five perfect (PPT), Make a food pyramid from Astro paper in A3 size and project sheet eat food "four healthy five perfects.", Picture story "Yum...yum...nyam... Knowing the importance of food for the body - Part 2, Project: Making Puppets "four healthy five perfects" Benefiting, and Strengthening knowledge and experience gained by students today first.

Day-3. learning process; Praying to start learning, Singing and dancing, Conversing about favorite foods and drinks, Discussion about the benefits of food four health five perfect, The teacher explains the benefits of vitamins, minerals, carbohydrates, and fats for the body in food four healthy five perfect, Food guessing four healthy five perfect, Picture story "Yum... yum... comfortable Knowing the importance of food for the body - Part 3, Project: Making Puppets "four healthy five perfects": Sticking pictures of food with ice cream sticks, It strengthens the knowledge and experience gained by students on the first day, and Closing prayer. Day-4. learning process; Praying to start learning, Singing and dancing, Talking about snacks that students have eaten, Discuss unhealthy foods, The teacher explains about unhealthy foods and diseases caused by eating unhealthy foods, Draw and color favorite foods and explain in front of the class, Stories Pictured "Yum...yum...nyam. Knowing the importance of food for the body - Part 4, Project: Making Puppets "four healthy five perfect": Finishing and beautifying food puppets "four healthy five perfects.", It strengthens the knowledge and experience gained by students on the first day, and Closing prayer. Day-5. learning process; Praying to start learning, Singing and dancing, Talking about the food that the students brought, In a discussion about what was brought, the student told his friend next door the benefits of the food and tried the food, The student saw the food his friend brought and counted the number of friends who brought healthy food and friends who did not, Pupils learn to count the number of students who bring healthy food and reduce the number of not bringing healthy food, Pupils play puppets with friends, Draw and color their favorite food and explain in front of the class, Picture story "Yum...yum...comfortable. Recognize the importance of food for the body - Part 5, and Reinforcement of the knowledge and experience gained by students on the first day.

Seventh, Teacher's Perception of Digital Literacy Learning Modules. After five days of teaching using digital literacy learning modules, the teacher was asked to remark on the healthy food modules included in the learning process. The findings of Figure 5 show that 94 percent of teachers strongly agree or agree that the models, materials, and teaching delivery techniques correspond to the developmental stages of children aged 5-6 years; the objectives and learning materials are aligned with student learning outcomes, and the showing of videos of "four healthy five perfect" healthy foods increases students' interest in participating in learning. Additionally, 88.2 percent of instructors believe that the learning module guidance introduces new concepts and ideas during the learning process, and 82.4 percent of teachers believe that the learning assessment questions are primarily linked to the topic being covered in the lesson. Most instructors (76.5%) agreed that most modules aligned with the early childhood digital literacy requirements for healthy food.

The data collecting pre-test is conducted on the first day of class, prior to the learning process modules and digital media in teaching. In comparison, the post-test on the final day is administered after the classroom teacher has concluded the instructional process. A comparison is made after measuring the pre-test and post-test weights or scores in children, as illustrated in Figure 6. The results indicate that 92% of the 219 children respondents had a score improvement, while 8% did not, either before or after the teacher's teaching and learning process in the classroom. It illustrates additional variables associated with improved knowledge about children's healthy eating habits and classroom learning. The differential t-test was conducted using SPSS software version 26 and paired sample t-test analysis procedures, which calculate the average difference between each child's pre-test and post-test scores. The average pre-test score is 19.29, while the average post-test score is 25.16. Because the average post-test score is higher than the pre-test score, there is a difference between the average pre-test and post-test learning outcomes. The output of the t-test is shown in [Table 2](#).

**Table 2.** Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Post-test	25.16	219	4.284	0.290
	Pre-test	19.29	219	5.381	0.364

It is represented by the output in Table 4, which depicts the outcome of a correlation test, the association between two data points, or the relationship between the pre-test and post-test scores, respectively. Based on this information, it can be determined that the correlation coefficient is 0.662 and that the significance value (Sig.) is 0.000. In this case, because the value of Sig. the test is greater than the 0.05 probability, it is possible to conclude that the pre-test and post-test scores have a substantial correlation.

The findings of the t-test revealed a statistically significant difference between the results of the scores on the pre-test and the results on the post-test (p 0.001). It indicates a significant difference in children's understanding before and after completing the digital literacy learning modules. After knowing that there was a significant difference in the results of the pre-test and post-test, it was continued by calculating the N-gain (effectiveness test) between the pre-test and post-test scores using the following Hake (1999) formula. The following are the categories of score acquisition and effectiveness percentage that are shown in Table 3.

**Table 3. Category and Interpretation of N-Gain**

N-gain value	Category	Percentage	Interpretation
$g < 0.3$	Low	< 40	Ineffective
$0.3 \leq g < 0.7$	Medium	40 - 55	Less Effective
$g > 0.7$	High	56 - 75	Quite Effective
		> 75	Effective

The calculation results of the N-gain value test yielded an average N-gain value of 0.6217 or 62.17 percent, which falls into the medium group with a range of values ranging from 10 percent to 100 percent. Based on analysis, it can also be concluded that the implementation of digital literacy learning modules is quite effective in expanding the knowledge of early childhood aged 5-6 years in two locations where this research was carried out and implemented.

**Discussion**

Early childhood education (ECE) is critical in creating the groundwork for knowledge in children before they enter primary school (Diningrat et al., 2020; Rasalingam et al., 2014). Early childhood education must be available from birth until the age of six (Alam & Lestari, 2020; Aulia & Budiningsih, 2021; Hasanah & Sugito, 2020; D. Kurnia et al., 2015). According to the findings of this study, the average age of the child respondents is approximately six years. It is consistent with the objective of this digital literacy learning module, which is to provide students with an opportunity to engage in a learning process that will expand their awareness of healthy food through the use of digital media. Preschool teachers have used traditional print-based materials and instruments to expose children to the world of reading and writing, preparing them for more formal reading and writing instruction in later years of schooling. Students' understanding of literacy and teaching may be shifting as digital technology becomes more important (Beschorner & Hutchison., 2013; Nusir et al., 2013; Sert & Boynueğri, 2017). Other research found that the literacy-based digital books can be used by kindergarten teachers as learning media to make it easier for the teachers to deliver learning material to their early students (Meliyani et al., 2022).

Early childhood education provides a stimulant to children by providing educational stimuli that enable them to acquire skills necessary for basic education levels (Afandi, 2020; Fleer et al., 2021; Khalfaoui et al., 2021; Rasalingam et al., 2014). In the modern-day, the advancement of technology and communication has enabled every child to connect with the digital world via television, smartphones, tablets, and the internet. The deliberate use of technology can promote children's cognitive and social development in their early childhood (Nusir et al., 2013; Sert & Boynueğri, 2017). Students' socioeconomic position, the type of school, the digital infrastructure, and teachers' confidence in their digital skills all contribute to the potential for digital literacy (Kim et al., 2021). As a result, the horizontal and ubiquitous integration of digital competencies into school programming benefits all stakeholders; small-scale initiatives to promote school digitalization are insufficient. On the other hand, implementing particular activities can serve as motivation and a springboard for building digital skills and routines while also demonstrating to young children that they care about the environment. Numerous children worldwide are digital natives who have constant access to mobile devices (Polizzi, 2020).

Preschool children spend two to three hours a day with the media. Although media play an essential role in the lives of children in that age group, these children still prefer to socialize and play with other children and with their parents (Pangastuti et al., 2020; Wijayanti & Fauziah, 2020). Most of the time spent with media is spent on television, but the importance of digital technologies (smartphones and tablets) is growing. Besides more, other research found that young children interact with touch screen tablets at home,



which may impact emergent literacy (Neumann, 2014). Children with greater access to tablets were found to have higher letter sound and name writing skills. However, no relationships were found between time on tablets and emergent literacy skills. The quality of experiences rather than time spent on tablets may be substantial, especially when viewed within a socio-cultural framework. Tablets have the potential to foster emergent literacy, although this may depend upon the quality of digital interactions.

Aspects of development in early childhood cannot be isolated from learning media. Early childhood learning occurs through play with learning media, including actual media, audio media, visual media, and environmental media, to ensure that early childhood learning activities function smoothly (Dewi et al., 2018; Susilawati & Satriawan, 2018). The selection of internet-based technology-based learning media for early childhood must be taken seriously since improper use might have a detrimental effect on children (Amini & Suyadi, 2020; Munawaroh et al., 2020). An educator must comprehend the principles and variables that influence the usefulness of digital technology in the learning process. The use of technology in education must also consider a variety of factors, not the least of which is the critical window of opportunity that exists throughout early childhood. Effective use of technology in the learning environment in early childhood education requires professional development. Educators must also have a breadth of knowledge to make appropriate decisions about using learning technology to meet early childhood learning and cognitive needs.

#### 4. CONCLUSION

The systematic and comprehensive strategy taken in developing this training module resulted in positive outcomes, not just for teacher satisfaction with teaching but also for students' enjoyment of learning and promoting their knowledge. The findings of this study demonstrate the relevance and applicability of the e-learning module in terms of content and structure for use with young children, particularly in developing awareness about healthy food. As judged by the pre-test and post-test scores, a significant increase in knowledge indicated that the test was quite effective.

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