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**| RESEARCH ARTICLE**

## **Nutrizone: Community Development Program for Autistic Children to Overcome Eating and Diet Difficulties in SLB Negeri Semarang**

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**| ABSTRACT**

Autism is a functional neurological disorder that may cause impaired communication and behavioral patterns. Nutritional problems in autistic children tended to be found at SLB Negeri Semarang. Referring to the results of the discussions, three main nutritional problems were encountered in autistic children. First, there is a lack of education on diet programs provided for autistic children. Second, deficiency of the right method to introduce healthy food to autistic children due to their picky eating behavior. Third, the Covid-19 pandemic has led to large disruptions in controlling the nutrition of autistic children, especially for teachers and parents. Nutri-App innovation, namely menu calendar and augmented reality pop-up book, is considered capable of being used as an interactive food introduction media for autistic children. This program aimed to develop SLB Negeri Semarang in implementing a diet program for autistic children through the Nutri-App mobile and augmented reality pop-up book application. This program was conducted through the Nutrizone, containing: Nutri-Ready (Program planning), Nutri-Pandai (Guidance for readiness), Nutri-Tangkas (Activities and programs actualization), Nutri-Pantas (Program potential sustainability) with an integrative way for teachers and parents. The results showed an increase in understanding of the diet program, menu preparation skills, and balanced food introduction skills by 76%, 67%, and 64%. The program results show that the Nutri-App and AR pop-up books are very effective, with 4.6 and 4.7. In conclusion, the Nutrizone program can improve understanding of the diet program, menu preparation skills, and food introduction through an integrated program.

**| KEYWORDS**

Augmented Reality Pop-Up Book, Autism, SLB Negeri Semarang, Nutri-App

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### **1. Introduction**

SLB Negeri Semarang is the only public school that handles children with special needs in Semarang City. SLB Negeri Semarang has 366 students with special needs and 236 students, including 41 students and 8 students with autism. Autism is a disorder of brain function that causes impaired communication, social interaction, and behavior patterns (Baculu & Andri, 2019). As a result of impaired behavior patterns, the fulfillment of balanced nutrition for autistic children is difficult to maximize.

The nutritional status of autistic children in SLB Negeri Semarang is much different from normal children, mostly overweight and obese. Based on the results of discussions with partners, the nutritional status characteristics of autistic students in SLB Negeri Semarang are; 42% obese and obese, 38% normal, and 20% thin. The high percentage is due to the behavioral patterns of autistic

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children who tend to be *picky eaters* or only eat certain types of food. This condition results in malnutrition and micronutrient deficiency in autistic children due to a lack of food variation (Setyaningsih, 2019). Therefore, efforts are needed to improve knowledge of diet and nutrition for autistic children among teachers and parents.

Based on the results of discussions with partners, three main points were the problems regarding nutrition for autistic children. First is the lack of education about implementing a diet program for autistic children and their diet arrangements. There are no SLB teachers in Semarang State who have a nutritional and health education background to accompany autistic children causing the lack of education. Second, there is no proper introduction of healthy food from parents and teachers to autistic children due to *picky eater* behavior. Third, there is no suitable method for setting and preparing dietary patterns for autistic children between teachers and parents because of the difficulty of controlling during the Covid-19 pandemic. Meanwhile, there are several potentials to empower in SLB Negeri Semarang, starting from the condition of partners who are open to change; it is straightforward to educate several teachers and parents. In addition, there is adequate infrastructure and health protocols on partners, so it can help when running programs offline.

Based on existing problems and potential, partners hope to implement a diet program for autistic children to the maximum. Therefore, an integrative and comprehensive program is prepared called Nutrizone. The implementation of this program is supported by *mobile* application media, which has the primary function as a calendar media for preparing meals and media control between teachers to parents in *real-time*. The preparation of food menus in application calendars is considered appropriate because it can integratively combine information, scheduling, guidance, and monitoring (Setyawan, 2016). In addition, *augmented reality pop-up books* are used as a medium to introduce healthy food menus to autistic children. Augmented reality pop-up book is considered effective in applied to autistic children because they can be emotionally evocative and interactive audio-visually (Nazaruddin & Efendi, 2018).

The community service program aims to make SLB Negeri Semarang empowered in dealing with nutritional problems for autistic children. Dealing with nutritional problems can be achieved by using Nutri-app application media and augmented reality pop-up books to help solve all three problems that have been identified. This program is helpful in education and health by creating SLB Negeri Semarang, which is more productive and capable of implementing gluten and casein-free dietary patterns through Nutri-App media and augmented reality pop-up books.

## **2. Methodology**

### **2.1 Partner Overview and Characteristics**

Partners in this activity are SLB Negeri Semarang from elementary, junior high, and high school levels. Subject or respondents in this activity were 10 students with autism, 21 teachers, and 49 parents or guardians of students with autism. Based on the observations, respondents' characteristics, namely students, have uncontrolled eating behavior patterns. The observations resulted in the nutritional status of students who were predominantly obese and obese with a percentage of 42%. In addition, several teachers and parents often provide improper food for autistic children, such as bread and milk.

### **2.2 Time and Place of Implementation**

This program was carried out within four months, from June 1 to September 20, 2021, at SLB Semarang State, Tembalang District, Semarang City, Central Java Province. The implementation of this program is carried out in a mix, including offline, online, and virtual digital.

### **2.3 Program Instruments**

The instruments used during the program's implementation consist of Nutri-app mobile application, application and printed book augmented reality pop-up book, program implementation manual, educational modules for teachers and parents, laptops, mobile phones, and stationery. In addition, to prevent the spread of the Covid-19 virus, the program's implementation was offline, equipped with medical devices such as masks, face shields, thermo-guns, *and* hand sanitizers.

### **2.4 Data Collection Techniques**

Data collection techniques used in the implementation of this community service program use three methods, namely:

1. Observation methods are carried out by observing food selection habits for autistic children, implementing diet programs through the exterior of augmented reality pop-up books and Nutri-App applications, and changes that occur after the Nutrizone program.
2. The purpose of in-depth interview methods, such as in-depth interviews involving teachers and parents, is to determine the changes after implementing the Nutrizone program.

3. The questionnaire method, the questionnaire used in implementing the program, is open and closed. An open questionnaire leads to respondents' opinions about the U.S. program's piration along with criticism and suggestions. Meanwhile, closed questionnaires are used to assess the level of understanding of partners after implementing several sub-programs, such as webinars and program evaluations. Closed questionnaires are also used in trials of Nutri-App applications and AR pop-up books in the form of System Usability Scale (SUS) question instruments. Questionnaire SUS measures an application's ability that users can easily use (Saputra, 2019). The SUS question instrument is presented in table 1.

**Table 1.** SUS question instrument

No	Question
1	I thought I would reuse this app
2	I find this app complicated to use
3	I find this app easy to use
4	I need the help of others in using this app
5	I feel like the existing features are going accordingly.
6	I feel like there are a lot of inconsistent things in this app
7	I feel like others will understand how to use this app quickly
8	I find this app confusing
9	I feel that there are no obstacles in pushing for applications
10	I need to familiarize myself first with using the application

## 2.5 Program Implementation Techniques

### A. Nutri-Ready (Program Application Planning)

#### 1. Nutri-Discuss

Nutri-Discuss is the initial stage of the entire series of programs in the form of discussions with partners that are carried out offline. The discussion was held in a participatory form that aimed to equalize perceptions to identify and find alternative problem solving, along with preparation for the program's implementation in the future.

#### 2. Program socialization

Socialization aims to educate partners about gluten and casein-free diet programs and program implementation exposure. The socialization program is conducted online and attended by teachers and parents through zoom meetings. Socialization techniques are carried out in a participatory form that is two-way. After socialization, an assessment is carried out through an in-depth interview to measure how far the partner's knowledge of the material is delivered.

### B. Nutri-Pandai (Guidance for Readiness)

#### 1. Publication of Nutrizone-Guide Book and Education Module

Guidebooks make it easier for partners to understand each activity stage and the sustainability of programs created using Microsoft word and adobe illustrator in terms of content and design. In addition, educational modules are also arranged for teachers and parents to improve their understanding of gluten and casein-free diets and the use of application externalities. Submission of manuals and modules is carried out offline and online through *the* WhatsApp group.

#### 2. Nutri-Integrated Training (NIT)

NIT is an integrated training aimed at teachers and parents that includes video conference training, preparing food calendars through the Nutri-App application, along with the introduction, preparation, and training of augmented reality pop-up books. NIT is carried out online and offline. Offline implementation with door to door to minimize the crowd. Meanwhile, online implementation is carried out through zoom meetings. The method used in the performance of NIT is Training of Trainer, where the team becomes a facilitator for teachers and parents. In addition, an assessment is carried out through a closed questionnaire to assess the feasibility of the application.

### C. Nutri-Tangkas (Actualization of Activities and Programs)

#### 1. Guide Book Actualization

This sub-program is in the form of monitoring and mentoring of the training results that have been given. This sub-program is carried out online through *WhatsApp personal chat*. The guidelines and modules that have been given previously become a reference for partners independently to implement gluten-free and casein-free dietary patterns using application outputs.

2. *Nutri-Learn*

*Nutri-Learn* is a series of health-minded programs in the form of national campaigns and webinars. *Nutri-Learn* is carried out online and *virtually digitally* using several *platforms* such as Instagram, Telegram, and *zoom meetings*. This sub-program begins with the opening of a national volunteer registration together with partners to commemorate children's day and national breast milk week.

At the close of this sub-program, a national webinar on nutrition was organized by UNICEF-LPPM Diponegoro University. In this webinar, the Nutrizone PKM team was invited as a speaker. In addition, the webinar session also involves partners to provide testimonials about the Nutrizone program that has been run. At the end of the session, an assessment was conducted through a closed questionnaire about the material provided by the PKM team to find out the level of understanding and external effectiveness.

3. *Nutri-Aspire*

This sub-program is a place to accommodate all aspirations of teachers and parents to improve the gluten and casein-free diet program that has been implemented before. The integration of aspirations is done through questionnaires in google forms shared online via WhatsApp personal chat.

**D. Nutri-Pantas (Potential Development and Sustainability Program)**

1. Nutrizone Sites and *Nutrizone* Social Media

Nutrizone's website can be accessed on [the www.pkmnutrizone.com](http://www.pkmnutrizone.com) browser. Then, Nutrizone can be found on Instagram, LinkedIn, and Youtube for social media. Content from sites and social media contains educational content related to the diet for autistic children and nutritional content in general discussed with partners.

2. *Nutri-Connect*

This sub-program is a form of integrating the Nutrizone program into the Bina Diri curriculum at SLB Negeri Semarang, which is carried out offline with participatory discussions. In addition, it is necessary to add organizational arrangements for partners such as IT experts to develop Nutrizone sites and application outputs, along with parents who support the implementation of the program. The formation of the organizational structure is based on the results of discussions with partners in the curriculum section.

3. *Sustainable Nutrizone*

Sustainable Nutrizone is a form of cooperation between the team and the Semarang Disability Friends Community. This sub-program is carried out offline by visiting the relevant community. This cooperation is in the form of the socialization of the Nutrizone program and the sustainability of the program.

4. Program Evaluation

The purpose of assessment and evaluation is to determine the changes in partners before and after the Nutrizone program. The implementation method is carried out in evaluation using testimony and closed questionnaires through Google Formulir.

**2.6 Data Processing and Analysis Techniques**

The data processing and analysis techniques used in the implementation of this community service program use three methods that refer to the research of Pranatawijaya *et al.* (2019) :

1. Edit and verification, which is the activity of checking data obtained from the results of questionnaires and in-depth interviews to find out the completeness of the data.
2. Coding, which is the activity of classifying data from respondents' answers by providing code e or symbols and scores according to existing criteria. The solution of each instrument used the Likert scale, which is a bipolar scale method that measures the results of question responses on the questionnaire.
3. Tabulation, which is the activity of processing data into the form of a table by processing the frequency calculation of the category.

**3. Results and Discussion**

**3.1 Nutrizone Program Concept**

The Nutrizone program implemented at SLB Negeri Semarang can run well following the targets and schedules that have been determined. The success of the Nutrizone program is inseparable from a series of integrative and comprehensive programs from upstream to downstream, including *Nutri-Ready* (Perencanaan application program), *Nutri-Pandai* (Guidance for readiness), *Nutri-Tangkas* (Actualization of Activities and Programs), and *Nutri-Pantas* (Development of potential and sustainability of the program).

The series of programs emphasize the *Total Quality Management (TQM)* approach. The TQM approach describes a systematic approach by emphasizing the improvement of the quality of program implementation and the results achieved (Zahroh, 2015). In the Nutrizone program, the TQM program is packaged through gluten and casein-free diet that involves all elements of teachers, parents, and students with autism. The Nutrizone program can be achieved by receiving the entire indicator presented in the figure.

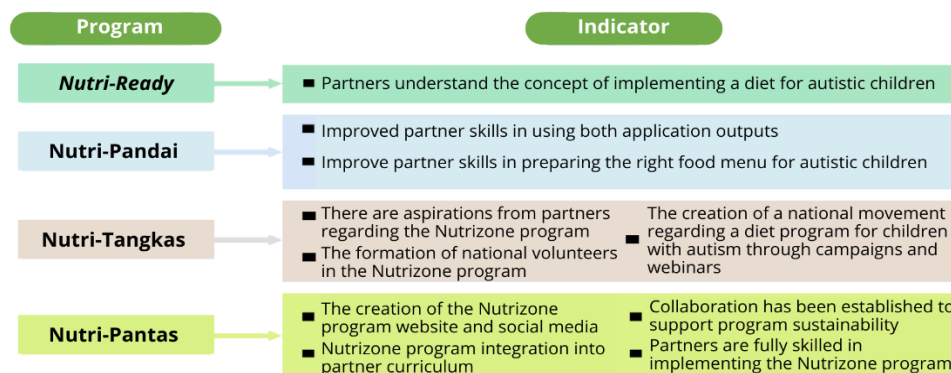


Figure 1. Nutrizone program achievement indicator

### 3.2 Nutri-Ready Program Performance (Program Application Planning)

Nutri-Ready is the headwater of a series of Nutrizone programs. The implementation of Nutri-Ready is divided into dua subprograms, namely Nutri-Discuss and socialization programs. Nutri-Discuss was held offline on June 2 and 14, 2021, with the coordinator and two teachers of the autism system. The implementation of Nutri-Discuss is in the form of participatory discussions to identify partner problems. The use of participatory discussions is considered appropriate because, in its implementation, it is two-way to maximize the participation and activeness of partners. In this sub-program, the implementation team presented a solution in the form of a series of Nutrizone programs.

A series of *Nutri-Ready* programs continued with the socialization of the program. The socialization was held online on June 20, 2021, through a zoom meeting attended by the implementation team, 10 teachers, and 11 parents. The socialization of the program was presented about the introduction of the Nutrizone program and the guidelines for diet programs for autistic children. The diet used in the Nutrizone program is a diet free of gluten and casein. This diet therapy is the main dietary therapy because gluten and casein can form *gluteomorphine* and *gauphine* in autistic children that trigger hyperactivity, so it needs to be reduced (Setyaningsih, 2019). The measurements were made through in-depth interviews with 21 participants to gain the indicator in figure 1. Based on the results of an in-depth interview, it is known that partners have understood the concept of implementing a gluten and casein-free diet. In fact, partners have disseminated to several other parents with similar problems.

### 3.3 Nutri-Pandai Program Performance (Guidance for Readiness)

Nutri-Pandai is part of the process of a series of Nutrizone programs. This sub-program is separated into two sub-programs, the issuance of program implementation manuals and educational modules for teachers and parents and *Nutri-Integrated Training*. The manual discusses the results of program implementation, which contains partner existing conditions, program details, operational instructions, and implementation results or expected results. To support the success of the program, an educational module was issued containing information about: 1) Permasalahan organizing meals for autistic children; 2) Pola eating and diet for autistic children, 3) Tor how to use Nutri-App and *augmented reality pop-up book*; 4) Program implementation scheme on partner curriculum (teacher module only).

Downstream from the Nutri-Pandai program series is *Nutri-Integrated Training*. This sub-program was held online through a zoom meeting on July 10, 2021, and offline door to door on July 6-12, 2021. In implementing this sub-program, *training of trainers* is carried out where the implementation team becomes a facilitator for partners. Partners are taught how to prepare menus and nutrition monitoring through Nutri-App and the use of *augmented reality pop-up books*. The results of the assessment of the effectiveness and *usability* of both applications are presented in figures 4 and 6.

### 3.4 Nutri-Tangkas Program Performance (Actualization of Activities and Programs)

Nutri-Tangkas is an advanced process of a series of Nutrizone programs. Nutri-Tangkas has three sub-programs, namely *Nutri-Guide Book*, *Nutri-Learn*, and *Nutri-Aspire*. The actualization of the *Nutri-Guide Book* was held on 22-23 July 2021 online

through *WhatsApp personal chat*. In implementing this sub-program, monitoring the results of previous training and monitoring the implementation of the manual and modules given. Manuals and modules are used as references by partners independently to implement gluten and casein-free diet programs through the application of external media. Based on the results of observation through *Nutri-App*, it can be seen that partners can already choose and compile food menus for autistic children. In addition, there was an increase in *Nutri-app* usage, which was originally 50% in the first week to 80% in the second week of monitoring.

*Nutri-Tangkas* program series is continued with *Nutri-Learn*. This sub-program began with recruiting volunteers on a national scale in the period 24-31 July 2021 in commemoration of children's day and world breast milk week. The result of the recruitment **of 14,000 volunteers was obtained** from 15 provinces in Indonesia. The high number indicates that the *Nutrizone* program has the capability and credibility. After recruitment, partners and volunteers carried out a national campaign on healthy lifestyles and diets for autistic children through Instagram. Through the campaign, both partners and volunteers can widely disseminate the knowledge obtained to the community.

The culmination of *the Nutri-Learn* activity was a national webinar organized by UNICEF-LPPM Diponegoro University with the title "Fulfillment of Nutrition in Infants and Children Through Breastfeeding and Balanced Nutrition". The implementation team received recognition as a speaker in the webinar according to invitation letter number 3275/ UN7.6.1/ TU / 2021. The recognition of the team indicates that the *Nutrizone* program has been recognized and trusted by the entire community. At the end of the session, an assessment is carried out to determine the audience's level of understanding. The results of the assessment are presented in table 2.

**Table 2.** Results of Unicef-LPPM Undip national webinar assessment

Question	Percentage (n=6675)				
	1	2	3	4	5
Suitability of themes and materials	0,0	0,1	4,2	37,4	58,3
The level of understanding of the material presented	0,0	0,1	6,7	46,7	46,5
Pentingnya diet for autistic children	0,0	0,2	3,2	21,1	75,5
The level of efficiency of campaign methods in disseminating the <i>Nutrizone</i> program	0,0	0,1	3,6	32,0	64,3
Average	0	0.12	4.42	3 4.3	6 1.16

Based on the table above, the assessment results showed that the audience was very satisfied with the webinar with an average score of 61.16% and only 0.12% gave a less satisfying assessment. In addition, based on testimonials from audiences, including partners and volunteers, it is known that they want to continue and disseminate the program because of the usefulness of the material delivered. Downstream from the *Nutri-Tangkas* program is *Nutri-Aspire*, held online on August 10, 2021. This sub-program is in the form of a decommissioning of aspirations from partners regarding the implementation of programs that have been run. Based on the results of open questionnaires obtained several aspirations such as providing education about the dose of sugar and the frequency of snacks.

**3.5 Nutri-Pantas Program Performance (Potential Development and Sustainability of the Program)**

*Nutri-Pantas* is downstream from a series of *nutrizone's* four major programs. *Nutri-Pantas* has four sub-programs, the creation of *Nutrizone* sites and social media, *Nutri-Connect*, Sustainable *Nutrizone*, and program evaluation. In the first sub-program, several social media accounts have been created, namely Youtube (2,500 followers), LinkedIn (500 followers), and Instagram (9,000 followers). Based on the testimonials from several users, the high number of followers on social media accounts indicates that the *Nutrizone* program has high benefits and attractiveness. In addition, *Nutrizone* also has a site that is [www.pkmnutrizone.com](http://www.pkmnutrizone.com). This site contains popular articles about diet for autistic children, program implementation manuals, educational modules for teachers and parents, and external applications connected to the Google Play store. Through this site, it is hoped that the general public can implement a series of *Nutrizone* programs and feel its benefits.

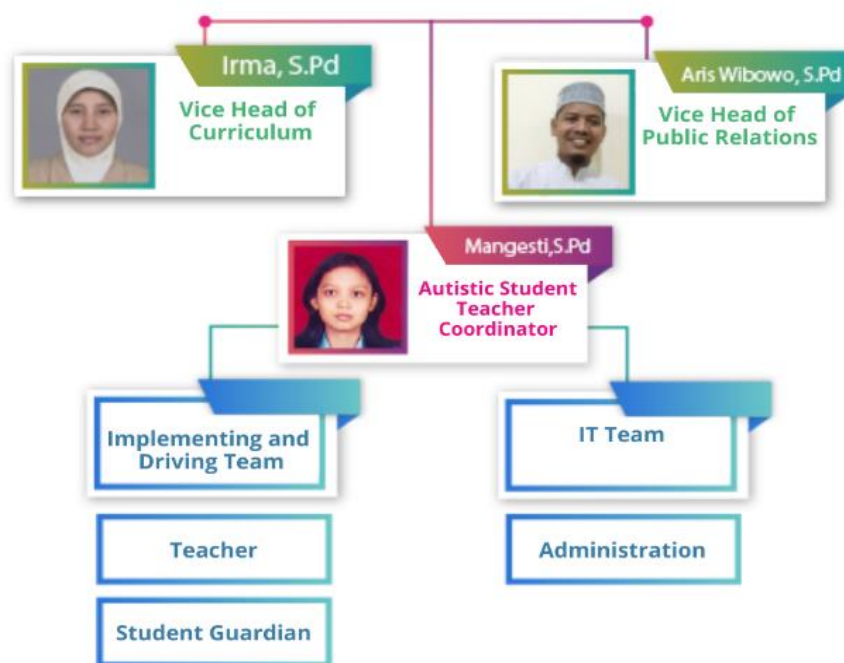
The next set of programs is *Nutri-Connect*. This sub-program is in integrating the *Nutrizone* program into the *Bina Diri* curriculum at SLB Negeri Semarang. Previously, the curriculum only taught how to wash clothes, cut nails, wash dishes, wash after menstruation, and how to change pads. Therefore, by integrating into the *Bina Diri* curriculum, partners can independently continue the diet program that has been taught. The *Nutrizone* program implementation scheme takes three hours of learning each week, with details in table 3.



**Table 3.** Nutrizone program implementation scheme on Self-Development Curriculum

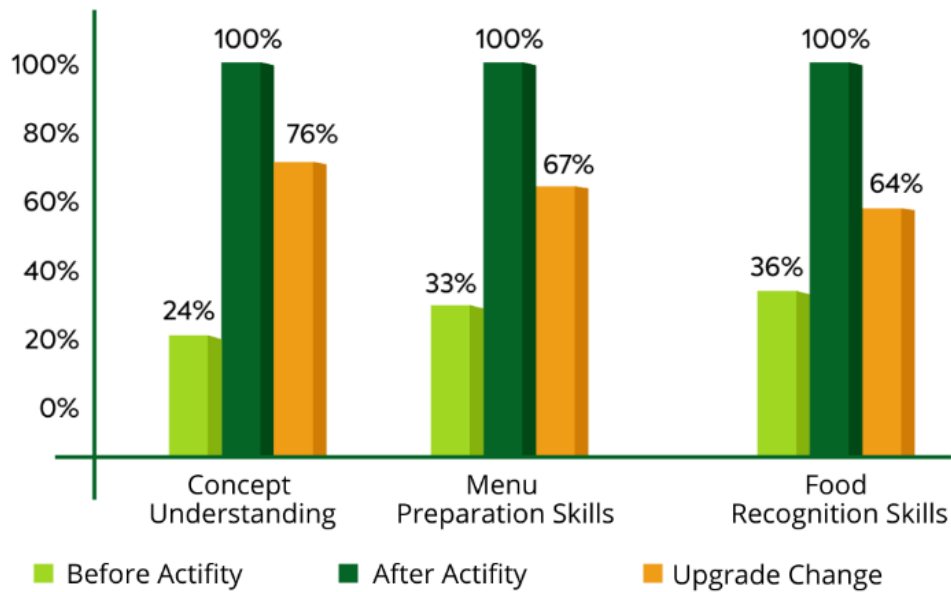
Material	Time allocation (hours)
Basic materials:	
- Introduction of healthy food and balanced nutrition	1
Core material:	
- Healthy diet for autistic children	1
- Application of the contents of my plate	
Supporting materials:	
- Introduction to healthy foods using <i>augmented reality pop-up books</i>	1
- Preparation of menus and weekly monitoring through Nutri-App	
Sum	3

The formation of organograms presented in figure 2 is needed to perfect the success of this sub-program. Based on figure 2, a driving and support team consisting of teachers and guardians of students is arranged. The driving and support team serves as the main executor of the activity. In addition, in figure 2, IT experts are developing Nutrizone applications and site outputs. Hopefully, nutrizone's application and site output can be tailored to partners' needs and applied to autistic children and other people with disabilities.

**Figure 2.** Nutrizone program organizational structure on partner curriculum

The upstream-downstream network of the Nutri-Pantas program continues with *Sustainable Nutrizone*. *Sustainable Nutrizone* is a form of cooperation between the implementation team and the Semarang Disability Friends Community (KSD) to support the dissemination and sustainability of the program. The community is a community that fights for the rights of people with disabilities that began to be set aside in the city of Semarang (Mutiah & Astuti, 2018). The reason for selecting the community is that all children with autism who are members of KSD attend SLB Negeri Semarang. Therefore, a series of programs run in SLB Negeri Semarang can also be adopted in these communities.

The last sub-program of a series of Nutrizone programs is the assessment and evaluation of the program. This sub-program aims to find out the changes in partners before and after the Nutrizone program. Assessment and evaluation are carried out through closed questionnaires. The results of the assessment are presented in figure 3.



**Figure 3.** Program evaluation results

Based on figure 3, it is proven that the Nutrizone program can increase partners' competence in implementing diet programs for autistic children from 24% to 100%. In the image above, it is known that partners are 100% empowered in compiling menus using Nutri-App and introducing healthy foods using *augmented reality pop-up books*. Based on the results of testimonials from partners, it is known that there are changes in autistic children who have undergone the Nutrizone diet program. These changes decrease hyperactivity and habits of consuming healthy foods such as vegetables and fruits.

**3.6 Effectiveness of Use of Nutri-App Mobile Application Media**

Nutri-App is a two-sided application between teachers and parents. The app contains a daily menu calendar between the implementation team, teachers, and parents. The app serves as monitoring by teachers and daily menu reminders for autistic children. The existing daily menu can be updated by teachers based on discussions with parents through a menu database integrated with the Nutrizone website. All existing foodstuffs were adjusted to the Indonesian Food Composition Table (TKPI) in 2019 to be well standardized. The appearance of Nutri-App is presented in figure 4.



**Figure 4.** Nutri-App app view

An application trial was conducted with a SUS questionnaire to measure the usability aspect based on the user's subjective assessment to determine the feasibility and effectiveness of the application used. The results of the questionnaire are presented in figure 5. In figure 5, the average SUS score from 30 respondents was 94, equivalent to a rating of 4.7 out of 5. The sus value category of more than 80.3 is categorized as *having a grade A* or easily accepted and effective for users (Saputra, 2019).



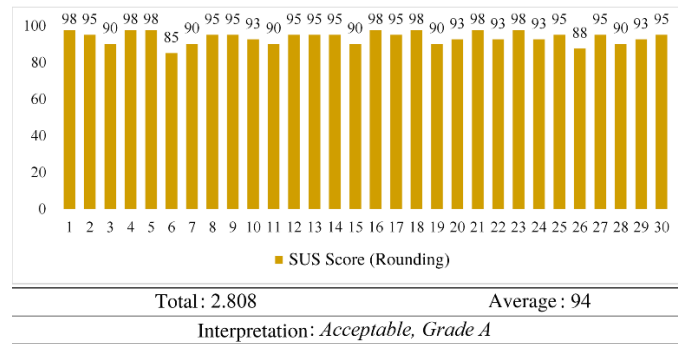


Figure 5. Nutri-App rating results graph via SUS questionnaire

**3.7 Effectiveness of Augmented Reality Pop-Up Book**

An augmented reality pop-up book is an application that can project virtual objects in real-time. This application provides an overview of healthy foods applied to gluten and casein-free diet therapy. This application aims to introduce new foods for autistic children who have been experiencing difficulties due to picky eater behavior. This application is considered capable of introducing new foods because of its interactive and engaging nature in audio-visual (Nazaruddin and Efendi, 2018). The appearance of this application is presented in figure 6.

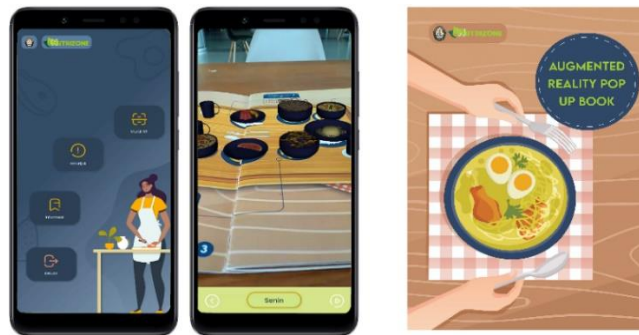


Figure 6. Print book view and pop-up book AR app

An application trial was conducted with sus questionnaire to measure the usability aspect of the user's subjective assessment to determine the feasibility and effectiveness of using the application. The results of the questionnaire are presented in figure 7. In figure 7, the average SUS score from 30 respondents was 92, or equivalent to 4.6 out of 5. The SUS value category of more than 80.3 is categorized as having a grade A or readily accepted and effective for users (Saputra, 2019).

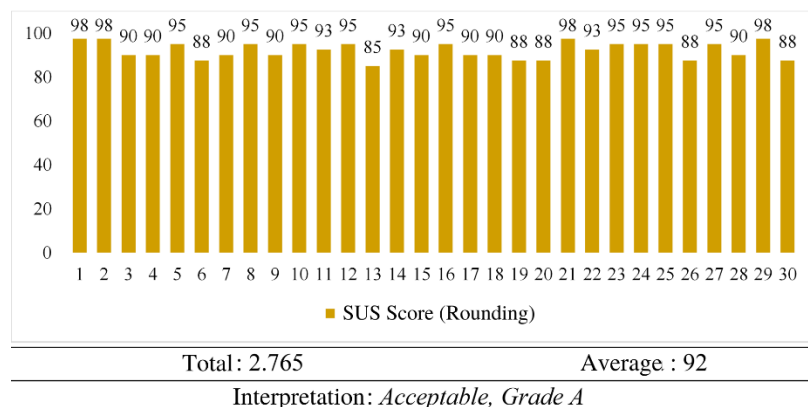


Figure 7. Graphic of ar pop-up book assessment results through SUS questionnaire

### **3.8 Benefits and Sustainability Potential**

Nutrizone program has added value to education and health through technological innovation, which is caused by the Nutri-App application, who's preparing menus and nutrition monitoring for the first autistic children in Indonesia. Unlike the Birdhouse application, which only presents the feature of recording the development of autistic children, the Nutri-App application has scheduled, consulting, reminder alarms, and menu preparation features that partners can update. In addition, the Nutrizone program is a sustainable program with several potentials, namely:

1. The potential for accessing and updating materials by partners due to the integration of materials and application outputs is available on the Google Play store and <https://www.pkmnutrize.com/> sites.
2. The embodiment of partners as a pilot institution in organizing diet programs for autistic children through the outside of the application. This is due to the success of the Nutrizone program, as evidenced by the assessment of the program evaluation, along with its integration into the partner curriculum supported by the formation of organizational arrangements in the implementation of the program.
3. The potential for initiating a new movement regarding nutrition and the dissemination of programs by 14,000 volunteers, partners, and the Sahabat Difabel Community of Semarang.
4. External user-friendly applications have the potential to be developed for people with disabilities.

### **4. Conclusion**

The implementation of the Nutrizone program concludes that it can increase the competence of partners regarding dietary programs for autistic children from 24% to 100%. In addition, both application outputs are considered feasible and effective in solving partner problems. The high value of SUS evidence on Nutri-App and AR pop-up books with foreign values of 94 and 92, respectively, is equivalent to 4.7 and 4.6 out of 5. Several changes occurred based on partner testimonials after running the program, namely a decrease in hyperactivity in autistic children and the habit of eating healthy foods.

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