APPLICATION DEVELOPMENT OF COMMUNICATION, LEARNING AND THERAPY FOR AUTISM BASED ON ANDROID MOBILE

Idwar Halid[1], Angga Setiyadi[2]

[1,2] Teknik Informatika - Universitas Komputer Indonesia
Jl. Dipatiukur 112-114 Bandung
E-mail : idwar.frin@gmail.com [1], anggasetiyadi@gmail.com[2]

ABSTRACT

Autism is a developmental disorder in overall that causing delayed in social skills, communication, and behavior. The autism children problems that may inhibit the development of their potential and skills, so it is very influential in their academic and non-academic result.

Based on the survey results that was conducted to 38 parents who has autism children through questionnaires stated that as many as 31 parents didn't understand their children words and desire. Twenty eight (28) parents didn't understand their emotions. This result indicated that the autism children difficulties to communication with the others.

Based on these problems, the application was builded that can help the process of communication, learning, and therapy with the method called augmentative and alternative communication (AAC), which is a method and media were used by children who have difficult to communicate smoothly with the people around them. Communications applications, studying, and therapy are an application that was builed to make autism expresse their desire and emotion easily, facilitate the learning process and also help them in the motoric nerve therapy.

Kata kunci : *Communication, Therapy, Autism, Android apps.*

1. INTRODUCTION

Autism is a developmental disorder resulting an overall resistance in social skills, communication, and behavior. Disorders experienced by children with autism is a disorder in the areas of social interaction, impaired in the field of communication (verbal and non-verbal), in the field of behavioral disorders, disturbances in the field of feelings or emotions, and disruptions in field of sensory perception [1].

Based on the results of questionnaires to parents of autistic children as many as 31 out of 38 parents of autistic children are less familiar with the expression and wishes of their childer. A total of 28 out of 38 parents of students with autism do not understand the emotions of their childer. From the results of observation, with the learning media tools that still uses books or other tools are less effective in terms of cost and learning to use media books tend to be always in a State of stationary (not moving, inactive, unchanging situation) makes easy the autism sufferers are tired and it's hard to understand the given material.

1.1 Android OS

Android is an operating system for mobile phones based on Linux. Designed for touch screen mobile devices such as smart phones and tablet computers. Android user interface is generally in the form of direct manipulation, using motion yanag touch similar to the real action, for example shifting, tapped to manipulate objects on the screen, as well as a virtual keyboard for writing text. [2]. Android provides an open platform for developers to create their own applications and for use by a variety of mobile devices (mobile device). It allows developers to write managed code (managed code) in the Java programming language, controlling the device via Google-developed Java libraries.

Table 1 components of the Android operating system

Funtionality	*Java Base Class*	Examples
Focused thing a user can do	*Activity*	*Edit a note, play a game*
Background process	*Service*	*Play music, update weather icon*
Receive messages	*BroadcastReceiver*	*Trigger alarm upon event*
Store and retrieve data	*ContentProvider*	*Open a phone contact*

Each application must have used at least one of these components, but there are some components that require lists specified permission before use as components Service, Broadcast Receiver, Content Provider [3].

1.2 Autism

Autism is derived from the word "autos" meaning everything that leads to himself. In the dictionary of general psychology, autism means preoccupation of the thoughts and fantasies alone or in other words more oriented to their subjective thoughts rather than seeing the reality or the reality of everyday life. Therefore, people with autism often referred to people living in the "natural" own [4].

Autism or infantile autism (Early Infantile Autism) was first proposed by Dr. Leo Kanner, a psychiatrist States in 1943. The term autism is used to designate a psychotic symptoms in children are unique and stand is often called Kanner's Syndrome. A prominent feature on Kanner's syndrome, among others, a blank facial expression as if daydreaming, losing his mind and it is difficult for others to draw attention to them or invite them to communicate [4]. At first the term "autism" taken from schizophrenia disorder, where Bleuer wear autism to describe the behavior of schizophrenic patients who withdrew from the outside world and create their own fantasy world. However, there are clear differences between the causes of autism in patients with schizophrenia with infantile autism. In schizophrenia, autism due to the impact area of a mental disorder in which there are hallucinations and delusions that occurred at least 1 month, whereas in children with autism infantile there is a failure in the development belonging to the criteria of interference pervasive in the lives of autistic that are not accompanied by hallucinations and delusions [4].

1.3 Communications

Communication implies together (common). Fill communication or communication comes from the Latin, meaning that communicatio notification or exchange. Adjective communis, meaning the public or together [5].

Experts define communication from their perspective respectively. Remember that the history of science communication, he developed from scientists from different disciplines [5].

Sarah Trenholm and Arthur Jensen communication defines thus: "A process by the which a source transmits a message to a receiver throught some channel." (Communication is a process by which the source transmits the message to the recipient through a variety of channels) [5].

Hoveland define communication, thus: "the prosess by the which an individual (the communicator) transmits stimuli (usually verbal symbols) to modify, the behavior of other people" (Communication is the process by which individuals transmit the stimulus to change the behavior of other individuals) [5].

Gode give an understanding of the communication, as follows: "It is a process that makes common to or Several what was the monopoly of one or some." (Communication is a process that makes being together for two or more previously monopolized by one or several people) [5].

The definitions as described above, certainly do not represent all the definitions that have been made by experts. However, at least we have gained an idea of what constitutes communication, sebagimana expressed by Shannon and Weaver (1949), that communication is a form of human interaction which mutually affect one another, intentionally or unintentionally, and not limited to the form of verbal communication, but also in terms of facial expressions, painting, art and technology [5].

1.4 Learning

In general, learning is a process of change, ie a change in behavior as a result of interaction between itself and its surroundings in meeting their needs. A complete understanding of learning is a process conducted by an individual to obtain a new behavior change overall, as a result of individual experience itself in interaction with the environment [6].

Learning is a change in a relatively permanent behavioral tendencies as a result of practices that reinforced that there are causes of learning. Learning itself occurs between the cause and result of learning (Kimble & Garmezy. 1963: 133). In the process of learning, a relatively permanent change refers to a change in appearance (performance). However, appearances can be observed, but learning (learning) itself can not be observed. It can be concluded that a person has done to learn if he had been able to do something that previously could not do. but not all learned to produce changes in behavior or appearance [6].

1.5 Therapy

Art treatment through therapeutic methods actually been from time immemorial, since when before knowing the medical term treatment with a therapy that was well-known. We can see the medication at the time of Indonesia before independence, or even when the days of empire, metodek improvement, with the spiritual expert, then combined with the treatment of nature (plants and launya). Then when religion began to enter Indonesia starting from Gujarat style treatment, China and Islam. All these treatment methods can be mentioned in the category of therapy [7].

Therapy or treatment, is remediation of a health problem, usually following a diagnosis. The person conducting the therapy is referred to as a therapist [8].

2. CONTENT OF RESEARCH

2.1 Method That Is Currently Running

Before doing the design of the system, the need for an analysis of the methods that are currently running, where this method will be a reference to

made into a program. Here are some of the running procedures:

2.1.1 Communication Method

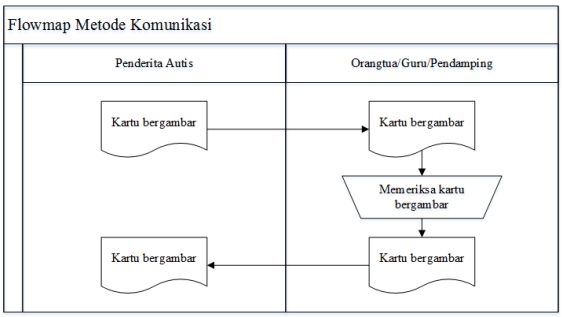


Figure 1 Flowmap Communication Method

2.1.2 Learning Methods

1. Learning Numbers

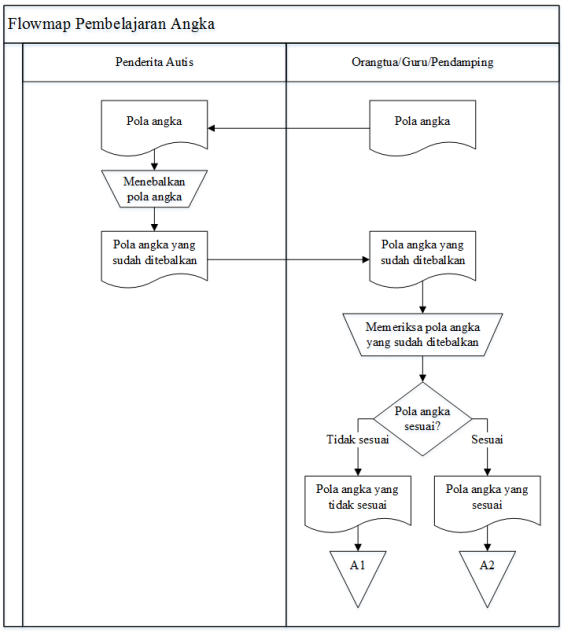


Figure 2 Flowmap Learning Numbers

2. Learning Letters

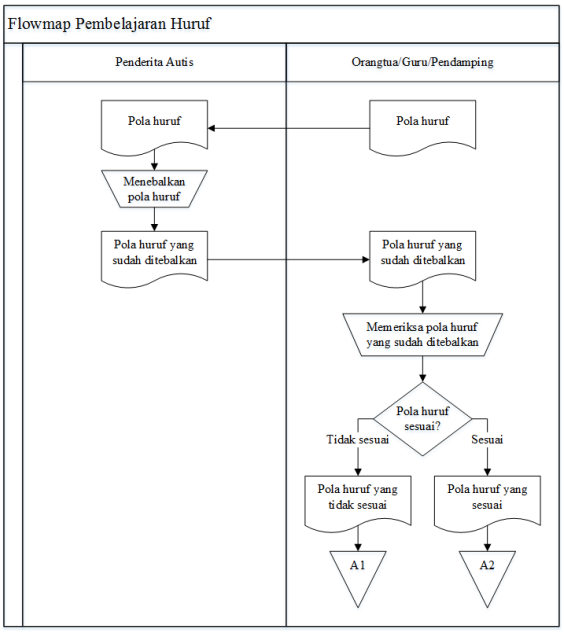


Figure 3 Flowmap Learning Letters

2.1.3 Method Of Therapy

1. Shapes Matching

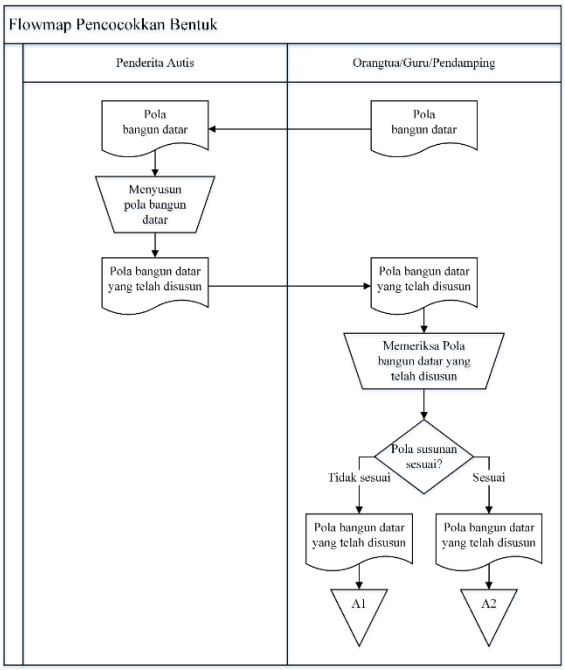


Figure 4 Flowmap Shapes Matching

2. Multiple Sizes Matching

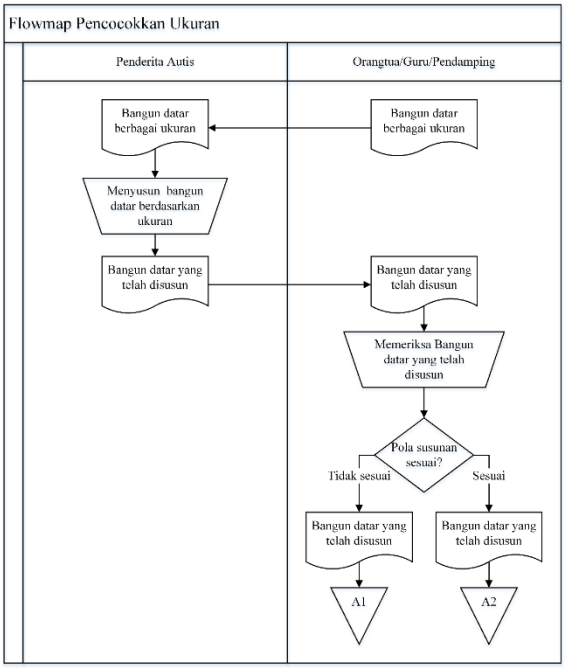


Figure 5 Multiple Sizes Matching

3. Colors Matching

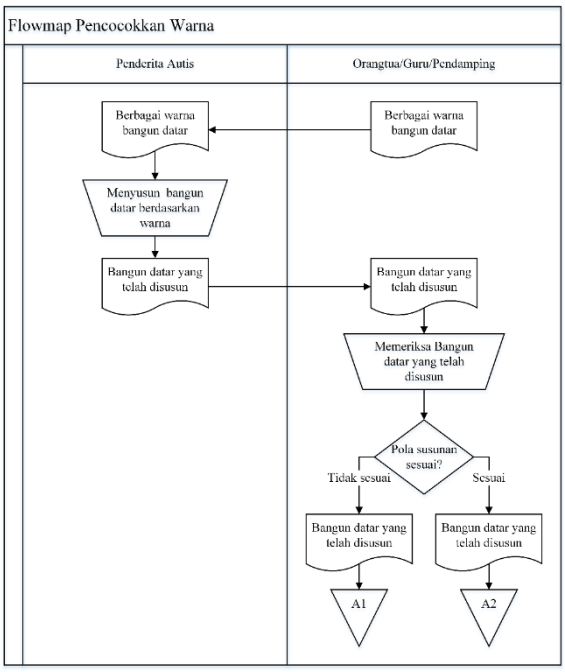


Figure 6 Flowmap Colors Matching

2.2 Analysis of Application that will be developed

applications that will be developed will use Indonesian language. Applications will be developed to help people with autism to communicate easily by pressing the buttons that have been provided. With portability of applications autistic children can communicate anywhere without carrying tools or other media display. In the study, subjects were given the introduction of letters and numbers that dynamic with images, animations, and sounds that can make children with autism are more interested and not easily bored in learning. In this application, the parents do not have to set up the card letters and numbers, the field of cardboard or other tools, the concept of interactive Drag and Drop the children to play as well as the introduction of learning letters and numbers common companion and parents. In the treatment will be applied to occupational therapy practice fine motor skills. Occupational therapy to help strengthen, improve muscle coordination and skills in autistic children. The following will be explained about the components contained in the application communication, learning, and therapy.

Table 2 Component In Applications Will Be Developed

No	Component	Information
1	Suara	Digunakan untuk suara pada menu komunikasi, belajar, dan efek-efek pada terapi.
2	Grafis	Aplikasi ini memiliki bentuk grafis 2 dimensi
3	Menu	Aplikasi ini terdiri dari beberapa menu yang memiliki fungsi beragam, diantaranya: a. Komunikasi 1) Benda 2) Emosi 3) Makanan 4) Minuman 5) Tempat 6) Tambah Item b. Belajar 1) Mengenal Angka 2) Mengenal Huruf Besar 3) Mengenal Huruf Kecil 4) Menulis Angka 5) Menulis Huruf Besar 6) Menulis Huruf Kecil c. Terapi 1) Mencocokkan Bentuk 2) Mencocokkan Warna 3) Mencocokkan Ukuran
4	Bahasa	Bahasa yang digunakan dalam aplikasi ini yaitu menggunakan Bahasa Indonesia.

2.3 User Analysis

Analysis of the physical device and the device is thought for users who will be using this application are as follows:

Table 3 User Analysis

Pengguna	Penderita autis minimal usia 5 tahun, Orangtua (Pendamping)
Hak Akses	Menggunakan Aplikasi
Tingkat Pendidikan Minimal	Setingkat Sekolah Dasar
Jenis Pelatihan Yang Harus Diberikan	Pelatihan seputar tata cara menggunakan Aplikasi Komunikasi, Pembelajaran, dan Terapi
Keadaan Fisik Pengguna	Tidak tuna netra, Tidak tuna rungu
Bahasa yang dikuasai	Bahasa Indonesia

2.4 Design The Structure Of The Menu

Perancangan struktur menu menyediakan gambaran dari stuktur menu perangkat lunak yang akan dibuat. Berikut adalah gambaran perancangan arsitektural menu pada Aplikasi Komunikasi, Pembelajaran, Dan Terapi.

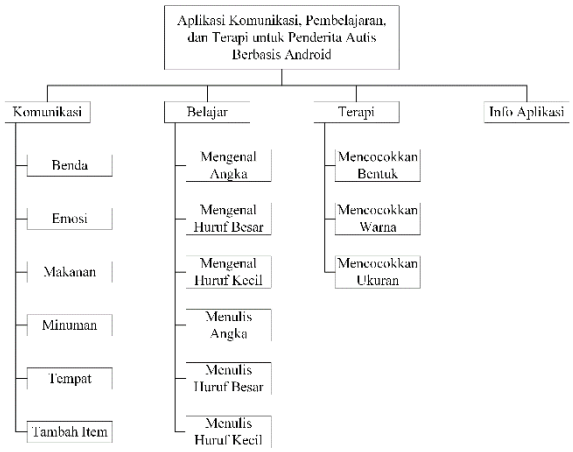


FIgure 7 Design The Structure Of The Menu

2.5 Implementation Of The System

Implementation of the system is a translation stage design based on the results of the analysis into a programming language that is used and the application software is built on a real environment. The purpose of implementation is to implement a design that has been made, so that the user can provide inputs for the development of applications that have been developed.

2.5.1 Software Implementation

Computer software is used to develop applications of communication, learning, and therapy for children with autism is as follows:

Table 4 Software Implementation

No	Software Builders	Information
1	Windows 8.1 Ultimate 64bit	Menjalankan program pendukung pengembangan aplikasi
2	Android Studio	Penulisan kode program java android
3	Adobe Illustrator	Pembuatan aset aplikasi
4	Audacity	Pengolah suara atau audio

2.5.2 Hardware Implementation

Computer hardware used to develop communications applications, learning and therapy for people with autism are as follows:

Table 4 Hardware Implementation

No.	Hardware	Specification
1	Processor	Processor dengan kecepatan 1.8 GHz
2	Memory	RAM 8 GB
3	HardDisk	Free Space 200 GB
4	Monitor	Monitor Dengan Resolusi 1366 x 768 pixel
5	Mouse	Standar
6	Keyboard	Standar
7	Graphic Card	Intel HD Grpahics Family 2 GB
8	Smartphone Android	OS Lolipop 5.1.1

2.6 Testing Systems

2.6.1 Data Questionnaire

The questionnaire data from application communication, learning, and therapy for people with autism are as follows:

1. The number of respondents consisting of 25 people who are parents of learners.
2. Point is the subject of the assessment are:
   a. Help people with autism to communicate.
   b. Help people with autism in the therapeutic process (fine motor skills) and learning (literacy and numeracy) as well as an alternative medium of learning in addition to books..

Here is a list of questions to the user in table 5.

Table 5 List Of Questions Questionnaire

User	Question
pengguna	1. Apakah aplikasi ini memberikan kemudahan dalam proses komunikasi?
	2. Apakah minat belajar anak Anda meningkat setelah menggunakan aplikasi ini?
	3. Apakah aplikasi ini membantu dalam terapi saraf motorik halus?
	4. Apakah aplikasi ini bisa menjadi alternatif media pembelajaran selain buku?
	5. Apakah anak Anda merasa senang menggunakan aplikasi ini?

2.6.2 Questionnaires Data Processing

The scale of answers from the questionnaire in Table 6.

Table 6 Scale Questionnaire Answers

Answer	Score
SS = Sangat Setuju	5
S = Setuju	4
BS = Biasa Saja	3
KS = Kurang Setuju	2
TS = Tidak Setuju	1

Here are the results of data collection from each answer to each user. The answer of each respondent can be seen in Table 7.

Table 7 Answers User Questionnaire

No. respondents	Questions / Scale Questionnaire					Total
	1	2	3	4	5	
1	4	4	3	3	4	18
2	4	4	4	3	4	19
3	4	3	4	3	4	18
4	4	3	3	3	4	17
5	4	4	4	3	4	19
6	4	4	4	3	4	19
7	4	3	4	3	4	18
8	4	4	4	4	4	20
9	4	3	4	4	4	19
10	4	4	3	3	4	18
11	4	5	4	4	4	21
12	4	4	4	3	4	19
13	4	4	4	4	4	20
14	4	3	4	4	4	19
15	4	4	4	4	4	20
16	4	4	4	4	4	20
17	4	4	4	4	4	20
18	4	4	4	4	4	20
19	4	4	4	3	4	19
20	4	4	3	4	4	19
21	4	4	5	3	5	21
22	4	4	4	4	5	21
23	4	4	4	4	4	20
24	5	4	5	4	4	22
25	5	3	4	4	5	21
Total						**487**

To view the overall attitude of the respondents to the quality of communications applications, learning and therapy for people with autism, the steps are:

1. Specifies the maximum score, the maximum score obtained by each respondent multiplied by the number of respondents. (25 x 25 = 625)
2. Specifies the minimum score, the minimum score obtained by each respondent multiplied by the number of respondents. (5 x 25 = 125)
3. Determining the value of the median, which is the sum total of the maximum score with a total score of at least halved. (625 + 125) : 2 = 375
4. Determining the value of quartile 1, which is the sum of the median total score of at least halved. (125+ 375) : 2 = 250
5. Determining the value of quartile 3, which is the sum of the maximum score with a median split in two. (625 + 375) : 2 = 500

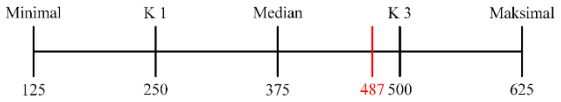


Figure 8 Results of Treatment Questionnaire Respondents

Table 8 Categories Overall Attitude

Sikap Sangat Positif	Kuartil 3 ≤ x ≤ Skor Maksimal	500 – 625
Sikap Positif	Median ≤ x < Kuartil 3	375 – 500
Sikap Negatif	Kuartil 1 ≤ x < Median	250 – 375
Sikap Sangat negatif	Skor Minimal ≤ x < Kuartil 1	125 – 250

Based on the picture above, the overall attitude of the respondents to the application of communication, learning, and therapy for people with autism there are in the category of a positive attitude. This is shown by the total score of respondents were located between the Quartile Median score of 3, which is the limit score in the category of a positive attitude. This means that overall the respondents saw this app useful and help people with autism.

The following is the calculation of the respective answers that have calculated values using a formula calculation result that the number of divided number of samples.

1. Processing the first question of the questionnaire

Table 9 aspect Questionnaire Question 1

Question	Information	Score	Frequenc	Total Score
1	Sangat Setuju	5	2	10
	Setuju	4	23	92
	Biasa Saja	3	-	-
	Kurang Setuju	2	-	-
	Tidak Setuju	1	-	-
Amount			**25**	**102**

Then obtained the following calculationt:

$$P = \frac{102}{5 \times 25} \times 100\% = 81.6\%$$

Based on respondents' answers to the first question, the level of agreement of respondents to question No. 1 is 81.6% of the expected 100%. Based on the processing of data obtained from 25 respondents, the average percentage of 81.6% is located in the area strongly agree. In the continuum can be described as follows:

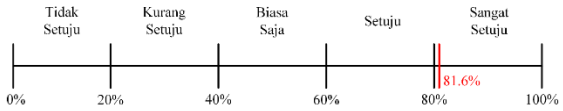


Figure 9 Processing Questions First

2. Processing the second question from the questionnaire

Tabel 10 Aspek Kuisioner Pertanyaan Ke-2

Question	Information	Score	Frequenc	Total Score
2	Sangat Setuju	5	1	5
	Setuju	4	18	72
	Biasa Saja	3	6	18
	Kurang Setuju	2	-	-
	Tidak Setuju	1	-	-
Amount			**25**	**95**

Then obtained the following calculation:

$$P = \frac{95}{5 \times 25} \times 100\% = 76\%$$

Based on respondents' answers to the first question, the level of agreement of respondents to question No. 2 is 76% of the expected 100%. Based on the processing of data obtained from 25 respondents, the average percentage of 76% is located in the area agree. In the continuum can be described as follows:

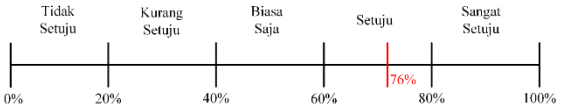


Figure 10 Processing Question Two

3. Processing of the third question from the questionnaire

Table 11 Aspects Questionnaire Question 3

Question	Information	Score	Frequenc	Total Score
3	Sangat Setuju	5	2	10
	Setuju	4	19	76
	Biasa Saja	3	4	12
	Kurang Setuju	2	-	-
	Tidak Setuju	1	-	-
Amount			**25**	**98**

Then obtained the following calculation:

$$P = \frac{98}{5 \times 25} \times 100\% = 78.4\%$$

Based on respondents' answers to the first question, the level of agreement of respondents to question No. 3 is 78.4% of the expected 100%. Based on the processing of data obtained from 25 respondents, the average percentage of 78.4% is located in the area agree. In the continuum can be described as follows:

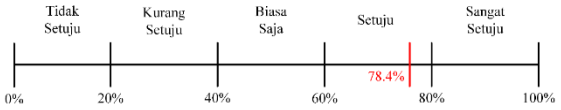


Figure 11 Processing Question Three

4. Processing the fourth question of the questionnaire

Tabel 12 Aspek Kuisioner Pertanyaan Ke-4

Question	Information	Score	Frequenc	Total Score
4	Sangat Setuju	5	-	-
	Setuju	4	14	56
	Biasa Saja	3	11	33
	Kurang Setuju	2	-	-
	Tidak Setuju	1	-	-
Amount			**25**	**89**

Then obtained the following calculation:

$$P = \frac{89}{5 \times 25} \times 100\% = 71.2\%$$

Based on respondents' answers to the first question, the level of agreement of respondents to question No. 4 is 71.2% of the expected 100%.

Based on the processing of data obtained from 25 respondents, the average percentage of 71.2% is located in the area agree. In the continuum can be described as follows:

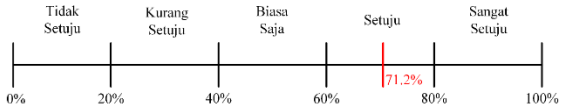


Figure 12 Processing Question Four

5. Processing fifth questions of the questionnaire

Tabel 13 Aspek Kuisioner Pertanyaan Ke-5

Question	Information	Score	Frequenc	Total Score
5	Sangat Setuju	5	3	15
	Setuju	4	22	88
	Biasa Saja	3	-	-
	Kurang Setuju	2	-	-
	Tidak Setuju	1	-	-
Amount			**25**	**103**

Then obtained the following calculation:

$$P = \frac{103}{5 \times 25} \times 100\% = 82.4\%$$

Based on respondents' answers to the first question, the level of agreement of respondents to question No. 5 is 82.4% of the expected 100%. Based on the processing of data obtained from 25 respondents, the average percentage of 82.4% is located in the area strongly agree. In the continuum can be described as follows:

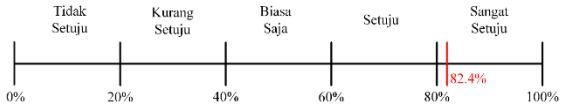


Figure 13 Processing Fifth Question

2.6.3 Conclusion Testing System

Based on the results of tests performed by questionnaire observation it can be concluded that the application of communication, learning, and therapy for people with autism can help and facilitate people with autism to communicate, recognize numbers and letters, and therapy. And with an attractive appearance, users become interested in learning numbers and letters as well as enough to help the process of fine motor therapy.

3. CLOSING

3.1 Conclusions

Based on test results perangat software on android platform it could be concluded as follows:

1. Applications built to help autistic children and make it easier to communicate.
2. Applications built to help autistic children and make it easier to express their emotions.
3. Applications incorporating images, animations, and sounds makes it an autistic child in the learning process.
4. With the introduction of the feature numbers and letters can be an alternative learning as the book so much, while minimizing costs.
5. With the features of communication, learning, and therapy in one application can provide various facilities and benefits for children with autism.

3.2 Suggestion

The advice in the development of these applications in the future are as follows:

1. Communication features in applications that are limited to five menu and have not been able to add a category can be developed so that users can add to kategor-other categories as needed.
2. Developing applications Communication, Learning and Therapy for people with autism by adding instructional material and animations that will attract more children with autism.

BIBLIOGRAPHY

[1] S. M. Rahayu, "Deteksi dan Intervensi Dini Pada Anak Autis," jurnal pendidikan anak, vol. III, no. 1, p. 420, 2014.

[2] L. M. Isabella Chen, "developer.android.com," [Online]. Available: http://developer.android.com/gude/components/activities.html. [Accessed 21 Marc 2016].

[3] F. Manjoo, A Murky Road Ahead for Android, Despite Market Dominance, The New York Times, 2015.

[4] C. Puspaningrum, "*Pusat Terapi Anak Autis Di Yogyakarta*," Tugas Akhir Sarjana Strata – 1 Pada Program Studi Arsitektur Universitas Atma Jaya Yogyakarta, P. 11, 2010.

[5] Wiryanto, Pengantar Ilmu Komunikasi, Jakarta: Grasindo, 2004.

[6] UPI, *Ilmu & Aplikasi Pendidikan*, Pertama ed., Bandung: Imperial Bhakti Utama, 2007.

[7] E. P. Jusuf, "*Perilaku Komunikasi Fasilitator Terapi Dengan Klien Dalam Terapi Usik Wiwitan*," Skripsi, p. 30, 2014.

[8] wikipedia, "wikipedia.org," 2014. [Online]. Available: https://id.wikipedia.org/wiki/Terapi. [Accessed 31 Maret 2016].