

Development and Study of AAC Application of Communication for Autistic Children

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Abstract

“Let’s Talk!” is a new AAC (Augmentative and Alternative Communication) application for personal digital assistance for autistic children. This new and remarkable application has many particular advantages compared to existing AAC. We especially focus on an easy and simple manipulation. By tapping a symbol on a screen of a PDA with this application, a user can show his/her thoughts with pictures and sounds to others easily. There are 2 modes that can be switched depending on different situations of users. It has 120 symbols based on daily life and a user can also modify the original page with new icons made by pictures or sound. A user also can customize an original page by arranging icons she or he made or existing symbols. On the newest version of this application, we added Task Schedule System to stimulate motivations of children to do something on their own. In the last part of this study, we show some case studies. We introduced this application to students in a school for handicapped children.

Keywords

Autism, VOCA (Voice Output Communication Aid), PDA (Personal Digital Assistant), AAC (Augmentative and Alternative Communication)

Introduction

Many autistic children tend to have verbal communication disabilities, so they need some support tools to express their thoughts or needs. Some assistant applications for PDA (Personal Digital Assistant), such as Drop Talks, Voice4u, and Tap to Talk, aim to help autistic children who have communication disorders already diagnosed. Those communication assistant tools are called AAC (Augmentative and Alternative Communication) or VOCA (Voice Output Communication Aid). Although many studies about VOCA have been made and school educational fields have adopted these tools, they have not come into general use because of the high price and complicated operations. Therefore, we tried to develop a new communication assistant tool for PDA with simple and easy manipulation at a low price. We spent half a year to develop the application from October 2010 and finally released “Let’s Talk!” in April 2011 on the iTunes Store. After we launched the app, we have modified and updated it 14 times within a year referring to data from schools for handicapped children or requests from users through ICT infrastructure.

Purpose of the study

There are some characteristics of autism as below:

1. Disorder in developing sociability
2. Disabilities in developing speech and communication ability
3. Repetition of same behavior and attachment to something

Because of these characteristics of disorders in developing sociability, it is very difficult for some autistic children to relate with others. Picture cards have been used to support communication for autistic children. But autistic children do not understand they need to show the card to someone who will fulfill their needs. In most cases, teachers show the cards and make

the children choose one. The autistic children did not get enough successful experiences with this method, so their communication ability was not improved.

In 1985, Dr. Andy Bondy and Ms. Lori Frost developed PECS (Picture Exchange Communication System). They pointed out the problems of the existing picture indication system as, “The system does not teach children to be interested in people but pictures,” and “The system ignores the approach for people which is a part of communication.” But PECS also has some other problems. A user carries “a communication book,” which is a note with picture cards. The more new words a user is gaining, the more picture cards he/she needs to carry. It would take much time to find a card he/she needs or to make new cards.

If an autistic child uses PDA as a communication tool instead of those picture cards, he/she can reduce much time and effort to make or find cards. A user can create symbols by himself/herself that are suitable to his/her situation. It is a great advantage of the application in increasing new vocabularies.

Construction of the system

Usability of the application

We focused on a simple manipulation without complicated explanation to develop this application. The reaction area is wide and the volume of the voice and sound is very clear and loud enough to be able to hear outdoors or in a crowded place such as a classroom. These distinguishing characteristics will let handicapped children use those AAC more easily. They can communicate with others whenever and wherever by using pocket-able PDA without carrying a special piece of equipment. It is also expected that the unique contents of this application may

create a chance to communicate with others. Autistic children will be accepted in the society by communication with the application, and it will increase the quality of life for them.

Two modes of the application

There are 2 modes on this application. First, on "Supportive Mode," a supporter who helps a person who has a disability starts communication. Second, on "Self-use Mode," a person who has a disability can show his/her request by voice with this application. By switching the modes depending on different situations of users, more effective communication will be expected.

Stamp Mode

On the newest version of "Let's Talk!" (iPhone / "Let's Talk!" AppVersionNumber 4.0 June 10, 2012), we added Stamp Mode. On this mode, you can make a chart with a goal. A child gets a stamp whenever he/she has done what they need to do. For an autistic child, it is easy to understand how many stamps they need to reach a goal. When a child achieves a goal, fireworks or fanfare will appear as a prize. It would be effective to give children the motivation to complete the chart to get these special prizes. Autistic children will get good influences through experiences of being able to do something by themselves repeatedly. It will help them to develop autonomy and independence and create motivations through trying anything on their own efforts.

Experiments at School for Handicapped Children

Introducing the application on an experimental basis was carried out at Miai Yogo School, a school for handicapped children. This application attracted the attention of most of the children, and they really enjoyed using it. They liked cartoon-like characters and were interested in the operation since it looked like a game for them. Some of the children who had never talked

before started to communicate with teachers or parents with the application. It is obvious this application had great effect on those children with speech disorders. We collected data about the correlation between “Let’s Talk!” and the behavior of a child through observation.

Case study 1

The subject of investigation

8 year-old boy with autism who does not have the ability to speak.

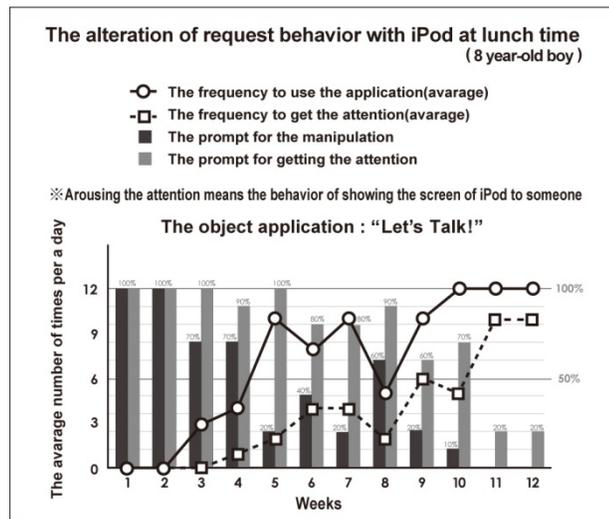


Fig. 1. The Alteration of Request Behavior with iPod at Lunch Time (8 year-old boy)

Table 1 The Alteration of Request Behavior with iPod at Lunch Time (8 year-old boy)

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
The frequency to use the application (average)	0	0	3	4	10	8
The frequency to get the attention (average)	0	0	0	1	2	4
The prompt for the manipulation	100%	100%	70%	70%	20%	40%
The prompt for getting the attention	100%	100%	100%	90%	100%	80%

Table 1 (continued) The Alteration of Request Behavior with iPod at Lunch Time (8 year-old boy)

	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
The frequency to use the application (average)	10	5	9	12	12	12
The frequency to get the attention (average)	4	2	6	5	9	9
The prompt for the manipulation	20%	60%	20%	10%	0%	0%
The prompt for getting the attention	80%	90%	60%	70%	20%	20%

This student tried to tell his teacher he wanted to have another plate at lunch with the application. His teacher divided his lunch into 12 small portions and gave one of them at a time to urge him to ask for a refill as a training in communication. Figure 1 shows how his behavior changed when he started to use this application. The dark bar graph shows how many times the teacher taught him the manipulation of this application. The manipulation is divided into 5 levels.

1. To get the iPod
2. To release the lock of the iPod
3. To start ‘Let’s Talk!’
4. To choose an icon
5. To show it to someone

Autistic children will learn 1 to 4 quite easily, but they will not understand 5, which means that they need to show the screen to someone if they want their requests satisfied. The light bar graph shows how many times the teacher told him to get the attention of others. It is very difficult for the children to understand that they need to get the attention of other people if they want to communicate. So the teacher’s support was needed more than 50% until the 10th

week for this boy. The solid line graph shows how many times he actually used this application. The dashed line graph shows how many times he tried to get the attention of his teacher.

It is clear that his motivation to communicate with the teacher had been increased by using the iPod with this application. His classroom teacher reported that he often had offensive movements, such as scratching or spitting at other students since he got in the school. But those behaviors decreased dramatically after he started to learn how to express his thoughts to others in a proper way with this application. Lately, he tries to start communication with PECS (Picture Exchange Communication System) and the iPod to let others to know his requests or needs.

In this case study, it is considered that the student is satisfied as his teachers understood what he needed, even if his requirements had not been fulfilled. It is important that he knows someone understands his requests and empathizes with him. Many teachers of the school said most of the children seemed to enjoy their life at school more after introducing this application.

Case Study 2

The subject of observation

11 year-old-boy (M in this report)

He was diagnosed with autism when he was 3 years old and has a severe mental disability. He did not speak. When he needs something, he will take another person's hand and move it to the thing he wants to get. He eats only certain foods and did not eat school lunch almost at all when he was in 1st grade. He was able to eat something little by little, but still left about half of the portion when he was in 3rd grade. He sometimes attacked someone around him, for example kicked friends or teachers, when he was in 1st to 3rd grade. He cried out suddenly,

ran around, stamped his foot or kicked someone around him when he became a 4th grader. He became interested in cell phones that his parents had when he was in 3rd grade.

Process of Development

In April, 2011, M touched the iPad for the first time. We gave it to him with “Let’s Talk!” on the screen. He understood that the screen would change when he touched it immediately. And he also got the idea that there were some screens that created sound when he touched them.

In May, 2011, he started to use the iPod, which he preferred for convenience to carry around, for lunch time. He began to show the words such as “Can I start?” “Reduce some of this, please.” “Can I have some more?” and so on with iPod that had some applications. He learned how to use those applications quickly when we taught him. In late May, we took pictures of the lunch menu and saved them in “Let’s Talk!” as original symbols. M showed what he did not like to eat when he saw the pictures. At this point, he did not try to arouse someone’s attention.

In June, 2011, he began to start the application quickly. He also became to be able to use other applications on the iPod. He erased the menu he ate with the To Do application and told us “Reduce some of this, please” with “Let’s Talk!” He started to arouse someone’s attention by tapping his/her shoulder or arm.

In September, 2011, he got used to the manipulation of the application. He even became able to create original symbols by himself. He added symbols of the way to go back home (a school bus or parents picking him up) by capturing images from the picture library.

In November, 2011, he began to be able to use some other applications besides “Let’s Talk!” He worked on his project, confirming the process with “Task Schedule.”

In February, 2012, M has been using “Let’s Talk!” less often lately. He uses his gestures to tell us simple requirements. If the person he tries to tell his request to cannot understand his gesture, he uses pictures in the iPod, which he always carries around or types limited words he knows on memo function. He seems to choose the suitable way for the situation to communicate. He sometimes makes voice sounds to get someone’s attention, which he had never done before this observation.

Summary of Observation

Before we started this project, M could do something only with someone’s indication and reply only yes or no if he was asked something. We tried to introduce PECS (Picture Exchange Communication System) to him, but we could not continue the training for supporters and his level stayed on Phase 2 (it is the phase a child can request even if he/she stays away from a supporter or picture cards).

He could understand how to use “Let’s Talk!” and what he can do with it by himself without any special training in a short period of time. He felt comfortable when someone sympathized with his emotion even if his request was not satisfied immediately while he learned the joy of communication with this application. He also became able to understand the situation when he needed to wait till someone finished what he/she was doing at that moment.

We believe that repeating the experiences of communicating with others stimulates the desire for communications and arouses initiative. It is obvious “Let’s Talk!” is useful in raising communication ability.

Conclusion

We developed a new communication assistant tool with PDA, “Let’s Talk!,” for autistic children. If autistic children feel the joy of communication by using this application, they will be strongly motivated to try to understand others’ thoughts.

On the report from the school for handicapped children introducing “Let’s Talk!” on an experimental basis, this application attracted the attention of most of the children and they really enjoyed using it. They liked the cartoon-like characters and were interested in the operation since it looked like a game for them. Some of the children who had never talked before started to communicate with teachers or parents with the application. Especially, it is very interesting that one of the children who had repeated self-injurious behavior, which some of the other children had made terrible fun of him for, tried to explain the problem with the application, then he stopped hurting himself. The most important thing is the application brought a lot of smiles to all the children. It is obvious “Let’s Talk!” had great effect on those children with speech disorders.

This application may have much possibility to be used by not only by autistic children but also people who have problems of communication because of some diseases, such as pharyngeal cancer, cerebral palsy from a stroke, or senile dementia. We believe this application will help all people with or without any disabilities to live a better life. And we also think if people can communicate with each other regardless of disabilities, it will provide new human resources and encourage developing a society where people support each other.

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