ABSTRACT:

This study aims to communicate with 4 autism spectrum disorders (ASD) and 1 normal student, as the research case, in order to improve their ability to communicate with Augmentative and Alternative Communication (AAC) intervention in social cognitive and emotional disorders, adopting a participatory multi-case study. Pre-organized expanding and contracting system. It was designed to terms with life situations to communicate the contents of construction, experimental evaluation using pre-organized expanding and contracting system, with the life situations of text, frames and videos, and with people in their social, emotional performance of the operation expression comparisons to define whether it can effectively improve the case of cognitive ability or quality of communication content. Pre organization scaling system interface design equipment using mobile touch tablet PCs, as intervention tools, system refer to the use of interactive communication training assessment evaluation methods construct the following items (A) the error rates: case required a controlled set of communication forum to answer questions (2) Communication Operational efficiency: click and select questions to answer communication system layout, the average completion time (3) the system easy to learn independently Level: Case Application for the issue of its own operating system interface or need help ...... and so on in order to assess the degree of learning and completion (4) System memory and cognitive links extent Ratio: case application pre-organized user interface and cognitive assessment of the case on operational issues, the degree to prove the memory link height ratio (5) active operation, motivation to maintain assessment: Case actively operating items and the number of frequencies are interested in communicating project evaluation. And experiment with communication disorders in the system precisely familiarity to assess the degree of improvement in each training capabilities. The experimental result found that: the use of pre-organized expanding and contracting system to communicate with Experimenter and cooperation in pronunciation, the autism spectrum disorders in cognitive training, communication and complement its lack of ability to have to gradually achieve accurate familiarity, whether it is impaired or normal student, cognitive, communicative distinction accuracy, efficiency, the average time to complete the degree or independent are showing remarkable progress. This study evaluated the process of intervention aids, communication cognition learning and training aid result on specific proposals, respectively. Finally, the pre-organized expanding and contracting communication, with a touch computer interface usability experiments to prove conducive to addressing communication, cognitive affective disorder. Sustainable development more pre-organizational communication research and design content provider engaged in family's teaching promotion or related research designers and teachers.

Keywords: Autism Spectrum Disorder, Augmentative and Alternative Communication, Pre-Organized Expanding And Contracting Systems, Cognitive Ability, Usability.
1. INTRODUCTION

For the speech therapist, the biggest challenge is how to provide assistance to communicate with autism and related disorders, according to (National Research Council, 2001) estimated that one-third to points an autistic adult children no communication with the ability to speak. Mirenda, P. (2003)

Communication is often defined as the process of information exchange, to express their opinions and receiving process, affective link exchange process or the process of thinking. Communication is the people's lives all the time in the event 's behavior, people communicate main purpose is (a) express basic needs; (2) to exchange messages; (3) establishment of social intimacy; (4) to participate in social routine activities (Light, 1989).

For most children, within a few years, no others deliberately taught in their native language can be learned structure, meaning and usage rules. Vocabulary words from the beginning of the present one, two-word combination, phrases/sentences simple to use, re-entering the complex sentence/multi-use clause of. Finally, they can automate, organized a longer narrative content. However, there are some children but in speech, language use, and listening comprehension difficulties or problems. They may understand and use fewer words, vocabulary Seek difficulties arise, the rules can not be grammatical structures appropriate conversations with others, can not be organized narrative event/story, unable to follow pragmatic rules for proper conversation with others appears auditory perception processing issues, verbal memory problems, etc., which causes the development of communication and language barriers.

Auxiliary expand communication system (Augmentative and Alternative Communication, abbreviated as AAC) in the past 20 years the United States and Europe, connecting the auxiliary communication system to enhance communication and irreplaceable. AAC provides professional language services hampered by serious obstacles and people who use it is intended to provide a temporary or permanently effective, convenient way to help connect people with severe communication difficulties, including the difficulty of writing barriers, language barriers.

Use Augmentative and Alternative Communication (AAC) device development has the absolute potential to meet the complex communication needs in the daily lives of their peers capability range of functions using (Beukelman and Mirenda, 1998 years). Using AAC interactive communication has proved to be a human interface design challenges. Have the ability to communicate with people is a basic human need, however, lagged physical and psychological factors, lack of learning experiences, environmental deprivation and barriers, as well as limitations in physical function and cognitive development...... Therefore, the situation of communication disorders is very difficult. They are unable to develop an effective and clear communication skills, are resulted in learning, relationships and difficulty of the work, and even a lot of behavior problems. In general, autism spectrum problems, there are a variety of disorders in children, physical and mental impairments, training, link capacity priority. In order to link their language and cognitive behavioral gap, through situational images to make a selection, links, vocabulary AAC graphics library interface design and layout, though seemingly abstract and complex, but also a mode of operation with a structured training.

Autism is a pervasive development disorder, but there are several important defect categories, including emotional communication disorders, social communication disorders, impaired social interaction, imagination is weak and other major defects (NAS 2000). In addition to these obstacles categories, autistic behavior repeatedly in self-stimulation and continuous repetitive movements often occur, and the limited number of actions associated with the very small amount of interest, and the relative standard of behavior than on a fixed structure with the needs of environmental cues such as often by those who are autistic behavior characterization.

Cathy binger and Janice light (2008) have completed those who use Augmentative and Alternative Communication (AAC) with pronunciation and serious physical injury (SSPI) review of 31 studies on personal use of part of the lexical and syntax. The results suggest that although many people use AAC are displayed extensive understanding and expression syntax structure of these cases is the risk.
of having experienced lack of grammar. Many domestic survey also wide individual differences. One of
the more significant finding is that they use graphic symbols database AAC system, compare the
expectations of participants expected, individuals tend to produce shorter words; however, seem to
show towards the use of longer discourse trends. Using AAC kind of lack of relevant research and
development and appropriate assessment tools, assessment and intervention techniques to improve
access to personal grammar. Development of such tools and the importance of technology
development is worthy of being discussed.

Personal use of Augmentative and Alternative Communication (AAC), language development,
grammar skills development is a complex part. These people, many of whom have severe speech and
physical disorders Severe Speech And Physical Impairments (SSPI), rely on AAC devices usually
contain graphic symbols (for example, line drawings, photographs) and/or traditional orthography.
Other forms of communication trust comparing speech created a unique language learning
environment, researchers have pointed out that many people seem to use the auxiliary AAC difficult
to master grammar skills (eg, Sutton, Soto, & Blockberger, 2002; Blockberger & Sutton, 2003).
There is no way to master grammar those practices, and there is clearly difficult to convey the
message of communication partners. Personal use of AAC frequently encountered in the school to
meet the requirements of an academic difficulties (Kent-Walsh & Light, 2003), to ensure and maintain
employment (McNaughton & Bryen, 2002), and may be lacking in the creation of these challenges to
master grammar plays a role. So, check the auxiliary AAC obtain and use personal morphology and
syntax. This is the key. Some researchers have begun to check the personal use AAC grammar skills.
Although some researchers to discuss these results in the literature (Sutton et al., 2002; Blockberger
& Sutton, 2003), has been up to now no systematic reviews on this topic published in the literature.

The main objectives are: (a) focus on individual barriers to provide effective communication services,
morphology and syntax does not involve difficult, therefore, to consider the development of
assessment tools and grammar interventional therapy for this group discussion
(b) break through the simple operation of both modes AAC content in advance of the Pre-organized
expanding and contracting system design, as the database can be extracted at any time of the pre-
organizational model that allows emergency cases through a scalable interface operation

2. METHOD

2.1. PARTICIPANTS

Four children with autism, one normal student and their teacher or teaching assistant participated in
this study. None of the children demonstrated a pointing response which prevented the completion of
any standardized measures of receptive or cognitive abilities prior to the start of the study.

<table>
<thead>
<tr>
<th>Participants</th>
<th>Name</th>
<th>Age</th>
<th>Communication disorder degree</th>
<th>Other disability describing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Crown Min</td>
<td>13</td>
<td>Autism</td>
<td>Light</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Heavy limbs disability, cognitive normal</td>
</tr>
<tr>
<td>2</td>
<td>Zong Han</td>
<td>13</td>
<td>Autism</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Slight limbs disability, cognitive normal</td>
</tr>
<tr>
<td>3</td>
<td>Yuk Chun</td>
<td>13</td>
<td>Autism</td>
<td>Heavy</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Study, cognitive and slightly weak</td>
</tr>
<tr>
<td>4</td>
<td>Zhu Feng</td>
<td>12</td>
<td>Autism</td>
<td>Heavy</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Study, cognitive, strongly weak</td>
</tr>
<tr>
<td>5</td>
<td>Little Chi</td>
<td>8</td>
<td>Normal</td>
<td>No</td>
</tr>
</tbody>
</table>

Table 1, Participants ability analysis
2.2. SEETING

Speech-Generating Devices (SGD) intervention has also been successfully initiated by teaching requests for preferred objects (Sigafous, Drasgow, & Schlosser, 2003). With SGD intervention, instead of exchanging a picture to obtain the real item, the learner is taught to touch a picture or line drawing on an electronic speech output device, which then produces a relevant [pre-recorded] message (e.g., “I want ___”). Therefore, We used a Tablet PC as user interface to design. About scene mode setting, We choose three videos, including multi-scenario to evaluate all participants by Operational definitions of child Word cognition ability.

Communication and cognitive understanding survey: subjects after each operation to tackle the problem reflect the actual situation, to communicate cognitive understanding investigation. The problem for the design of content understanding of the operation when asked to respond, for questioning after each question by helping to complete, such as over time is taken into account, this problem will continue until completion; random sampling five times each section title with a record of experimental accuracy completion time.

<table>
<thead>
<tr>
<th>Questions Design / Session</th>
<th>Pre</th>
<th>Post</th>
<th>Pre</th>
<th>Post</th>
<th>Pre</th>
<th>Post</th>
<th>Pre</th>
<th>Post</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expression my emotions - My feeling</td>
<td>46.43</td>
<td>26.23</td>
<td>25.1</td>
<td>8</td>
<td>38.3</td>
<td>9</td>
<td>58.4</td>
<td>539</td>
</tr>
<tr>
<td>How does it feel when being scolded?</td>
<td>46.30</td>
<td>25.40</td>
<td>25.1</td>
<td>8</td>
<td>38.3</td>
<td>9</td>
<td>58.4</td>
<td>539</td>
</tr>
<tr>
<td>How does it feel to be appreciated time?</td>
<td>122.5</td>
<td>8</td>
<td>23.4</td>
<td>2</td>
<td>39.4</td>
<td>1</td>
<td>54.3</td>
<td>1</td>
</tr>
<tr>
<td>How does it feel to go school days?</td>
<td>128.5</td>
<td>3</td>
<td>28.33</td>
<td>3</td>
<td>28.33</td>
<td>3</td>
<td>28.33</td>
<td>3</td>
</tr>
<tr>
<td>Vacation feeling</td>
<td>28.4</td>
<td>5</td>
<td>28.4</td>
<td>5</td>
<td>28.4</td>
<td>5</td>
<td>28.4</td>
<td>5</td>
</tr>
<tr>
<td>Go out to play feeling</td>
<td>124.4</td>
<td>7</td>
<td>14.48</td>
<td>7</td>
<td>25.1</td>
<td>6</td>
<td>18.4</td>
<td>6</td>
</tr>
<tr>
<td>When you feel physical discomfort</td>
<td>1.215</td>
<td>9</td>
<td>20.19</td>
<td>9</td>
<td>11.4</td>
<td>1</td>
<td>18.0</td>
<td>4</td>
</tr>
<tr>
<td>You feel the content of the target of interest</td>
<td>1.215</td>
<td>9</td>
<td>20.19</td>
<td>9</td>
<td>11.4</td>
<td>1</td>
<td>18.0</td>
<td>4</td>
</tr>
<tr>
<td>You feel target subjects are not interested</td>
<td>11.4</td>
<td>1</td>
<td>18.0</td>
<td>4</td>
<td>11.4</td>
<td>1</td>
<td>18.0</td>
<td>4</td>
</tr>
<tr>
<td>When you feel frustration or depression</td>
<td>21.1</td>
<td>2</td>
<td>20.5</td>
<td>2</td>
<td>21.1</td>
<td>2</td>
<td>20.5</td>
<td>2</td>
</tr>
<tr>
<td>Communication correct response rate % / average time</td>
<td>84%</td>
<td>84%</td>
<td>100%</td>
<td>67%</td>
<td>17%</td>
<td>0%</td>
<td>0%</td>
<td>84%</td>
</tr>
</tbody>
</table>

Table 2: Scene mode setting - emotion

2.3. MATERIALS

Picture Master Language Software (PMLS) platform by means of board pre-organized system method for cases to use pages from PC to any platforms. Support Touch screen Pocket size PC running Windows CE giving high performance and loud volume. It is linking up the communication and interaction fast, for the tool by way of helping student’s expression, teacher’s teaching (such as Fig 1).
3. EXPERIMENTAL DESIGN

3.1. RESEARCH QUESTIONS

In order to successfully communicate with disabilities to communicate using appropriate aids and express their ideas, solve critical communication barriers, and daily special and important needs and via mobile devices connected to communication skills good interface design flaws, so the main purpose, will discuss the following questions: A survey students with autism spectrum communication barriers, What did the cases of demand and its effective manner to communicate? Why did the cases willingness to take the initiative to operate? 2 life terms training and assess students on the autism spectrum frame, text, clip method involves comparing the training assess how the case operation cognitive comprehension? 3 Pre-organized scalable system interface layout assess self-care, how defined situational teaching training effect mobility aids equipped? 4 situational frames, text, video clips way involved with the pre-organizational life term scaling system, cognitive, communicative operation training pretest, situational modes of communication posttest usage and evaluation, to understand whether the increase of cases of cognitive, communication skills and enhance their communication behavior? whether ASD who can enhance social, emotional recognition accuracy? How to learn cognition and understanding of different content?

At first, we observed their ability and problem analysis of the participants in advance. Secondly, materials collecting and writing down their life demand in structurization (Table. 1). Then, we used editor's system of figure storehouse with the user's habitual cognitive way to design communication board improved their syntactic performance (Figure. 3). [Yin, Robert K., 2001].
Augmentative and Alternative Communication (AAC) devices are designed to meet the needs and capabilities of the features users. In these functions, there are several options, the development mode speeds and retrieval messages. Such a scheme involving the use of abbreviated extension code (for example, rmb? Remember), but to master these codes and generalize their use of functions, using the AAC interactive communication has proved to be a challenge for many people (Beukelman & Mirenda, 2005). PECS (Picture Exchange Communication System) In this study, the system used is based on image-based adjuvant, AAC systems and individuals often use ASD (Mirenda, 2001; Mirenda & Erickson, 2000). PECS is based on several key concepts of personal and ASD, and how they learn the language and social interaction skills (Bondy & Frost, 1994, 1998, 2001). Hux, Burke, Elliot, and Ross (2001) reported two participants to use the AAC learn a few codes, direct instruction, but they did not contain these codes to use daily communication. Fager, Hux, Karantunis, Beukelman investigated 25 cases associated with traumatic brain injury and depends on the AAC for a longer period (3 - 28 years). These people, only one using orthographic coding strategy success.

3.2. PRE-ORGANIZED SYSTEM DESIGN AND EVALUATION
AAC Menu interface design, to meet the needs of a range of user functions and capabilities. In these functions, there are several options to speed up the development and retrieve messages. This idea comes from using abbreviations, extended code (for example, rmb? Remember) method, but how to master these codes and summarize its function, the use of interactive communication AAC has proved there are still many challenges to be a breakthrough (Beukelman and Mirenda, 2005) Alternative strategies may be abbreviated as follows: 1. Simple hyphenation 2. Omit vowels and simple hyphenation 3. The first and last letters 4. Phrase in the first letter of each word 5. From other background standard abbreviations 6. Phonics.

AAC offers a variety of modern science and technology to develop models and message retrieval method, as follows: AAC Menu Design, bopomofo phonetic system, Fitzgerald key Felizijiele color code, Picture-based system (Beukelman & Mirenda, 2005; Higginbotham, 2001; Stuart, Lasker, & Beukelman, 2000; Todman, 2001).

ASD to learn the traditional picture cards and word cards, due to carry, organize and find inconvenient, each will need to use the vocabulary are looking for content, and the limited number of convenience with decreasing usage. Which classification is a very complex task, for the cognitive aspects of difficult cases, look for the words he wanted to express card or cards, is quite time-consuming and difficult to link to, so communication forum AAC invention improves the picture card system shortcomings, but for very good, with severe communication disorders, no cases of verbal ability, vocabulary and Gallery amount bit lacking. On the other hand, carry out, or would have the dignity and the case was not enough to normalize. Therefore, this research through a systematic approach to organizational communication scalable content layout with ASD in the social, emotional deficiencies link, you can provide the selection of cases relatively selective vocabulary response, rather than absolute requirements for case questions are, period can assist with communication needs, and further can recognize the complexity of human emotions delivered on various occasions to interact with emotion.

Fig. 3 Life, campus, food, shopping page
4. RESULTS

The study compares the results computed using an analytical modal with the participants (Table 2) who ASD communication and cognition disorders, the experiment divides into two parts who are examined, what each person go on graphic cards to communicate by life idiom of communication board and by Pre-organized expanding and contracting system. All experiments constructed communication board design, and the findings of two methods also can improve ability of communication and cognition disability obviously.

4.1. ASSESSMENT

Every participant accepts the Pre / Post experiment of five times respectively, carries on the experiment according to the topic designed. The experiment is divided into two parts altogether: “The effect of studying and training evaluation”, and “The effect of cognitive and reflecting evaluation”. Then It is compared the ability of graphic exchange and Pre-organized modes. The results indicated pre-organized mode to improve apparently with the design object of the experiment by content of examining.

Learning to communicate response training effectiveness evaluation Null hypothesis H0: no difference in response to an independent communication training The alternative hypothesis H1: Training communication independent responses have significant results. From (Fig. 4) the communication of experiment, we find from the “Wrong average”, “Finishing Communication degree independently” (Tab. 4).show that trains obviously progress through operating training.

Accuracy respect is progressive trend in "Word cognition ability”. On the other hand, “Communicate accuracy of distinguishing”, "Communicate passive response rate", and “Communicate accuracy rate voluntarily” (Tab. 3). but it must incorporate auxiliary study voluntarily, and become a kind of expression habit.
Figure 6: Manipulate board wrong rate.

Figure 7: Response questions efficiency
Studies comparing acquisition of requesting skills using pre versus post Tablet PC are few in number, but the results have generally shown very little differences in terms of the ease or speed of Learning
The line chart can be found from (Fig. 7) training each time, Response questions efficiency makes obvious decrease.

We can find from result, “Communicate average time of selecting”, “Communicate response average time”, and “Communicate average time voluntarily”, are lower trend with Response ability training (Tab. 5). Time is shortened, so we can find out that use progressive possibility one by one.

4.2. OPERATIONAL INTERACTION EVALUATION

The result finds “Manipulate board wrong rate”, “Response questions efficiency”, “Word cognition ability”, “Finishing Communication degree independently”, “Response ability” <0.05. It is quite apparent that four participants reflect that they study and train difference of showing (Table 6).

“Manipulate board wrong rate”, “Response questions efficiency”, “Word cognition ability”, “Finishing Communication degree independently”, “Response ability” analyze afterwards from Duncan, we find by comparing every section in training one by one, 2, 3, 4, 5 obviously superior to section 1, so we can say that communication will making progress by training.

Communication independent from the training response (Table 6) Pre / Post comparisons, P = 0.000 <0.05. Five cases under test results are quite significant, representing communication response time and response assessment through communication training is very effective, reflecting the learning and
training communication training responses are significantly different, as long as ASD cases through pre-organized systems approach successive training and use of effective progress is to be expected of the state.

<table>
<thead>
<tr>
<th>Evaluation</th>
<th>Method</th>
<th>F</th>
<th>P-value</th>
<th>Duncan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manipulate board wrong rate</td>
<td>7.568</td>
<td>0.000&lt;0.05</td>
<td>2 · 4 · 5 section &lt;1</td>
<td></td>
</tr>
<tr>
<td>Response questions efficiency</td>
<td>2.684</td>
<td>0.000&lt;0.05</td>
<td>3 · 4 · 5 section &lt;1</td>
<td></td>
</tr>
<tr>
<td>Word cognition ability</td>
<td>5.718</td>
<td>0.001&lt;0.05</td>
<td>2 · 3 · 4 · 5 section &lt;1</td>
<td></td>
</tr>
<tr>
<td>Finishing Communication degree independently</td>
<td>2.918</td>
<td>0.032&lt;0.05</td>
<td>2 · 3 · 4 · 5 section &gt;1</td>
<td></td>
</tr>
<tr>
<td>Response ability</td>
<td>5.436</td>
<td>0.022&lt;0.05</td>
<td>2 · 4 · 3 · 5 section &gt;1</td>
<td></td>
</tr>
</tbody>
</table>

Table 6: Operational interaction evaluation of variable analysis and duncan evaluation

5. DISCUSSION

This research has compared with using pictures before the pre-intervention, after the post-intervention using pre-organized expanding and contracting system, with the life situations of text, frames and videos, and with people in their social, emotional performance of the operation expression comparisons to define whether it can effectively improve the case of cognitive ability or quality of communication content. at probing into computer aided communication boards in studying result and expert's evaluation of communication usability:

The experiments of every 5 classes of experiment are trained, found finally:

(1) Training the effect of studying
After training for 5 times including pre/post test, four ASD participants compared with one normal student make apparent progress in the following. In clicking and selecting to communicate and training, the ”Communicate accuracy of distinguishing” raise gradually, ”Communicate average time of selecting” reduces gradually too, the tendency has risen to communicate quality gradually.

(2) Communicate response effect
In reacting, the response rate increases gradually, average response time is shortened gradually too, the will that the system reacts increases gradually to is it communication using PMLS to represent the participants, and reflect and click movements selected that is familiar with precisely gradually. On training last stage, participants can use the board to answer the questions. it shows that the way to communication board has effect of showing on the interactive behavior of improving the participants.

(3) Communication the effect voluntarily
In communicating voluntarily, the number of times to increase gradually, average response time is shortened gradually, it will represent the participants communicate voluntarily to increase gradually. They operate and communicate familiar with precisely gradually. Training last stage, participants can use the board of communication and take the initiative even more. The participants who look after with home mainly communicate effectively, show that it has effect of showing on the behavior of improving the participants that the life idiom of school systematic boards.

Throughout the training activities were found, the researchers applied computer-aided training communication and cognitive impairment cases, for training modules to do is step one step explanation demonstrations, case follow the steps to practice in order to deepen the impression, and then repeated on exercises, good results. The study has observed the training activities, the learning to operate with the case because the communication system with parents, teachers and students to pass messages to each other and demand, to achieve the purpose of passing messages. Therefore, training ASD students to use pre-organized expanding and contracting system, and thus learn to be applied to school life, for ASD, the solution is nothing more than a good way to communicate with people.

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