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The Application Status of Augmentative and Alternative Communication in the Field of Special Education in Mainland China

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ABSTRACT
In special education, Augmentative and Alternative Communication (AAC) is an important means of education and rehabilitation training for children with communication disorder, and it is significant to improve children's communication ability and life quality. In this paper, in order to understand the application status of AAC in the field of special education in Mainland China, computer is utilized to search the papers of AAC published in domestic journals from 2005 to 2018 in the CNKI, and documentation methods are also adopted to sort out as well as analyze the collected papers. By analyzing the number of published documents and the content of literature research, the paper summarizes the current research characteristics and future research prospects of the AAC in Mainland China, so as to provide reference basis for the researches in the future.

Keywords: *Augmentative and Alternative Communication (AAC), Application status, Communication, Special education.*

1. INTRODUCTION

Communication refers to the process of transmitting and receiving information. As one of the basic skills for human survival, communication is used in daily study, work and recreational activities as well. Communication is an important way for human to transmit messages, share information and establish social relations. The main means of communication for human is language, which contains spoken, written, sign and other forms. Some people have some kind of difficulty communicating by using spoken, written or sign language because of psychosomatic disorders such as dysaudia, dysgnosia, autism and cerebral palsy etc, or individual neuromotor abnormalities, hearing impairment, environmental factors, cognitive impairment, physiological and anatomical defects, etc.[1]. When they are unable to use language to communicate, Augmentative and Alternative Communication (AAC) provides other possible channels to help. The American Speech-Language-Hearing Association (ASHA) defines AAC as "an area of research, clinical and educational practice. AAC involves attempts to study and when necessary compensate for temporary or permanent impairments, activity limitations, and participation restrictions of persons with severe disorders of speech-language production, and/or comprehension, including spoken and written communication." [2] In addition to traditional language therapy, to the people with severe communication disorders, especially those who have no capability of spoken language, low capability of spoken language and inability to write, multi-channel communication strategy of AAC can also be used to help people with severe communication disorders, and to increase, maintain, improve or replace their communication ability, thus promoting their social interaction. Since its appearance in the 1970s, AAC has been applied in many fields such as education and medical treatment at both home and abroad, and

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many results have been achieved. Therefore, by searching the research results of Augmentative and Alternative Communication from 2005 to 2018 in CNKI (China National Knowledge Infrastructure) database, this paper aims to understand and summarize the progress and shortcomings of AAC in China, so as to provide some enlightenment for the future researches.

2. RESEARCH DESIGN

2.1 Research Method

In order to understand the research status, characteristics and shortcomings of AAC in Mainland China, this paper systematically sorts out the papers published in domestic journals from 2005 and 2018 by using documentation methods, and makes comparative analysis from the aspects of research methods, objects as well as contents.

2.2 Research Process

After entering CNKI (China National Knowledge Infrastructure) database to search, a total of 46 papers are retrieved with "Augmentative Communication", "Augmentative and Alternative Communication", "AAC" as the key words to search. Eliminating the duplicate and irrelevant ones, 25 literature are selected, including 18 journal articles and 7 MA theses.

3. RESULTS AND ANALYSIS

3.1 Overview of the Paper Research

3.1.1 Publication Time of the Papers

"Figure 1" presents the literature achievements of Augmentative and Alternative Communication published in China. Generally, the number of literature is increasing yearly, and since 2005, when Yuan Bin published the first AAC paper in Mainland China, the number of people who pay attention to AAC has been increasing year by year. However, in terms of the overall number, there are few relevant research results, especially in the first half of the year, the annual number of literature is about 0-1, which has only increased since 2014. Generally speaking, the research on Augmentative and Alternative Communication in the field of special education in China is very weak, and the attention is far from enough.

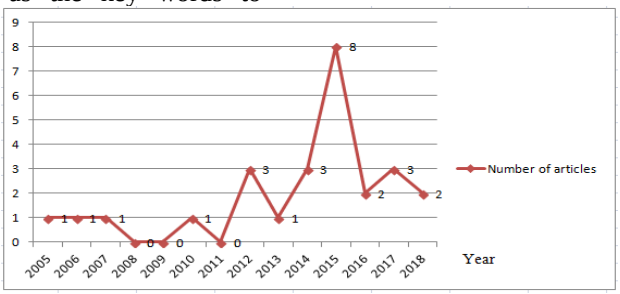

Figure 1 Quantity trend of literature on AAC.

3.1.2 Distribution of Working Units of the Authors

Based on the analysis of the first author unit of the literature, after eliminating duplicate authors, it is found that almost all the research institutions related to AAC are from universities in "Table 1". It is not difficult to find that college researchers are the main group of people who pay attention to this field. Specifically, those college researchers also include the ones from comprehensive universities, normal universities and medical schools, most of which are from normal universities. Meanwhile, among the research groups of colleges and universities, the proportion of Master's thesis is about 35%, while less attention is paid by the special education schools, the rehabilitation institutions and other related personnel. Therefore, it can be seen from the distribution of working units of the authors that the attention from hospitals and teachers of special education is very lacking, and their relevant literature achievements are rarely seen.

Table 1. Distribution of research institutions of domestic AAC papers

Working Units of the authors	Colleges	Hospitals
The amount of the paper	20	1
Percentage (%)	83.3%	0.42%

4. MAIN CONTENTS OF LITERATURE RESEARCHES

From the main contents of the collected literature, predecessors mainly carried out from the aspects of basic theory of AAC, intervention research, design and application of communication aids. This paper will introduce the research status of each aspect in detail.

4.1 Discussion on the Basic Theory and Assessment Model of AAC

Yuan Bin introduces some basic contents in the first Augmentative and Alternative Communication paper published in Mainland China in 2005. He puts forward the concept and elements of AAC, and explains that AAC is suitable for the people with communication disorder despite their ages, classes and economic backgrounds. He also mentions that the intervention of AAC needs to be done as soon as possible and it requires team cooperation and professional support. Meanwhile, some difficulties AAC faces in its development in China, such as lack of professional personnel and high cost of assistive devices, are analyzed [3].

Some researchers like Szu-Han Kay Chen, Katya Hill, also systematically introduce augmentative communication from its concept, types, beneficiaries and principles of intervening services [4]. A language-based Augmentative and Alternative Communication assessment and intervention model is also put forward, in which the goal of augmentative communication is to establish interactive communication language, and the language model, method of language performance, the technology model, and the instruments of augmentative communication constitute its architecture diagram of assessment [5]. Over the years, a variety of foreign augmentative and alternative communication assessment and intervention models have been developed, including candidacy models and participation model. However, candidacy models have not been considered the best one, but the participation model, whose design concept is based on the full participation of functional participation, demander of complex communication and peers without disabilities, was first brought up by Beukelman and Mirenda in 1988, then fine-tuned and confirmed by other researchers. By referring to the participation needs of peers without disabilities, the field of participation model assessment is composed of several aspects, such as confirming participation patterns and communication needs, assessing participation obstacles, intervention planning and implementation, and effectiveness evaluation [6]. Some scholars propose that the assessment of AAC should be individualized, dynamic and continuous, and the combination of multiple models of AAC system should be considered in the process of utilization, because with the improvement of children's ability, the evaluation, training programs and models of AAC should be adjusted and changed accordingly [7].

4.2 Intervention Research of Augmentative and Alternative Communication

Among the collected papers, a total of 10 discuss the analysis of the intervention effect of AAC on individuals with disorders of complex communication. The following will be introduced from the aspects of the objects of intervention, the selection of communication aids and the effect of communication.

4.2.1 The Objects of Intervention

As it can be seen from "Table 2", among the collected empirical papers on the implementation of AAC intervention, the types of intervention objects include dysgnosia, autism, multiple disorders, cerebral palsy and aphasia, etc., in which autism makes up the majority. From the perspective of age, it puts the main focuses on the intervention research of children while few on that of adults. In fact, there are no specific rules for the usage objects of AAC. They may be in different age stages or with different types of communication disorders, but their common feature is that they have temporary or permanent defects in using gestures, speech and/or writing to communicate, which are the causes that they cannot meet the communication needs.

Table 2. The main types of AAC intervention objects (Number)

	Intellectual Disability	Autism	Multiple disorders	Cerebral palsy	Aphasia
Children	1	6	1	1	
Adults					1

4.2.2 Analysis of Intervention Effect

It can be found in the paper that the major intervention object is the Autism, the communication methods adopted in AAC, such as gestures, objects, pictures, visual symbols and schedules, are exactly in line with the characteristics of visual thinking mode of autistic children, which can not only promote their communication skills and effectiveness, but also the development of their cognitive ability [7]. Xu Yun et al. report five cases of significant increase in the quantity as well as quality of communication behaviors of autistic children after they received the Augmentative and Alternative Communication training carried out by the method of single-subject research [8]. Hu Xiaoyi et al. investigated the influence of self-developed voice output application software combined with smart phones on the needs of expression behavior of three preschoolers with severe autism, and the results showed that this effect was positive, and the expressive behavior of functional requirement of the three subjects was improved [9]. After conducting AAC intervention on a 13-year-old girl by the single-subject research, Zhang Xiaoxia finds that the number of self-need and interpersonal communication of the subject increased, the generalization effect was obvious and the times of interactive communication of learning increased, while its maintenance effect was not satisfying [10]. Ma Rongrong also adopted the method and obtained similar results [11]. In addition, some researchers took activity-based AAC as intervention program and conducted intervention training for children without speech or intellectual impairments, and the results showed that the individual behaviors of active communication gradually increased, and oral English and simple sentences began to appear [12]. After Zhou Chao trained a child with multiple disorders by pictures and communication templates, the frequency of active and passive communication of the subject increased, and a certain migration effect appeared [13]. Ye Qiaoping demonstrated that the abilities of an aphasia patient to listen, understand, retell and read were improved by using electronic communication board [14].

From the research results above, it can found that the effectiveness of AAC is mainly reflected in two aspects. One is the impact on communication behavior. Most research results show that the intervention of AAC can improve the frequency of active communication behaviors and communication responses of participants using communication aids, enhance their communication motivation and improve communication efficiency [9][13]. The other is the improvement of emotions. Many negative emotional behaviors of exceptional children generate from the poor communication. After AAC solves the problems, some of the negative emotional behaviors are improved. Besides, AAC intervention also influences the enhancement of the oral expression ability of the participants. Imitation is an important way of language learning. In the process of training, by means of the voice output of the voice communication software, the participants have the opportunity to imitate the voice when they choose the communication information, thus promoting their oracy to a certain extent [12]. However, the purpose of communication involves different aspects, such as expressing needs, passing on information, and sharing experience. It can be found from the searched papers that, the main teaching content of the intervention on the individual case is limited to "I want to eat/drink/play..." or other expressions of self needs, and whether the communication behaviors in this field can be transferred to other social communication situations is not clarified by the research results, and whether the oracy developed by children can be transferred to other situations needs to be further explored in future studies. Besides, whether the intervention of other communication contents can have the same effect is the direction of further research in the future.

4.2.3 The Choice of the Communication Aids

Communication aids refer to the devices designed to convey or receive communication information with the purpose of assisting people with severe communication disorders to use the external devices or equipment to transmit information [13]. According to technology, communication aids can be divided into low-tech and high-tech. Low-tech aids refer to those without the functions of printing or voice output, such as pictures, communication books, PECS, etc. which are easy to obtain and produce at a low price. High-tech aids possess the functions of printing and audio output, and they are complex in manufacture and high in price. Communication aids can also be divided in to specialized and non-specialized according to characteristics. Specialized high-tech aids exist alone, such as "Chirp", "Cardinal", U-pen, while non-specialized aids need to be attached to the operating system of computers or tablets PC

to operate, such as PMLS, listen & talk (LAT), Listen & Speak (LAS) [12].

According to previous studies, the communication aids used by researchers are different, such as voice communication tablet Cardinal, PECS, tablet-based electronic assisted communication system, and phone-based voice output application software. It is for sure that different communication aids have different advantages and disadvantages, different requirements for the using abilities of users, and they can also achieve different effectiveness when they are being used. By adopting the experimental method, a comparison on the improvement of communication skills and behavioral problems of children with autism was made between Digital Augmentative and Alternative Communication (DAAC) and Picture Exchanged Communication System (PECS). The results show that both DAAC and PECS are conducive to improving the communication intention and communication ability of autistic children. However, compared with PECS, DAAC is easier to learn and generalize [15]. There is a big difference between the abilities and needs of AAC users, which is also an important aspect to assess in the selection of communication aids. Therefore, the selection of aids should be considered in combination with the characteristics of communication aids and the needs, expectations as well as the abilities of people with communication disorders.

4.3 Research and Development of Communication Aids

Though as this paper has mentioned before that the selection of communication aids should be based on the characteristics and needs of the users, and even people with the same type of communication disorders may have different needs and use of communication aids, for now they are few in types and high in prices in Mainland China. The researches on communication aids have just started, and the achievements in the design and development of communication aids are not many according to the papers published in China. Wang Hong et al. designed an AAC based on Android tablets and divided it into pragmatic communication board for children with intellectual disorder and text-to-speech board for children without disorders to meet different communication needs of groups [16]. Zhao Guangbiao studied the adjustment and modification of the S-YJK-05 communication training system ZM42.3 to adapt to various types and different ages of clinical patients with communication disorders, such as adults with communication disorders due to acquired diseases, injuries, aging and other reasons. They also conducted experiments on 22 aphasia patients, which achieved positive results [17]. Zheng Yidong explored the design of chart-based auxiliary input and communication system on Android platform, in which the content can be entered by tapping the corresponding charts, the symbols can pronounce and natural sounds can be automatically generated after a sentence is typed. In addition, augmentative communication and rehabilitation training were also organically combined by him [18]. Generally speaking, there are few researches on communication aids, but mainly case studies. With the rapid development of science and technology as well as the popularization and application of computer information technology, more research achievements on the communication aids are expected to be made in the future to benefit people communication disorders.

5. SUMMARY AND REFLECTION

5.1 The Total Amount of AAC Research Is Small, Though More and More Attention Is Gradually Paid to AAC

It can be seen from the papers that AAC is gradually concerned by more and more people in Mainland China and applied in practical teaching. However, generally there are few research results, and the discussion on AAC is still in the preliminary attempt stage, lacking of universality and depth. From the perspective of the people who put focus on AAC, most of them are postgraduates or teachers in colleges and universities, who pay attention to the AAC either for the need of graduation thesis or for the need of the subject, but have little research on how to train rehabilitation teachers with AAC ability and the course setting of augmentative communication. It is known that among the colleges and universities offering special education or rehabilitation majors, none of them offers the course of AAC. The college that the author is in did not offer the AAC course for the junior students from the Education and Rehabilitation major since 2017, and it is still exploring and trying.

At present, few front-line special education schools and rehabilitation institutions have seen the research results of the Augmentative and Alternative Communication. As special education

institutions directly facing and serving special children and parents, the lack of attention in this field is a big pity.

5.2 The Types of Research Objects Are Relatively Single

From the perspective of research subjects, it mainly focuses on autism, while other types such as Intellectual Disability, hearing disability, and children with cerebral palsy and multiple disorders are less involved. There are many and complex factors that cause communication disorders, such as the physiological disorders caused by hearing impairment, cerebral palsy and cleft lip and palate patients, as well as the causes of cognitive impairment, including mental retardation and autism. For many exceptional children, communication problems will ultimately affect emotions, social interactions, study and work. In this way, individuals with the needs of augmentative communication may exist in any of the above listed areas, while the relevant researches in Mainland China involve relatively few and single individuals at present. At this stage, the effectiveness of AAC needs proving by more cases of empirical researches, and more successful cases of AAC needs to be seen by more special education workers, parents, people with communication disorders, speech therapists and other groups, thus to make AAC to be correctly understood.

5.3 The AAC Teaching Procedures Are Inconsistent and the Results Are Difficult to Popularize

Currently the teaching and training of Augmentative and Alternative Communication are still at the exploratory stage, and they vary in different existing researches. Some researchers adopt activity-based AAC intervention trilogy, take daily activities or activities of interest as intervention points, and conduct teaching orderly through functional vocabulary teaching, sentence construction exercise and situational generalization [12]. Some researchers use the case semester IEP select the target that may be suitable for the training purpose of AAC for teaching [10]. Some other researchers carry out teaching directly by taking the communication aids as the base, while inconsistencies in teaching contents, strategies and procedures will not only affect the presentation of teaching effects, but also prevent its direct comparison and analysis, as well as the replication of experimental effects, which will make it difficult to popularize AAC results in a larger scope.

6. PROSPECTS OF FUTURE RESEARCHES

6.1 Exploration of AAC Assessment

AAC assessment mainly includes three objectives: to identify functional requirements, find appropriate interventions to enhance or maintain interactive communication, and monitor and measure the therapeutic effect [5]. The purpose of AAC intervention assessment is to help users find the most economical, appropriate and effective augmentative way of communication and thus to improve the quality of communication. To have a powerful backing, interdisciplinary knowledge and people are needed in AAC intervention. And at the early stage of use, it is very important to establish a strong communication confidence and motivation for patients with communication disorders as well as AAC needs. If it is not used properly, the frustration brought by inefficient and ineffective communication will make them lack of motivation for using AAC. Therefore, figuring put how to establish a systematic and effective AAC assessment framework so that professionals can find ways to improve the effectiveness of intervention is a crucial step in AAC.

6.2 More Empirical Cases of AAC

The development of AAC needs the support of empirical research, which should include the study of the AAC intervention effect on specific types of disorders, the exploration of effect of specific communication aids, the AAC intervention effect on oral language, the comparison of intervention effect among the different symbols used to assist communication, such as pictures and sign language, and the analysis of the effect of AAC in the early intervention and problem behavior processing. Based on previous research results, in terms of research methods, the single-subject research method is mainly used in empirical research. In order to enrich the empirical research cases, different methods such as the single-subject research, case study and action research can be adopted in the future researches, and thus to improve their reliability and validity. In terms of research objects, previous researches mainly focused on children with autism. Future researches can further broaden the types and age range of research objects, such as the patients of dysgnosia,

cerebral palsy, dysaudia and also those who have other different disorders and belong to different age groups. In terms of the scenarios and fields of using, AAC is mainly utilized in the special education schools and the content of communication is mainly about expressing needs. Few related researches are conducted in the regular schools and organizations of early education, or on the care of family and adult, and the continuous follow-up reports and theoretical exploration on ACC are also lacking. Therefore, more cases of empirical research are needed to provide more practices and support for relevant scholars and clinical staff, because the promotion and development of AAC will be difficult without enough effective research results and practices.

6.3 Strengthening the Popularization of AAC

The utilization of AAC involves many different levels, including governments, schools, teachers, therapist, parents, manufacturers as well as research personnel, and its promotion and application will be limited if AAC is not correctly comprehended and understood. As important people to the lives of children, parents and teachers are their main communication objects, and they will have a direct and profound influence on the motivation and degree that children have when it comes to using AAC. However, many parents and teachers do not have a enough understanding of AAC for now, and many people still hold on to the traditional idea that the use of AAC will hinder the oracy of children, which has not proved by any empirical research so far. Such misleading information comes from the insufficient understanding people have for ACC, thus, to correct this situation, the popularization of AAC concept have to be strengthened.

6.4 Strengthening the Development and Application of Communication Aids

Symbols, aids, techniques and strategies are the four basic elements of the AAC, and communication aids mainly help users to convey communicate information through outside devices other than their bodies, which play a very critical role in the whole process. With the development of computer and information technology, the application of electronic computing technology in special education has been integrated for many years, and the improved equipment and technology as well as communication aids have also benefited many people with disabilities. However, the utilization of communication aids is highly personalized, and the equipment should be selected according to the ability characteristics, communication requirements, current and future environmental requirements of the individuals, thus many even people with the same type of communication difficulties may have different needs for the communication aids. The application of AAC in China is still in its starting stage. The available communication aids are few in types but high in prices, which cannot meet the demands of most users. Therefore, the development and application of different kinds of communication aids have to be strengthened in the future to meet the different demands.

7. CONCLUSION

As you know, nowadays, for the application of AAC in the field of special education, there's increasing attention raised by researchers. However, the overall study scale is far from enough, the methods we have used are relatively simple, the results of practical research are not reliable enough to use. Moreover, the inconsistency of procedures in AAC researching and teaching practice makes the results difficult to reproduce, let alone to popularize. So, in order to speed up the application of AAC, we should make more efforts to develop the diversity of researching ways and methods, as well as the number of study cases.

AUTHORS' CONTRIBUTIONS

Juan Yang wrote the manuscript, Xuanfeng Duan analysed data and revised this paper, and Yao Tong contributed to revising and editing.

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