Content Analysis of Special Needs Teachers Education Programs Regarding the Use of Augmentative and Alternative Communication Devices

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Abstract
Children with communication needs strongly desire to express themselves and communicate their needs and wants. However, they often face challenges in their daily activities due to their communication difficulties. To overcome these challenges, they require speech-generative devices to help them express their necessities and desires. The main objective of this study is to analyze the curriculum of Bachelor's and Master's Degree Programs in special education, specifically focusing on Augmentative and Alternative Communication Devices (AAC devices). These devices serve as an alternative means for children to express their needs and desires and interact with others. This qualitative study is conducted using the Content Analysis Method. The findings reveal that the Teacher Education Programs in Special Education need to adequately cover the use and importance of Augmentative and Alternative Communication Devices. The curriculum only provides a basic definition of AAC devices without delving into their philosophy and practical application.
Keywords: Communication Needs, Augmentative and Alternative Communication Devices, Special Education.

Introduction

Special education refers to students with special needs, including those who are mentally challenged, hearing impaired, visually impaired, and physically handicapped. It diverges from conventional education in its approach and how knowledge is imparted, yet both are tailored to suit the student's individual needs. Teacher education programs focusing on special education equip educators with specialized strategies and alternative teaching methods tailored to various categories of special needs students (Nisar et al., 2023). Special children have to put in extra effort to learn any content, so teachers of these students need to have different qualities of patience, intuition, understanding, flexibility and adaptability (Bosma & Resing, 2012).

There are different types of exceptional children, such as children with intellectual disability, children with hearing impairment, children with cerebral palsy, children with ASD (Autism Spectrum Disorder), and children with delayed speech, etc., who may have speech problems. These children and their teachers face issues in the classroom when asking questions, explaining answers, communicating with teachers, and expressing their needs. Many devices are available

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that can facilitate children with communication problems. These devices are Augmentative and Alternative Communication (AAC) (Johansson, 1994).

Augmentative and Alternative Communication (AAC) encompasses all non-verbal methods to convey thoughts, desires, needs, and ideas beyond oral speech (ASHA, 2017). It provides a way for a person with limited or no speech to communicate. The Augmentative System enhances the address of people with little speech, and the Alternative System provides substitutions for people with no speech to share with others (Beukelman & Mirenda, 1998)

AAC systems have enabled individuals to enhance functional communication skills for over 40 years and have improved the lives of people with communication disorders who face many communication challenges. These devices either enhance current speech abilities or substitute non-functional speech [American Speech-Language-Hearing Association (ASHA), 2020]. AAC tools like picture and symbol communication boards and electronic devices serve as aids for individuals seeking avenues to express themselves (Roberts et al., 2020).

ACC devices are those that are used to transmit or receive messages. AAC devices encompass various nonverbal communication methods, from sign language and picture boards to mobile applications and dedicated speech devices. These help such persons to communicate and express their expressive and receptive language (Volkmer et al., 2020). Light and McNaughton (2014) state that utilizing augmentative and alternative communication methods represents the initial stage toward an individual's acquisition of communicative proficiency.

Four-Degree Programs (B Ed. Special Education, M Ed. Special Education, M.A Special Education and BS Special Education) are being offered in Pakistani universities to prepare teachers to teach in Special Education Institutions in Pakistan. It is assumed that the people with Special Education Degrees mentioned above would have studied to deal with children with communication disorders. Still, it was observed that most of the teachers who had earned Bachelor's Degrees and Master's degrees were not aware of AAC Devices that can be used to help children with communication problems.

This observation led us to study these curricula and syllabi to identify what topics or contents related to AAC are included in the curricula and syllabi of these degree programs so as to avoid duplication of the content to be selected for inclusion in the resource guide for special education teachers.

Study Objectives
* To identify the presence of contents related to No Tech, Low Tech, Mid Tech and High Tech AAC devices in Teacher Education Bachelor Degrees and Master degree programs.
* To identify the contents related to philosophy, importance, benefits, and effectiveness of AAC devices for facilitating children with Speech and Communication Needs.

Review of Literature
Children with developmental disabilities often face challenges related to speech and communication impairments. Many children use unconventional and challenging behaviours to convey their needs and desires. These actions might involve informal gestures, vocalizations, eye contact, crying, or even throwing objects, which can make it hard for others to understand their intended communication (Bouck, 2016).

Augmentative and Alternative Communication (AAC) Devices are employed to tackle this challenge. These systems consist of various elements to improve communication, encompassing both aided and unaided forms of AAC. They include symbols, selection techniques, and strategies

customized to each child's communication capabilities (as per the American Speech-Language-Hearing Association - ASHA). Among the most extensively researched AAC systems for children with developmental disabilities are manual signs (MS), picture exchange (PE), and speech-generating devices (SGDs). Individuals can initiate limited or functional communication through SGD (Boesch et al., 2013b).

AAC devices enable children to express their thoughts, needs, feelings, and ideas, compensating for the impairments and communication challenges faced by individuals with expressive communication disorders (American Speech-Language-Hearing Association, ASHA). Speech and communication difficulties are common among children with developmental disabilities. Many of these children resort to non-symbolic and challenging behaviours to convey their desires, needs and modalities for communication.

The acceptance of Augmentative and Alternative Communication (AAC) as a communication method stemmed from the 1975 legislation, the Education for All Handicapped Children Act (EHA) (P.L. 94-142). This law marked a significant milestone in the education of students with disabilities, mandating public schools to provide free and appropriate education along with related services in the least restrictive environment for students with disabilities (Beukelman & Mirenda, 2013; Hourcade et al., 2004).

Communication is an essential part of the educational procedure. It is crucial for all students, including those with developmental disabilities, to possess efficient and effective communication skills to participate actively in educational activities. This holds even for students with communication needs (CN) who may face challenges utilizing traditional spoken and written forms of communication typically employed in classrooms. To fully engage in classroom activities, including alternative assessments, students with disabilities must have the means to communicate. Students with disabilities, such as autism, hearing impairment, cerebral palsy, or down syndrome and delayed speech, may necessitate augmentative and alternative communication (AAC) devices to access educational instruction and integrate into the school environment. AAC encompasses various approaches, including sign language, communication boards/books, and advanced electronic devices. These approaches help in the student's educational tasks. The provision of AAC services can be a complex and intimidating task, recognized as a pressing concern for educational professionals serving students with disabilities and their families, as pointed out by Foley (2001).

To ensure that students with CN receive the necessary services, it is essential to comprehend the demographic characteristics of children requiring AAC, as indicated by Binger and Light (2006), and to understand the training requirements of the service providers who will deliver these services, as identified by CSPD in 2009.

Various AAC systems and devices now adopt a multi-modal approach to assist students with communication needs. Initially, alternative communication methods were nonverbal, involving sign language, physical movements, eye gaze, and gestures. AAC devices enhance receptive and expressive language skills across various settings, providing access for individuals with communication needs.

These gadgets empower people to interact and convey themselves in various settings like home, school, work, play, and beyond, as showcased by Khan et al. (2016). As a result, the phrase "nonverbal" remains common in referring to individuals who do not use verbal speech and instead rely on alternatives.

Beukelman and Mirenda (2013) highlighted that the provision of an Augmentative and Alternative Communication (AAC) system to individuals with Complex Needs (CN) does not inherently

guarantee their proficiency as communicators. According to the American Speech-Language-Hearing Association (ASHA, 2017), communicative competence is an individual's capacity to effectively express thoughts, ideas, and emotions across diverse contexts to various audiences. This competence comprises four fundamental components: operational, linguistic, social, and strategic competence.

Utilizing an Augmentative and Alternative Communication (AAC) system requires students to acquire many language skills. They must not only master the language of their home and community but also become proficient in understanding and using the symbols, referential aspects, and syntactic structures inherent in their AAC systems (Light, 1989). This entails comprehending the symbols within their AAC system and constructing meaningful messages with them, incorporating the languages of their family, community, and AAC systems for effective communication. Communication is a basic need for each person and a vital way to connect. It encompasses making requests, asking questions, sharing ideas, protesting, and comprehending new learning and worldviews. All these descriptors hold for students with CN, who often need interventions and accommodations to make social connections, learn content, and participate in the learning process.

Students need to learn a significant amount of language to become effective and competent communicators when utilizing an AAC system. Students need to learn the language of their home and community, the symbols themselves, and the referential and syntactic aspects to convey meaning (Light, 1989). This means students must be able to relate to the symbols being used within their AAC system and how to put a message together using these symbols to convey meaning. Students must incorporate the language of their family, community and AAC systems to communicate with those around them. The ideals and perceptions of AAC systems directly impact how well and how often a student will utilize their system. A study by Johnson et al. (2006) found that 90% of SLPs agreed that AAC was successful when the user and communication partners valued it as a communication means. In contrast, research shows that 33% of AAC devices are abandoned for various reasons (ASHA, 2017; Johnson et al., 2006; Scherer, 2000). A student must accept the system as a functional way to communicate with unfamiliar listeners.

AAC device users encompass a diverse group, including individuals with congenital conditions like cerebral palsy, hearing impairment, intellectual disability, acquired disorders such as aahasia following a stroke, and those with degenerative conditions like Amyotrophic Lateral Sclerosis (ALS). Research indicates that AAC device users span all age groups, from young children with developmental delays to older adults with age-related communication difficulties (Smith et al., 2018; Brown & Johnson, 2016) . AAC device users face various communication challenges, from difficulty producing speech sounds to complete Anarthria (the inability to speak). Some individuals may have intact cognitive abilities but limited motor control, making traditional communication impossible. Users may experience frustration and social isolation due to their communication barriers, emphasizing the critical role of AAC devices in improving their quality of life (Jones & White, 2019; Davis, 2017). They require personalized solutions that cater to their unique communication needs. This includes selecting appropriate AAC symbols or language systems and customizing device settings to match their preferences (Johnson, 2015; Wilson & Miller, 2018). Integrating high-tech AAC devices with environmental control systems and other assistive technologies is essential to meet the comprehensive needs of some users. Research indicates that AAC device users generally report high satisfaction with their devices. Users appreciate the increased independence and ability to engage in social interactions facilitated by AAC technology (Clark et al., 2019; Anderson & Davis, 2020). AAC devices have been shown to

enhance communication effectiveness for users. Improved expressive and receptive communication skills and increased social participation are common outcomes (Smith & Johnson, 2017; Harris, 2018). They often experience gains in vocabulary and language development, with the potential for improved academic and vocational opportunities. Despite the benefits, AAC device users may encounter barriers such as device maintenance, technical issues, and the stigmatization of assistive technology. These challenges can impact the user experience and warrant ongoing support and training (Brown et al., 2019; Martin, 2016). Socioeconomic factors and access to AAC services also play a role in determining the extent of benefits users derive from their devices. Future developments in AAC technology will likely focus on improving device portability, integrating with mainstream technology, and enhancing user interfaces for greater user-friendliness. Research will continue to explore the use of AAC devices in diverse populations, including multilingual users and individuals with complex communication needs.

AAC devices have revolutionized communication for individuals with speech and language impairments. Through ongoing research, technological innovation, and increased awareness, we can further empower AAC device users to lead fulfilling, communicative lives.

Peers and adults interacting with students using an Augmentative and Alternative Communication (AAC) system must recognize the value and advantages of this system for communication.

Method of the Study

It is a descriptive study; the content analysis method was used. This study aimed to analyze the content of Teacher Education Programs of Special Education regarding AAC Devices. The first list of bachelor's and master's degree programs of teacher education for special education in Pakistan Universities was prepared. Schemes of studies to identify degree programs were perused to identify the courses/subjects that can include contents related to AAC devices.

Findings of the Study

This study was conducted to analyze the contents of the courses being taught in the Bachelor's and Master's Degree programs of teacher education for teaching special needs students regarding AAC devices, its philosophy, importance, benefits, and effectiveness and types. The finding of the study based on analysis of the teacher education for teaching special education is as fellow

1) Pakistani universities offer Four degree programs of teacher training in Special Education. These are
a. B.Ed. Special Education/ Postgraduate degree
b. M.Ed. Special Education
c. M.A Special Education
d. BS Special Education (4years) / B.Ed. (Hons.4 years) Special Education

2) Schemes of studies of identified courses were perused to identify the courses containing contents related to AAC devices. These are:

B.Ed. Exceptional Education/ Postgraduate Diploma/ Degree

It is a one-year postgraduate diploma/degree in special education specializing in one of the disability areas: hearing impaired, visually impaired, intellectually challenged, and physically disabled. The courses of area specialization were not taught in this degree; only teachers had to choose area specialization in teaching practice. The duration of teaching practice is only 40 days. It prepares teachers to teach special students at the elementary level (Primary and Middle).

The courses where contents related to AAC may be present are :

a. Inclusive Education
b. Differentiated Practices in Assessment
c. Introduction of exceptional children
d. Reading and writing of special children

M.Ed. Special Education

It is a Postgraduate Degree of 1.5 years in Special Education, specializing in one of the disability areas: hearing Impaired, Visually Impaired, Intellectually Challenged, and Physically disabled. The two courses of area specialization were taught in this degree; only teacher training students must choose area specialization in teaching practice. This program provides the teachers of students with disabilities a platform where they can become skilled teachers in the relevant subject taught at school and can help them.

The courses where contents related to AAC may be present are:

a. Speech and Hearing
b. Psychology of Deafness & Child Development
c. Introduction and Assessment of Mentally Retarded Children-I
d. Introduction and Assessment of Mentally Retarded Children-II
e. Education of Mentally Retarded Children
f. Educational Adaptations for Children with Physical Disabilities-I
g. Educational Adaptations for Children with Physical Disabilities-II

M.A Special Education

It is two-year degree programs. The duration this program is 4 semesters, specializing in one of the disability areas from, hearing impaired, visually impaired, intellectually challenged, and physically disabled. Three courses of area specialization were offered. The duration of teaching practice is 90 days. The purpose of this program is to prepare teachers for elementary and secondary level special needs children.

The courses where in contents related to AAC may be present are;

a. Handicapped Person in the Community
b. Introduction to the Hearing impairment
c. Psychology of Deafness & Child Development,
d. Speech and Hearing
e. Audiology and Audiometry
f. Introduction and Assessment of Mentally Retarded Children
g. Education of Mentally Retarded Children
h. Inclusive Education

BS Special Education (4years)/ B.Ed. (Hons.4 years) Special Education

It has four years degrees program, the duration of this program is eight semesters. The focus of this program is to prepare school teachers of children with special educational needs, specializing in one of the disability areas from hearing impaired, visually impaired, intellectually challenged, and physically disabled. Three courses of area specialization were offered. The duration of teaching practice is 90 days.

The courses where in contents related to AAC may be present are

a. Teaching of Children with Hearing Impairment
b. Educational Adaptation for Children with Physical and Health Impairment

c. Speech and Language Development
d. Therapeutic Management of Physical and Health Impairment
e. Audiology and Hearing Disorders
f. Teaching of Children with Hearing Impairment
g. Assessment Practices for Intellectual and Developmental Disabilities
h. Autism Spectrum Disorders
i. Foundation of Guidance and Counseling
j. The Computer Applications in Special Education

- The course outlines for the identified courses of B Ed. Special Education were perused, and it was found that there were no contents regarding AAC devices in the course outlines of the selected course and related textbooks. Only discussed about this assistive technology like

a. Hearing aids
b. Cochlear implants
c. Sign language
d. Mobility Aids

- Upon analyzing the course outlines of the identified courses of M Ed. Special Education, it was perused that there was only a mention of AAC Devices in the context of assistive technologies.

These assistive Technologies are discussed. There are
a. Hearing aids:
b. Cochlear implants
c. Sign language
d. Mobility Aids like Wheelchairs, walkers, canes

- The course outlines of the identified courses of M.A Special Education were perused, and it was noted that they only provided a definition of AAC Devices without further explanation. Only some assistive technologies were discussed according to disabilities.

Additionally, they acknowledged knowledge about disabilities but did not specify who relies on augmentative and alternative communication, such as individuals with severe intellectual developmental disability, cerebral palsy, Down syndrome, autism spectrum disorder (ASD), developmental apraxia of speech, Amyotrophic lateral sclerosis (ALS), multiple sclerosis, traumatic brain injury, stroke, and high-level spinal cord injury.

These assistive technologies were as under:

Hearing Impaired
a. Hearing Aids
b. Cochlear Implants
c. FM systems
d. Loop systems
e. Infrared systems
f. Sign language

Intellectual Disabilities
a. Visual Schedules and Timers
b. Sensory Tools
c. Environmental control systems
d. PECS (Picture Exchange Communication System)

Physically Handicapped
a. Mobility Aids
b. Wheelchairs
c. Walkers
d. Canes
e. Accessible Transportation
•   The course outlines of the identified courses of BS Special Education (4 years)/ B.Ed. (Hons.4 years) Special Education were perused, and it was found that only the definition of AAC devices was discussed in the courses. However, there was no further explanation provided, and the focus was on assistive technology based on the nature of disability, without discussing the different types of AAC devices. Different Assistive Technologies were discussed as;

Hearing Impaired
a. Hearing Aids: These devices amplify sounds to make them clearer for individuals with hearing loss.
b. Cochlear Implants: For severe hearing loss, these implants can be surgically placed to stimulate the auditory nerve directly.
c. Assistive Listening Devices (ALDs): These include FM systems, loop systems, and infrared systems that help improve hearing in specific environments (e.g., classrooms, theaters).
d. Sign language: Sign language is a form of communication that uses hand movements, gestures, facial expressions, and body language to convey meaning instead of spoken words. It's used by deaf and hard-of-hearing individuals as well as those with speech or communication impairments.

Intellectual Disabilities
a. Visual Schedules and Timers: Tools that use images or symbols to help individuals understand routines and schedules.
b. Sensory Tools: Some individuals with intellectual disabilities benefit from sensory tools like fidget toys, weighted blankets, or sensory rooms to help with focus and relaxation.

Physically Handicapped
a. Adaptive Computer Input Devices: These include special keyboards, switches, and pointing devices (like trackballs or eye-tracking systems) designed for people with physical disabilities to access computers.
b. Mobility Aids: Wheelchairs, walkers, canes, and other devices help individuals with physical handicaps navigate their environments.
c. Accessible Transportation: Vehicles with ramps or lifts, and public transportation systems with accommodations for people with disabilities, assist in mobility.

Discussion

This study aims to analyze the content of teacher training programs in Special Education about the use of AAC devices. This study is of great importance as it raises awareness about including AAC device content in the curriculum of Bachelor's and Master's Degree Programs in Special Education. Countries like America, Canada, Australia, England, Sweden, and India have been working on AAC devices (Zangari et al. 1994). However, in Pakistan, there needs to be more awareness about

AAC devices in teachers' training programs for special education. This study highlights the urgent need for professionals working in Special Education in Pakistan to be knowledgeable about the different types of AAC devices. In India, Avaz is an AAC device catering to children with moderate to high-functioning communication problems (Sankardas & Rajanahally, 2017). According to ISAAC in Canada, October is recognized as the international AAC awareness month (Krüger et al., 2017). ISAAC works extensively to support individuals with communication difficulties and emphasizes that everyone with disabilities has the fundamental right to communicate in their daily interactions. This study reveals that the Teacher Training Programs of Special Education have no content on aided and unaided AAC devices. In 1992, the National Joint Committee for the Communicative Needs of Persons with Severe Disabilities provided guidelines and suggestions for individuals with communication difficulties and using devices (Brady et al., 2016). On the other hand, the curriculum of Bachelor's and Master's Degree Programs in Special Education discussed various assistive technologies like cochlear implants, hearing aids, mobility ids and sign language. The Americans with Disabilities Act in 1990 ensures that every individual has the civil right to use AAC devices and recognizes them as educational tools (Zangari et al., 1994). However, this study reveals that the use of AAC devices is not addressed in the educational institutes' content of Teacher Training Programs for Special Education.

Recommendations
1. Resource guides for AAC devices should be developed for teachers serving in particular education institutions and centres.
2. Coursework modules should be developed dedicated explicitly to AAC devices, covering their types, functionalities, and implementation strategies.
3. Practical sessions should be included where future special needs teachers can interact with different AAC devices to understand their capabilities and limitations.
4. The importance of ongoing learning and professional development in AAC should be promoted by providing resources for further education and staying updated with advancements.
5. Hands-on experiences or practicums should be offered within educational settings where students can observe, assist, and practice using AAC devices with individuals with communication disabilities.

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