IDENTIFYING OPTIMAL EDUCATIONAL PARAMETERS FOR AUGMENTATIVE AND ALTERNATIVE COMMUNICATION USERS: STAKEHOLDERS' PERSPECTIVES

A Dissertation by

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DEDICATION

To my parents, sisters, and brothers
Thank you for your endless love, support and encouragement

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ABSTRACT

Research involving parameters for designing and developing an appropriate educational program for students who use augmentative and alternative communication (AAC) in school settings is considered a relatively recent development in the field of science. The purpose of the study was to a) identify parameters for developing an educational program for AAC users in school settings, b) identify intervention options that maximize AAC users' participation in schools, c) identify aspects of educational opportunities for promoting AAC users' learning and academic success, d) identify potential obstacles to positive outcomes in educating AAC users in school settings and e) identify differences in communication partner skills among stakeholders. The findings identified parameters for the education of AAC users in school settings as a solution to the fundamental problem of developing and designing appropriate educational programs for students who use AAC. Additionally, the findings revealed an agreement among the stakeholders on the survey items, meaning that the identified key considerations in AAC and educational opportunities for AAC users would potentially enhance AAC users' participation and academic success in the school settings. Participants also agree on the potential obstacles that negatively impact educating AAC users in school settings, eliminating the positive outcomes of any educational program trying to serve AAC users in schools. The high level of agreement on key considerations and barriers suggests that a plan can be made for improving education with AAC in the classroom, and the plan is outlined. Lastly, there was a significant difference among the stakeholders in the communication partner skills at a 95% confidence interval, indicating that some specific stakeholders are significantly better communication partners than others.

TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

LIST OF TABLES

TABLE OF CONTENTS (continued)

LIST OF FIGURES

LIST OF ABBREVIATIONS

AAC	Augmentative and Alternative Communication

ASHA	American Speech-Language-Hearing Association
ANOVA	Analysis of Variance
BE	Black English
CA	Colloquial Arabic
CCN	Complex Communication Needs
CDC	Centers for Disease Control and Prevention
e.g.	For example
EA	Educational Assistant
EFA	Exploratory Factor Analysis
IEP	Individualized Education Plan
IDEA	Individuals with Disabilities Education Act
MSA	Modern Standard Arabic
NCES	National Center for Education Statistics
PECS	Picture Exchange Communication System
RSEPI	Regulation of Special Education Programs and Institutes
RCT	Randomized Control Trial
RTI	Response to Intervention
SLP	Speech-Language Pathologist
SDLMI	Self-Determined Learning Model of Instruction
SET	Special Education Teacher
SE	Standard English

SPSS	Statistical Package for the Social Sciences
UDL	Universal Design for Learning
UNESCO	United Nations Educational, Scientific, and Cultural Organization
WHO	World Health Organization

LIST OF SYMBOLS

$\eta 2$	Effect Size

CHAPTER I

INTRODUCTION

The right to an appropriate and free public education is affirmed in the legislation in many countries. In Saudi Arabia, the Regulation of Special Education Programs and Institutes (RSEPI) states that students with disabilities (regardless of the severity of the disability) should receive education in general education settings with the least restrictive environments to the maximum extent possible (Alquraini, 2013). According to the American Speech-Language-Hearing Association (ASHA), individuals with severe disabilities should be included in schools and other life aspects (American Speech-Language-Hearing Association, 2020). Providing services outside students' natural environments can occur if the education cannot be achieved in regular classes, even with appropriate accommodations and supplementary aids due to the disability (Alquraini, 2013).

The literature review findings have shown evidence about the benefits of inclusive education, with appropriate supports, for students who use augmentative and alternative communication (AAC) in general education classrooms (Jorgensen, 2018; Mirenda, 2014). With proper supports in regular classrooms, students with complex communication needs (CCNs) can attain meaningful learning improvement in literacy (Ahlgrim-Delzell et al., 2016; Mandak et al., 2018), math (Spooner et al., 2019), science, and other lifelong learning skills (Spooner & Browder, 2015). In addition to the academic benefits, students using AAC gain significant benefits from inclusive education that they cannot find in special education settings, such as developing friendships with typically developing peers, building new social networks, and enhancing AAC use in natural environments (Kleinert et al., 2015; Lund & Light, 2007).

Students with CCNs–which is how they are commonly referred to in the field of AAC–often are at significant risk of severe deficits in receptive and expressive language skills and are therefore at even greater risk of being excluded from participating in regular classrooms, social interaction, and academic curriculum (Chung et al., 2012; Thiemann-Bourque et al., 2017). Research has shown that the roles played by speech-language pathologists (SLPs), general education teachers, special education teachers, parents, and school principals are fundamental to promote successful inclusion for students using AAC (Alquraini, 2010; Campbell et al., 2016; Kent-Walsh & Light, 2003; Murray et al., 2020; Rogers-Adkinson & Fridley, 2016; Steiner, 2018; Wasburn-Moses, 2005). For instance, SLPs, parents, classroom teachers, and special educators all have essential roles in teaching and supporting a wide range of communication and language skills, whereas school principals provide AAC resources to engage AAC users in all school environments actively. Hence, understanding stakeholders' perspectives is crucial for providing high-quality educational opportunities for students using AAC in general education classrooms (Lund & Light, 2007; Soto et al., 2001).

Statement of the Problem

Students who use AAC in regular schools need access to appropriate curriculum, communication, reading, and writing tools that can assist them to engage in learning actively (Sturm et al., 2006). They also require access to core literacy education opportunities across grade levels that promote literacy and other educational skills development (Light et al., 2019). The significance of the acquisition of traditional academic skills such as literacy and mathematic skills for students using AAC cannot be overemphasized. For example, AAC users are not usually employed in jobs requiring manual labor. Thus, they need highly developed writing, reading, and math skills for jobs typically carried out in an office or remote work. Given the

limited job opportunities for them, general education in preparing AAC users for the future is crucial. In public education classrooms, AAC users will have access to experts in reading, writing, math, science, technology, and so many others compare to special education classrooms. However, AAC users have limited opportunities to be educated in regular classrooms (Calculator, 2009; Kent-Walsh & Light, 2003; Phelps, 2019; Simpson et al., 2003; Williams et al., 2008). One of the critical difficulties in supporting students who use AAC has been a lack of appropriate curricula, appropriate inclusive programs, and efficient AAC services (Douglas et al., 2013; Kent-Walsh & Light, 2003). The key reason why so many AAC users are out of general education classrooms is that the current inclusive education programs are not well designed to equip AAC users with skills, knowledge, and learning opportunities that meet their needs.

The literature review shows that AAC users are capable of developing advanced reading, writing, and other academic skills when their needs are addressed appropriately in general education schools (Douglas et al., 2013). Individuals who use AAC are highly successful in developing these skills to make tremendous gains in overall language development and the use of their AAC systems (Harrison-Harris, 2002). In the case of students who use AAC, general education must be designed to integrate and unify education, communication, social interactions, and other types of supports for students who use AAC in regular classrooms (Hunt et al., 2002).

However, despite years of effort, the findings from reviewing the existing literature indicate a lack of a coherent framework for developing a suitable educational program for AAC users in regular school settings. The literature review shows evidence of missing exact parameters that can be used to guide stakeholders to design and develop an appropriate inclusive education program for AAC users to support their unique needs and learning styles. Parameters

are developed and maintained by the key stakeholders who are involved in the process of educating AAC users. Hence, the key stakeholders can provide valuable perspectives based on their knowledge and experiences that will be crucial to have when identifying parameters for developing a suitable educational program for AAC users in schools.

Purpose of the Study

The purpose of this study was to identify parameters that were crucial for developing an appropriate educational program for AAC users in regular schools, including key considerations in promoting AAC users' participation in general education environments, opportunities in enhancing AAC users' learning and academic success, potential obstacles to positive learning outcomes, and the current communication partner skills of different stakeholders. In the current study, the following research questions were asked:

1. What do stakeholders perceive as parameters for developing an educational program for students who use AAC in regular schools?
2. What interventions do stakeholders report as key considerations in maximizing AAC users' participation in school settings?
3. What aspects of education do stakeholders report as an opportunity to promote AAC users' learning and academic success in school settings?
4. What do stakeholders report as potential obstacles to positive outcomes in educating AAC users in general education?
5. Are there different perspectives among stakeholders regarding their skills as communication partners?

CHAPTER II

REVIEW OF THE LITERATURE

Defining the Concept of Inclusion

Inclusion has various definitions across and within countries, with many researchers working to clarify the definition. According to Odom (2000), some researchers define inclusion as placing students with disabilities in classes with a reflective ratio of a natural population (e.g., students with disabilities represent 5%-6% of the classroom). In contrast, Odom (2000) reports that other researchers suggested that a third of students in the classrooms should have disabilities. In the US, inclusion has been defined as an approach to support students' placement, whatever their abilities or disabilities, in classes with their peers, with proper supports and accommodations as needed (Block, 2007). Osgood (2005) argued that inclusion does not mean only a place or a classroom setting; inclusion is a philosophy of education that integrates students with disabilities into educational environments in which meaningful learning occurs. McLeskey et al. (2017) defined inclusion as integrating all students, whatever their abilities or disabilities, as valued members of the school communities. McLeskey explains that this definition involves students with disabilities participating in school activities, including academic and extra-curricular classroom activities with their peers (McLeskey, 2017). They are given accommodation and instructional support as needed to promote their success. Halvorsen and Neary (2009) stated that students with disabilities should be seen as participating community members; they do not belong to other separate classes or specialized educational environments based on their disability characteristics.

Lipsky and Gartner (1998) pointed out that inclusion is not about returning students with disabilities who have been in separate classrooms to the regular classrooms; instead, it promotes

students' right to fully participate in all school activities with their peers without pulling them out of the regular classroom to obtain services. Power-deFur and Orelove (1997) defined inclusion as providing students equal access to regular classrooms with implementing support to enhance their inclusion in different environments inside the regular classrooms and extended to all aspects of school facilities. Berg (2005) stated that inclusion means educating all students in learning environments and exploring all opportunities to eliminate barriers and obtain more understanding and acceptance of students with disabilities. Booth (2014) mentioned that inclusion has three perspectives:

1. enhancing the learning and participation of all students and stopping all forms of exclusion,
2. reforming educational rules and settings so that they respond to the differences in ways that value individuals equally, and
3. putting values into action in education and community.

The aim is to view inclusive education as an approach for increasing participation and eliminating all forms of exclusion of students with disabilities from educational communities, cultures, and course syllabi.

The Saudi Arabian Ministry of Education adopted the term "Mainstreaming," which means teaching students with special education needs in regular education schools and providing them with special education services as needed (Al-Mousa, 2010). Saudi Arabia has established a standard general curriculum whereby all students with and without disabilities are offered an opportunity to access education in which they are educated together (Alharbi & Madhesh, 2018). In Saudi Arabia, inclusion intends to teach all students within public schools, providing supplementary specialist services as needed (Alharbi & Madhesh, 2018). The Ministry of

Education announced Article 18 in 2002, which considers regular schools as the natural environment for teaching students with disabilities (Al-Mousa, 2010). However, there is no full agreement on a specific definition for inclusion in Saudi Arabia. Nevertheless, there are some attempts from Saudi Arabian researchers to clarify the term of inclusion. For instance, Al-Ahmadi (2009) defines the term "inclusion" as a service delivery model that promotes commitment to meeting students' educational needs within general education classrooms to the maximum extent appropriate. Alkhateeb et al. (2016) mentioned that Saudi Arabian educators define inclusion as an approach in which all students are educated in regular classrooms regardless of their disabilities.

In this dissertation, the term *inclusion* is used instead of mainstreaming or integration. Inclusion is defined as a student who uses AAC (regardless of his or her identified disability or severity of the disability) spending a significant portion of the school day (greater than 80% of the school day) to the maximum extent appropriate in general education classrooms and other school facilities alongside peers without disabilities in welcoming environments for all students, acknowledging and building on the competence of all students regardless of their communication disabilities, differences, and abilities (Dudley-Marling & Burns, 2014). That includes providing students with support services, adaptations, and accommodations in the general education settings instead of excluding them. The term augmentative and alternative communication (AAC) is used to describe all the ways that students use to share their ideas and feelings without talking, which include all forms of AAC such as unaided AAC systems (e.g., gesture and body language) and aided AAC systems (e.g., speech-generating devices and touching pictures) (ASHA, 2020).

Inclusive Education Models for Students Who Use AAC

Co-Teaching Model

Co-teaching is defined as two or more professionals sharing responsibility and providing instruction to all students assigned to them in general education classrooms (Brendle et al., 2017; Heisler & Thousand, 2019). Cook and Friend (1995) highlighted the rationales for implementing co-teaching in general education classrooms:

1. Increasing instructional options for students with and without disabilities,
2. Improving program continuity,
3. Reducing stigma for students with disabilities, and
4. Increasing support for teachers and related service providers.

Collaborative SLP in such a model would include the SLP providing support to identified students with communication disorders; at the same time, the regular classroom teacher teaches the whole class, with the SLP sharing the reasonability of teaching some curriculum content integrated with the SLP expertise, or both the teacher and SLP joining each other in team-teaching for delivering the content (Prelock et al., 1995; Suleman et al., 2014). Throneburg et al. (2000) pointed out that co-collaborative teaching led to significant improvements in children's academic and communication skills with speech and language disorders.

The researchers Elksnin and Capilouto (1994) and Heisler and Thousand (2019) stated six different models of co-teaching that SLPs and teachers can implement in general education classrooms that include students with speech-language impairments:

- one teach, one observe,
- one teach, one assist,
- station teaching,

- parallel teaching,
- alternative teaching, and
- team teaching.

Throughout these different co-teaching levels, the researchers outlined several roles for SLPs and teachers to perform in classrooms. These roles allow both students with communication disorders and those without disabilities to access the curriculum content. Brendle et al. (2017) reported that the need for differentiated instruction in general education classrooms has been growing due to recent shifts in the field of speech-language pathology requiring generalization and functional goals. More details about the six different levels of co-teaching are listed below.

One Teach, One Observe. In this co-teaching level, either the SLP or co-teacher observes, while the other takes the responsibility of the primary instructional role. The individual who takes on the role of observing students, stepping in to provide support as needed to students, whereas the co-teacher continues providing the content (Elksnin & Capilouto, 1994; Heisler & Thousand, 2019).

One Teach, One Assist. In this type of co-teaching, the SLP or co-teacher takes primary instructional responsibility, whereas the other supports students with their work. The SLP can assume either a leading or supporting role. With the lead role, the SLP may model for the co-teacher some communication interventions. In the assist role, SLP may take the responsibility of supporting students with complex communication needs. For example, the SLP may support the student in combining words and phrases to respond to the co-teacher questions (Elksnin & Capilouto, 1994; Heisler & Thousand, 2019).

Station Teaching. In this level, the SLP and co-teacher divide the instructional content into two parts (e.g., new vocabulary and content review). Students are switched so that all students obtain instruction from each teacher. Each co-teacher takes responsibility for monitoring, creating, and teaching one or more learning stations within the classroom (Elksnin & Capilouto, 1994; Heisler & Thousand, 2019).

Parallel teaching. For this co-teaching level, the students are divided into two equal groups, then the SLP and co-teacher teach each group simultaneously. SLP and co-teacher need to address the same objectives and information. This co-teaching type does not involve whole-group teaching and is considered the most familiar to SLPs (Elksnin & Capilouto, 1994; Heisler & Thousand, 2019).

Alternative Teaching. In the alternative teaching approach, the SLP or co-teacher instructs the larger group of students using a standard format, whereas the other co-teacher adopts the content for those who have difficulties with mastering the materials and provides extra guidance on learning and applying skills or concepts in classrooms using remediation strategies (Elksnin & Capilouto, 1994; Heisler & Thousand, 2019).

Team Teaching. In this co-teaching level, both the SLP and co-teacher share the same responsibilities of instructing and presenting the lesson to all students. This co-teaching level includes planning, teaching, assessing, and assuming responsibility for all students. For an SLP, this co-teaching consists of sharing responsibility for all students with and without disabilities in the classroom, not just those who have communication disorders (Elksnin & Capilouto, 1994; Heisler & Thousand, 2019).

The Participation Model

Beukelman and Mirenda (2005) proposed a model for including students who use AAC in general education classrooms. Within this model, there are three levels of inclusion: full, selective, and no integration. Full integration means that the placement of all students using AAC in general education classrooms must be full, and all needed supports are offered in that place instead of in special classes or schools (Fuchs & Fuchs, 1998; Kauffman et al., 2018). Selective integration refers to the educational settings where students who use AAC spend part of their school day in regular classrooms. However, they also spend the other part of the school day in a separate learning environment, other than those environments that are usually considered for typically developing peers, such as special education classrooms and resource rooms to receive special education services. In some cases, it may be determined that students who use AAC fully receive educational services in separate classrooms with no opportunities to participate in regular classrooms; this level is referred to as "no integration," and it is generally not recommended (Beukelman & Mirenda, 2005).

Educational Participation. In the Participation Model, Beukelman and Mirenda (2005) identified four different education participation levels for exposing students who use AAC to the general education curriculum and learning culture offered in inclusive programs: competitive, active, involved, and no educational participation. In competitive participation levels, students who use AAC are expected to participate in the same educational activities in regular classrooms as their peers. Their work is evaluated similarly to their peers based on academic standards. Active educational participation refers to the idea that students who use AAC participate in the same academic activities similar to their peers, but the learning content and workloads may be modified. Furthermore, students who use AAC are not expected to perform the same as their

peers, and their academic performance is evaluated according to individualized academic standards and objectives. For involved participation level, students who use AAC are involved in the same educational activities as their peers in regular classrooms with minimal academic expectations. Their academic performance is evaluated based on individualized academic standards. Additionally, the academic content may require extensive modifications within this level of involved participation. If there are no academic expectations for students who use AAC, this level is called “no educational participation.” Within this level, students who use AAC are still integrated into regular classrooms with their peers. However, they are not involved in academic activities with their typically developing peers, but they may participate in different activities separately.

Social Participation. According to Beukelman and Mirenda (2005), there are four levels to describe students' social participation who use AAC in regular classrooms: influential, active, involved, and no social participation. Students who use AAC are considered socially influential when they are assumed to have friends with and without disabilities. They are also assumed to have leadership roles within their social groups, such as initiating social activities and making group decisions and choices. The active social participation level is when students who use AAC are actively involved in social contexts with their peers but do not directly influence their social activities. For involved participation level, students using AAC may choose to involve in social contexts with small circles of friends without disabilities. Their participation is characterized by being observers or passive participants with no direct influence on social group activities. In most cases, socially involved participants do not have appropriate communication means to enable them to be active or influential participants. Students who are not involved in social interaction with typical peers in regular classrooms are considered not social participants. In this

type of social participation, students who use AAC have no opportunities to make friendships with students without disabilities; thus, it is considered undesirable for inclusive education, and it requires appropriate remediations.

Levels of Support (Independence). Beukelman and Mirenda (2005) described three support levels for educational and social participation within the Participation Model: no required support, independence with setting up, and fully assisted. Students who can effectively participate in regular classroom activities without human assistance are considered independent based on the Participation Model. Those AAC users can independently operate their AAC systems, position themselves in the classroom with no assistance, and involve themselves in social contexts appropriately without support. An independent AAC user with set-up support is when an AAC user requires support from another person such as an SLP or a classroom teacher to set up the AAC system, equipment, or other educational tools to allow them to participate effectively. In some cases, full assistance may be needed to enable AAC users to participate in classroom activities with verbal or physical assistance. Inclusive teams can also manipulate the environment to help them engage in regular classroom activities.

Universal Design for Learning Model

Universal Design for Learning (UDL) is an inclusive instruction with several principles to give all students with and without disabilities an equal opportunity to participate and learn in general education classrooms (ASHA, 2020; Jiménez et al., 2007; Katz, 2013). This model allows students who use AAC to receive the curriculum content in multiple means of presentations such as digital text, video, photos, and images. Students also can express themselves in classroom activities using different means of communication, such as assistive technology, video recording, writing, and drawing (ASHA, 2020). According to King-Sears

(2009), the universal design aims to enable more people with disabilities to independently and immediately participate in different educational environments providing them with the necessary adaptations. The UDL requires teaching staff to adjust their teaching method and change their views toward the teaching-learning process so that lessons planning and instruction are suitable for students with and without disabilities (Jiménez et al., 2007). Thus, UDL provides access to learning for all students by eliminating physical, cognitive, intellectual barriers and other learning challenges for students with and without disabilities (ASHA, 2020).

A study was conducted by Rose et al. (2005) confirmed that UDL provides a flexible curriculum to minimize the barriers faced by students with disabilities; digital text helps in reducing decoding barriers for students with dyslexia; video or digital photos provide an alternative representation of content that eliminate barriers in comprehension for students with language disabilities; descriptions and captions can offer alternative mean of presenting the information to students who are blind or deaf; and keyboard alternatives may minimize barriers associated with navigation and control for students who have physical disabilities. For Alnadhi's study (2014), the author examined the roles and benefits of using assistive technology in UDL design. The author stated that assistive technology within UDL design could help students with disabilities facilitate and maximize their learning gains and increase their confidence while performing some educational tasks that can be completed using low-tech assistive technology.

There are seven principles presented by King-Sears (2009) to be used within UDL design for students with learning difficulties in regular classrooms:

- flexibility in use,
- equitable use,
- perceptible information,

- tolerance for error,
- simple and intuitive use,
- low physical effort, and
- size and space for approach and use.

Flexibility in Use. For this principle, teachers show flexibility in designing instruction that accommodates most students' learning preferences and abilities. For example, teachers can use physical and virtual manipulatives and be flexible in providing students with choices for learning different concepts in the classroom. However, relying only on concrete and virtual manipulative is not enough; teachers need to demonstrate flexibility in delivering the content verbally by explaining the curriculum content, concepts, and rules (King-Sears, 2009).

Equitable Use. With this principle, the instructional materials are offered via technology (e.g., digital texts), considering students' diverse abilities to increase the content's accessibility for all students (King-Sears, 2009). Some instructional materials that are not well designed for AAC users, such as textbooks, SLPs, and teachers, may redesign them before the instruction is delivered to students. Poorly designed textbooks may create problems for some students with disabilities who have organizational issues and difficulty finding patterns among information, demanding more cohesive and well-organized instruction (Jitendra, 2001; Van Garderen, 2006).

Perceptible Information. For this UDL principle, educators use various ways to present and practice lessons and course content, such as tactile experiences, visual supports, illustration, and visible contrast of the critical content. The UDL principle also allows for technology use in conjunction with verbal and written explanations to provide the necessary accommodations needed by students with disabilities (King-Sears, 2009).

Tolerance for Error. Errors are seen as learning opportunities within this UDL principle. Educators are expected to take students through the instructional process when an error is made. The process can include teaching strategies such as scaffolding and immediate feedback to correct and guide students through the learning process (Dihoff et al., 2004). This feedback provides a critical learning opportunity for students to solve problems or understand the content efficiently (King-Sears, 2009; Schumaker & Deshler, 2009).

Simple and Intuitive Use. The curriculum content is offered in various formats suitable for students' language skills and background knowledge within this principle. For instance, educators may use a graphic organizer to present a list of different concepts (Kim et al., 2004). This principle's primary goal is to reduce content complexity to enhance learning and understanding of the content (King-Sears, 2009).

Physical Effort. This principle requires designing efficient classroom activities and educational materials that are comfortable for students to use. A study conducted by Egilson and Traustadottir (2009) found that students are less involved in classroom activities that require excessive efforts leading to fatigue and withdrawal from the activities. For some students who have issues with fine motor skills, an adapted keyboard or other high-tech options would be beneficial to eliminate the physical effort in finding intended keys. This adaptation helps them devote their mental energy to what they are typing (King-Sears, 2009).

Size and Space for Approach and Use. Educators need to present the content using an appropriate size that is large enough for students to see the content. Scally (2001) reported several variables that may influence learning, such as background complexity, size, shape, and content position. Instruction also needs to be delivered using clear and precise language appropriate for all students' language skills to understand the content (King-Sears, 2009).

Robinson and Soto (2013) stated that UDL requires careful planning and adaptations that meet all students' needs before implementing it in educational settings. The SLPs' roles within the UDL model requires working with the teaching staff to make the classroom more accessible for students using AAC systems (ASHA, 2020). According to Ralabate (2011), UDL is challenging for educational teams because they must provide learning activities in regular classrooms that are inclusive and accessible for all students. UDL enables students to use AAC to access various assistive technologies that can be used in the classrooms, such as text-to-speech options for students with expressive language impairment, allowing them to read aloud with their typically developing peers (Robinson & Soto, 2013). Wehmeyer (2006) discussed multiple means of representation, expression, and engagement. Means of representation addresses providing the curriculum content in multiple and flexible formats; means of expression focuses on providing opportunities for students to demonstrate what they know in various ways; means of engagement emphasizes the importance of enhancing students' engagement and motivation.

Response to Intervention

Within the response to intervention (RTI) model, decisions about receiving special education services are based on structured activities such as data-based problem solving, regular monitoring of students using valid measures, flexible service delivery, and a focus on the nature of educational contexts (Bradley et al., 2005). RTI has three-tiered intervention levels. At tier 1, services are provided in the classroom, initially by screening the students to decide who is at risk for not developing essential skills at an adequate rate. The teaching staff is responsible for improving the learning environments before further referral of the student to rule out the possibility of a lack of appropriate instruction in causing students' deficiency (Fuchs & Fuchs, 2006; Grether & Sickman, 2008). If the student is identified as being at-risk, the student is

moved to tier 2 and provided with instructional intervention and progress monitoring. Tier 2 is a curriculum-based level; therefore, monitoring students' progress and success is based on the curriculum (Fletcher & Vaughn, 2009).

Students who use AAC are considered for services at tier 2 and tier 3 (Grether & Sickman, 2008). Students using AAC at tier 2 are provided with supports and modifications in the classroom from educational teams, including SLP. At tier 2, the primary focus for students using AAC is to identify the modes of communication used to respond effectively to education tasks in the classrooms, such as using sign language and speech-generating devices (Grether & Sickman, 2008). If it is determined that the student makes adequate progress in tier 2, then the student continues to receive services within tier 2; however, if the student does not respond to the intervention effectively, then the students are considered for receiving additional supports in tier 3 (Fuchs & Fuchs, 2006). At tier 3, SLPs use evidence-based practices to provide intervention in the classroom, such as assessing students, monitoring progress, and adjusting intervention as needed to meet students' language, literacy, and learning needs (Grether & Sickman, 2008). Students who respond successfully to the intervention in tier 3 need to move back into the classroom and receive all services within the tier 2 level.

A study was conducted by Grosche and Volpe (2013) to examine the feasibility and applicability of RTI as an approach for facilitating the inclusion of students with learning and behavior issues. The authors concluded that the RTI model affords excellent opportunities to enhance the inclusion of students with learning and behavior issues. Inclusion is negatively affected when there is ambiguity around the implementation strategies and the roles between professionals (World Health Organization, 2011). Also, inclusion cannot be unsuccessful when students are stigmatized and labeled due to their disabilities (WHO, 2011). RTI offers

opportunities to overcome these barriers to inclusion by providing an implementation plan for including students in classrooms, defining teaching members' roles and responsibilities, enabling students to receive the needed resources for learning, and ending early stigmatization of students with learning and behavior issues (Grosche & Volpe, 2013).

However, RTI may have undesirable side effects. If the educational team decides to offer services outside the regular classroom to students identified as at-risk, the classroom teacher is not responsible for learning how to instruct students at-risk and possibly others with similar needs (Frattura & Capper, 2006). This risk can be eliminated if students at tier 2 stay in the general education domain with teaching teams' services, so regular education teachers cannot be released from the responsibilities for teaching students identified as at-risk (Grosche & Volpe, 2013). Another negative aspect of RTI is that it can be a source of stress for struggling students due to low achievement and minimal positive feedback from educators (Chang, 2003; Lackaye & Margalit, 2006). The last possible side effect of RTI is the intense focus on the effectiveness of education, and data-based decision-making may put huge pressure on the struggling students (Grosche & Volpe, 2013).

Beyond Access Model

Sonnenmeier et al. (2005) created the Beyond Access Model that focuses on enhancing AAC users' full participation and learning of the general education curriculum and activities in the regular education classroom. The Beyond Access model is differentiated from other AAC users and team support planning models by:

1. the assumption that all students with significant complex communication needs can be educated and learned the academic content in regular classrooms,
2. the application of emerging AAC best practices in inclusive classrooms,

3. the use of the classroom activities and general education curriculum and as the context for teaching and learning academic skills, functional communication skills,
4. the provision of ongoing support to inclusive team members to facilitate engagement in an efficient collaboration to design, solve problems, and resolve disagreements,
5. the provision of professional development wanted by the educators to deliver learners supports effectively and consistently,
6. consideration of organizational and systemic obstacles that hinder the use of best practices, and
7. the linkage of judgments about student progress to the evaluation of the quality of supports.

There are four phases of the Beyond Access model that provide a framework for educators to improve their capacity to plan for, design, implement, and assess AAC users and educators' supports within an inclusive education context. These phases are: 1. comprehensive assessment of student and team supports, 2. exploration and description, 3. observation and documentation, and 4. reviewing and reflecting on the process of learning (Jorgensen et al., 2010). For detailed descriptions of the Beyond Access Model's four phases and how to implement them to support students who use AAC in inclusive education settings, interested readers are referred to the book "The Beyond Access Model" by Jorgensen et al. (2010).

Best Practices for Inclusive Education

Definition of Best Practices

"Best practice" has various meanings and definitions across different fields and disciplines. Farkas and Anthony (2006) defined best practices as inclusive of evidence-based and value-based practices that demonstrate recovery outcomes of variables in different settings with diverse individuals. The Centers for Disease Control and Prevention (CDC) defined the term best practices as a practice approved by an extensive peer-review process and evaluation, showing effectiveness in promoting health outcomes that are usually illustrated through systematic reviews (Spencer et al., 2013). According to the Commonwealth of Learning, the term best practices depends on the context under consideration; hence, the principles of best practices need to be adjusted based on the nature of the context, which also can be considered as the use of "good practice" in a particular context (Osburn et al., 2011). Arendale (2010) defined best practices in education as a range of individual activities, policies, and programmatic procedures to obtain positive changes in pupil attitudes or learning behaviors. The United Nations Educational, Scientific, and Cultural Organization (UNESCO) defined best practices as a practice with a demonstrable and tangible impact on enhancing individuals' quality of life that is socially, culturally, environmentally, and economically sustainable (Osburn et al., 2011).

Foundations for Best Practices in Inclusive Education

The literature review reveals several essential foundational components for building best practices in inclusive education to make the inclusion of students with disabilities successful. King-Sears (1997) pointed out four critical foundational components necessary to any inclusive program when considering applying best practices: shared vision, change process, preparation, and ongoing support. The most critical step toward enhancing inclusion is a shared vision in

which all the educational teams believe and value the inclusion of students with and without disabilities in general education settings together in rich learning environments when every student is seen as a valued member of the school (1997). Creating a shared vision should be a collaborative effort between the inclusive teams and the community of learning by creating shared vision circles to achieve a successful inclusion (Riewerts, 2006). According to Waldron (2020), if the teachers, administrators, or other related service providers do not recognize the need to assess and change some of their beliefs regarding inclusion, the inclusive program is more likely to entail superficial change only, or what Goodman (1995) describes as “change without a difference.”

The second foundational aspect is the change process. Some educational team members resist changing the school environment to be more inclusive because of the lack of knowledge, skills, training, or motivation (King-Sears, 1997). In this case, training is necessary to overcome a lack of knowledge and be more skilled in applying the new inclusion methods and enhancing the inclusive teams' participation in planning and designing the inclusive program, motivating them to apply it. Resistance to change among any educator impacts the effectiveness of implementing educational reform, such as an inclusive program (Snyder, 2017). Ford and Ford (2009) recommended a "conversational" method when meeting with resistance. In the conversational process, change advocates ask questions, and the change recipients are seen as active and interested individuals to work with them to make the change happen. Within this conversational approach, resistance is seen as a chance to learn, understand, and improve the change process. Researchers agreed that the school principals and administrators are more responsible for initiating the change process to implement inclusive programs (Chitiyo, 2017; Lyons, 2016; Roberts et al., 2018). Steiner (2018) stated that communication from management

regarding the change process influences the organization's implementation of change. Also, administrators' negative attitudes toward the change process may impact how the professionals perceive the change in their organization, limiting the number of options for making any positive change (2018).

The next foundational elements for building best practices in inclusive education is preparation and ongoing support. Both preparation and ongoing support are connected, and one must not occur without the other (King-Sears, 1997). Teachers' knowledge, preparation, and readiness to implement inclusive education may impact their perception and beliefs toward including students with disabilities in regular classrooms (Ajuwon et al., 2012; Lohrmann & Bambara, 2006). Aldabas (2017) conducted a study to examine pre-service special education teachers' perceptions regarding their knowledge and preparation to use AAC in Saudi Arabia. The findings showed that most participants felt that their preparation programs were not adequate in preparing them for using AAC in classrooms, although most of the participants felt confident in teaching students who use AAC. The lack of AAC training is evident in Saudi Arabia and other countries such as the United States, United Kingdom, India, and Israel (Da Fonte & Boesch, 2016).

Lohrmann and Bambara (2006) found that the teachers' concerns about their lack of preparation for implementing inclusive education made them doubt the inclusive education effectiveness. McMillan's study (2008) examined the effects of teachers' professional development on student use of AAC devices in schools. Findings indicate that teacher professional development in assistive technology and AAC positively impacted integrating AAC in the classroom for students with severe disabilities. The authors noted that without adequate training and support for teachers, favorable outcomes such as increased communication

initiations and participation among students using AAC are unlikely to be reached (McMillan, 2008). Teachers work in educational environments where students with diverse needs are present, and there is a need to provide them with ongoing support. Kerr and Nelson (2002) suggested that the term "full inclusion" should be replaced by "supported inclusion," in which educational teams and students with and without disabilities have access to ongoing supports that promote their success. Students with disabilities also need more support and assistance from regular education teachers than other students to achieve mastery in learning. This support from regular education teachers helps them work out their classroom activities without any difficulty that may hinder their performance (Vygotsky, 1980; Wenger, 1999).

Collaboration

Collaboration is defined as individuals working together toward shared goals and entails people with disabilities, family members, professionals, community members, and friends coming together to reach a shared vision (Solone et al., 2020). People on collaborative teams have diverse life experiences and can add significant benefits to the collaborative planning process. To build a collaborative team, the team members should share responsibilities, resources, and expertise to create effective inclusive education and meaningful educational programs for students with and without disabilities (2020). Collaboration demands that all collaborative team members commit to working together toward a shared goal, that is, how best to support students' learning (Friend & Cook, 1992). Achievement of inclusive education presumes that no one individual could have all the expertise needed to meet all students' needs in a classroom; hence, collaborative team members must become effective and efficient members (Villa & Thousand, 2009).

Collaboration Between Regular Teachers, Special Teachers, and Service Providers.

Jackson et al. (2000) conducted a study to examine experts' perceptions in moderate to severe disabilities on the most useful practices for a successful inclusive program. The majority of participants indicated collaboration between general and special educators as a critical component of inclusive education. The majority of participants indicated collaboration between general and special educators as a critical component of inclusive education. Participants agreed on the need to have a shared vision for all students, with the stakeholders working together to accomplish it. The participants emphasized the necessity to dissolve the rigid boundaries between related service providers and regular/special teachers to work together to achieve the students' goals and objectives and reframe associated services so they can be integrated within the classroom activities rather than outside the regular classroom (Jackson et al., 2000).

Olore's study (2017) investigated the benefits of the collaboration between general and special educators and the factors hindering the collaboration in inclusive education. Findings suggest that collaboration helps educators improve their ability to instruct students at all levels and modify the curriculum for individual needs, giving educators insight into new teaching pedagogy and new instructional approaches. Collaboration also provides educators with access to expertise, new resources, and different perspectives on students' needs, which help meet all students' diverse needs. The author identified some obstacles that might hinder educators' collaboration process, such as a lack of time, scheduling conflicts, differences in teaching philosophy, and personality conflicts between team members. Glover et al. (2015) examined SLPs and teachers' preferences for service delivery when working in the mainstream in England. Results indicate a minimal collaborative practice among SLPs and teachers, and both professionals expressed a desire for increased collaboration and knowledge.

A study conducted in Saudi Arabia examined the perceptions of teachers and parents of deaf students regarding the inclusive programs (Alothman, 2014). Findings show a lack of collaboration among school teachers and staff and lack of communication between school and parents; participants placed more responsibilities on school principals in creating time and opportunities for collaboration among educators in the school. Similarly, a study was completed by Stoner et al. (2010) to examine implementing AAC in an inclusive high school setting in the United States. The author noted a lack of cooperation among school staff involved in the study as no team member was willing to implement an AAC device across different school environments. The authors suggested that AAC could be more effective if team members had communicated about the AAC use across different learning environments in the school. The lack of collaboration in implementing AAC was identified as limited knowledge in AAC, lack of problem-solving skills, and lack of effective communication skills among staff. Results revealed the importance of a collaborative team for successfully including students who use AAC even if they demonstrate technological proficiency. Because there was no consistent, cooperative teaming present in this study, AAC was not implemented effectively and fully across different high school environments.

One effective way to overcome these obstacles that may negatively affect team members' collaboration is to implement co-planning and co-teaching together (Murawski & Hughes, 2009). Findings from research indicate that co-teaching was not only beneficial for building strong collaboration between educators due to its emphasis on social skills instructions but also had positive academic and social outcomes for students with and without disabilities, such as improvement in reading and writing and collaboration skills among students with and without disabilities (McDuffie et al., 2009; Murawski, 2006; Tremblay, 2013). Tango (1997) suggested

that in order to enhance collaborative relationships among educators, it is essential to address the attitudes and feelings of the inclusive team members and provide them with training on collaborative team approaches.

Collaboration Between Parents and Educators. Parents should be included in all aspects of learning because they are considered the first source of education. After all, most learning occurs at home; thus, parents need to be brought on board to enhance the process of inclusion (Krahn, 2011). Strong research-based literature confirms that parent-teacher collaborative relationships are crucial for successful learning, and social and behavioral improvement among students with disabilities (Turnbull et al., 2011). Positive collaboration between parents and school led to improved academic achievement and increased engagement in school activities (Barton & Coley, 2007; Henderson & Mapp, 2002). Schools that encourage parents' collaboration develop high-level improvement in inclusive programs, social skills, teacher morale, community engagements, and learning achievements compared to schools that never promote partnership with families (Anderson, 2006; Epstein, 1996). Similar findings from research studies indicated that family's expectations, school, and parental behaviors would affect student academic performance and learning outcomes, respectively (Epstein, 2018; Redding, 2002).

Findings of parental involvement in the AAC literature are growing; however, their results are mixed. Several authors, including Angelo, Jones, Kokoska (1995), and Cress (2004), emphasized the importance of family involvement for successful AAC intervention. In contrast, some researchers noted some negative family experiences. McCord and Soto (2004) conducted qualitative research to examine Mexican-American families' perspectives on AAC. Findings suggest that parents felt that they were not included in the decision-making process, and they did

not use the AAC systems consistently at home and that the AAC devices usually did not have vocabulary relevant to their culture and life. The findings highlight the need for improved collaboration between parents and professionals. Starble et al. (2005) noted that using a family-centered approach for AAC implementation demonstrated positive outcomes and enhanced family participation in programming and implementing the AAC system. Sandall et al. (2005) described the family-centered approach as requiring shared collaboration, enhanced family participation, and individualized practices and concluded that educators should recognize both the overall and the individual needs of the students and families they serve.

Collaboration Between Students Without Disabilities and Students Using AAC. Previous research has shown that people's attitudinal behaviors toward individuals who have disabilities are less positive than those toward peers without disabilities (Burke, 1994; Cook et al., 2000; Specht et al., 2000). Negative beliefs about people who use AAC create obstacles that negatively impact communication and full engagement in society. For instance, negative attitudes can influence individuals' willingness to communicate with AAC users, consequently interfering with developing meaningful social relationships with AAC users (McCarthy et al., 2002). Todman (2000) stated that delays in initiating responses from AAC users tend to decrease the enjoyment of the social exchange between both partners and to lead to negative impressions toward AAC users' communicative competence. Hyppa-Martin et al. (2016) reported that the well-being of individuals who use AAC is improved by their ability to engage in meaningful social contexts. The author conducted a study to examine college students' attitudes toward same-aged peers who used a nonelectronic AAC system with and without a partner reauditorization approach (Hyppa-Martin & Reichle, 2018). Reauditorization is defined as a communication partner's contingent verbal production of AAC users' aided message (2018).

Sixty-four subjects completed surveys after watching a video of two counterbalanced conditions of a peer who communicated using nonelectronic AAC. Findings indicate more positive attitudes, understanding, and increased willingness to communicate with the peer who used the nonelectronic AAC system with partner reauditorization, which shows that partner reauditorization can be used as a strategy to enhance individuals' attitudes toward AAC users.

Best Academic Practices for Inclusive Classrooms

Cooperative Learning. Cooperative learning is an instructional strategy in which educators organize students into small groups to accomplish shared academic goals. Collaborative learning techniques are widely investigated, and they are known to considerably increase learners' achievement in various educational subjects across different grade levels (Slavin, 2011). A study was conducted by Hunt et al. (2002) to study cooperative learning effectiveness to enhance three students' social participation and educational achievement using AAC in general education classrooms. The significance of the collaborative learning strategy was evaluated using team interviews and behavioral observations. Findings suggest that consistent implementation of the cooperative learning approach by inclusive team members was associated with improvements in academic gains, social interactions with classmates, participation in classroom activities, and enhanced use of various AAC systems among students using AAC in general education classrooms.

Strategy Instruction. Strategy instruction is defined here as an alternative instructional approach to working with students who use AAC in regular classrooms. Binger et al. (2010) investigated the effectiveness of using a communication partner instructional program to teach classroom educational assistants (EAs) how to support students using AAC to generate multi-symbol message productions using their speech-generating devices. The participants were three

EAs who worked with at least one student using AAC in a general education classroom. Findings show that the intervention had a large effect as all three students using AAC produced various multi-symbol messages compared to the baseline when none of the students who use AAC produced any multi-symbol messages. All students in this study learned to produce symbol combinations using their speech-generating devices within a short period after the intervention.

Thiemann-Bourque (2012) investigated the effectiveness of integrating AAC instruction within the peer-mediated intervention to enhance children's social skills using AAC in preschools. The author started the intervention by teaching peer partners how to use AAC and communicate with AAC users. Each AAC user was then paired up with one trained peer using various AAC systems for exchanging communications between partners. Peers served as instructors who taught AAC users how to communicate and engage in classroom opportunities effectively. The author reported increased functional communication, decreased inappropriate social behaviors in classrooms, and improved social communication between students who use AAC and those without disabilities.

Previous studies have also shown that shared book reading is a critical instructional strategy used in elementary classrooms (Sturm et al., 2006). Shared reading is an elementary instructional activity in which the teacher manages a group of students reading a selected Big Book (Harris & Hodges, 1995). The Big book is an enlarged format of the printed book with texts and illustrations (Mahayanti & Asrina, 2017). During this shared reading activity, the teacher helps students learn beginning literacy concepts such as print conventions, vocabulary, and reading strategies (e.g., predictions) (Sturm et al., 2006). To engage efficiently in the shared reading activity, students using AAC require access to tools for supporting communication and participation in the academic activity. For instance, core vocabulary or messages from the shared

book should be available on their AAC systems. Then, AAC users can select from the vocabulary choices to express feelings (e.g., funny, sad, and surprised). With book adaptations and activity modifications, students with significant and multiple disabilities may receive great learning benefits from shared book reading (Browder et al., 2008).

Self-Determination

The Self-Determined Learning Model of Instruction (SDLMI) is an evidence-based model of instruction used by educators to support students in achieving the academic goals and objectives and improving self-determination (Raley et al., 2018). Self-determination involves choice-making, decision-making, problem-solving, goal setting and attainment, planning, self-management, self-awareness, and self-knowledge, enabling people with disabilities to work as causal agents toward achieving valued goals and objectives (Nota et al., 2007; Shogren et al., 2017). SDLMI includes a three-phase instructional process that needs to be repeated over time: (a) set a goal, (b) take action, (c) adjust the goal or plan. Findings show positive outcomes from implementing SDLMI in educational settings, such as increased academic achievement, improved access to curriculum, and improved classroom behavior (Raley et al., 2020). A study conducted by Shogren et al. (2020) examined the effectiveness of SDLMI with 186 students with intellectual disabilities. SDLMI was implemented by randomly selecting school districts across Kansas and providing teachers with training on SDLMI strategies. Findings showed improvement in student self-determination and increased academic achievement. Milner and Kelly (2009) identified self-determination as one of five essential antecedents for building a sense of community participation by individuals with disabilities because they use their skills and knowledge to achieve independence in self-chosen activities.

Barriers, Facilitators, and Benefits of Inclusion Classrooms for Students Who Use AAC

Despite the range of benefits from including students who use AAC in general education classrooms, several barriers were found in literature, including challenges in teaching students using AAC, complexities in creating inclusive teams, incompatible school environment and curriculum, and limited skills to handle the diversity in inclusive classrooms. (Andzik et al., 2016; Chung et al., 2012; Chung & Douglas, 2014; Finke et al., 2009; Hunt et al., 2002; Kent-Walsh & Light, 2003; Mukhopadhyay & Nwaogu, 2009; Ruppar et al., 2011; Sonnenmeier et al., 2005; Soto et al., 2001; Steiner, 2018).

Barriers Associated with Including Students Who Use AAC in Regular Classrooms

Several barriers were found in the literature related to students using AAC in regular classrooms, such as barriers related to AAC users, inclusive teams, parents, school environments and curriculum, teachers, and SLPs.

Barriers Related to Students Using AAC. Students with severe complex communication needs sometimes lack the social skills necessary to participate in most classroom activities (Chung et al., 2012; Finke et al., 2009; Kent-Walsh & Light, 2003). Even though Chung et al. (2012) observed improvements in some social interactions by students who use AAC after including them in general education classrooms, skill limitations in communication among students lead to uncertainties over their chances to effectively participate in academic activities (Mukhopadhyay & Nwaogu, 2009). The complexity of teaching students with disabilities increases with the severity of one's disability, which implies that students with severe expressive language disorders are more challenging to engage in standards-based instruction in general settings than those with mild or moderate disabilities (Sonnenmeier et al., 2005). Mukhopadhyay and Nwaogu (2009) reported that some teachers had mixed feelings about AAC

users' academic achievements and success who were diagnosed with varying intellectual disability levels because they posed challenges for teachers in regular classrooms.

Andzik et al. (2016) observed that AAC systems are often not in close proximity to students when they need to use them. Calculator (2009) and Stoner et al. (2010) reported that physical disabilities might limit students' access to AAC devices. Kent-Walsh and Light (2003) observed that the concern over limited use results from students' lack of motivation to use AAC systems. Consequently, the few interactions that students who use AAC had been mainly in passive roles, and they initiated them rarely or inconsistently replied to others' initiations (Chung et al., 2012). Frequent absenteeism and lateness leading to lost instruction time were concerns raised by Chung et al. (2012). Students with complex communication needs may have emotional and behavioral problems requiring considerable energy and effort by teachers to maintain individual discipline (Mukhopadhyay & Nwaogu, 2009). The concern arises because missing significant peer interaction opportunities affects the students' sense of belonging and membership within the inclusive classrooms (Chung et al., 2012).

Barriers Associated with Inclusive Teams. The literature reveals the challenges that often arise in realizing effective inclusive teams (Finke et al., 2009; Kent-Walsh & Light, 2003; Mukhopadhyay & Nwaogu, 2009; Sonnenmeier et al., 2005). As Finke et al. (2009) noted, elementary school teachers face difficulties coordinating their schedules amidst conflicting stakeholders' contributions. Teamwork is vital for the successful inclusion of students who use AAC, but it is often elusive (Kent-Walsh & Light, 2003). Members failed to work together effectively because of limited planning time, role confusion, and limited access to professional development specific to students who use AAC (Finke et al., 2009; Sonnenmeier et al., 2005). It

is a significant challenge for utilizing AAC effectively if support staff professionals, teachers, and parents do not collaborate and consult regularly (Mukhopadhyay & Nwaogu, 2009).

Barriers Related to Parents of Students Who Use AAC. Parents' contributions to team efforts are often limited or counterproductive (Finke et al., 2009; Kent-Walsh & Light, 2003; Mukhopadhyay & Nwaogu, 2009; Hunt et al., 2002). Mukhopadhyay and Nwaogu (2009) report that teachers were concerned about parental support and involvement in the teaching-learning process. As Kent-Walsh and Light (2003) observed, parents often play a limited role in supporting the inclusion process, and they hold different expectations compared to the inclusive teams' expectations of the target students. Hunt et al. (2002) argued that parents frequently consider student performance as the teachers' responsibility and fail to assume responsibility. On their part, Finke et al. (2009) found that parents often make questionable judgments in identifying the curriculum that matches their child, thereby compromising children's foundation of developing skills applicable for the rest of their lives.

Barriers Related to School Environment and Curriculum. Study findings indicate that the general education school environment and curricula do not fully suit students who use AAC and are challenging to modify (Mukhopadhyay & Nwaogu, 2009; Ruppar et al., 2011). Mukhopadhyay & Nwaogu (2009) categorized the barriers facing AAC into structural and resource barriers. Kent-Walsh & Light (2003) observed that technology limitations are a commonly-recurring challenge in schools. Andzik et al. (2016) pointed out that AAC systems are sometimes unavailable when needed in inclusive schools. Calculator (2009) pointed out that lack of support from SLPs often renders inclusive education an elusive construct with limited applicability. Barriers arise as classrooms present multiple demands, and the school staff assumes numerous responsibilities, but none assumes ownership for AAC implementation

(Stoner et al., 2010). Difficulties in altering the school environment and curriculum to accommodate students who use AAC are common hurdles to useful inclusion in general education classrooms (Kent-Walsh & Light, 2003).

Barriers Related to Teachers. Some of the hurdles faced in realizing successful inclusion are attributable to teachers (Finke et al., 2009; Hunt et al., 2002; Kent-Walsh & Light, 2003). Hunt et al. (2002) stated that student performances are frequently viewed as the responsibility of teachers. Whereas, Finke et al. (2009) noted that some teachers perceive inclusion as something forced and are prone to be frustrated by the lack of support from others, and teachers' resistance to change is considered to be a significant challenge to inclusive classrooms. Realizing inclusive education settings involve dealing with multiple responsibilities. In their study, Kent-Walsh & Light (2003) identified that it is challenging for teachers to perform all their job-related duties within the allotted time when dealing with students who use AAC in general education classrooms. Mukhopadhyay & Nwaogu (2009) pointed out that gaps in teachers' training limit the content delivered in general education classrooms and limit teachers' ability to meet the needs of students who use AAC. As Ruppar et al. (2011) observed, the lack of knowledge explained why teachers perceived a mismatch between general education classes' academic requirements and the needs of learners with severe disabilities.

Barriers Related to SLPs. A study conducted by De Bortoli et al. (2014) revealed that SLPs perceived students' complex communication needs (CCNs) as an obstacle to providing communication intervention. They described the challenges with interpreting students' communicative behaviors, limited responsiveness, and slow progress toward intervention goals. These perceived difficulties made it hard for SLPs to support the needs of teachers, parents, and others to engage with the student (2014). From the SLPs' viewpoint, support requirements could

increase therapy aide time, and there was limited time to meet or collaborate, which might affect their relationship with inclusive teams (Glover et al., 2015). SLPs observed that their support of teachers and families was insufficient because of a lack of time or practical experience and knowledge (Tegler et al., 2018). According to De Bortoli et al. (2014), SLPs who were early in their careers reported a lack of skills and experience in collaborating with other inclusive teams and dealing with AAC systems as a perceived issue to communication intervention for students with CCNs. Soto et al. (2001) pointed out that SLPs specified that teachers, school administrators, and parents often had expectations of SLPs to provide traditional pullout services as a service delivery method. SLPs stated that they could be more successful in carrying out their professional responsibilities if the rest of the inclusive team considered them as a "communication therapist" whose responsibility is to work within the classroom instead of outside it (2001).

SLPs observed that team members differed as to which team member they felt was responsible for specific tasks; thus, conflicts in the team members' roles and responsibilities could be a source of unsuccessful inclusion that should be resolved on a team-by-team basis (De Bortoli et al., 2014; Glover et al., 2015; Soto et al., 2001). Jordan (2020) reported that some SLPs had opposing views on the social benefits of inclusive education. For instance, some participants felt that inappropriate behaviors exhibited by students with disabilities had a negative impact on nondisabled students in general education classrooms, such as causing disruption in classrooms and functioning at a lower rate than other students. Jordan (2020) also observed that some SLPs shared a common perception that students with disabilities may not be learning in inclusion classrooms effectively or mastering academic standards. These attitudes toward students with severe disabilities were obstacles to facilitating communication

interventions successfully. SLPs' perceptions reported in the studies provide valuable insights into the influence of different contextual factors at different levels on AAC implementation in general classrooms.

Facilitators for Successful Inclusion of Students Using AAC in Regular Classrooms

Indicators of successful AAC implementation should be in place (Stoner et al., 2010). Calculator & Black (2009) mentioned that principals and school administration's support are vital to successful inclusion as they provide the resources needed, such as in facilitating technological improvements and architectural adaptations necessary. Hunt et al. (2002) observed the value that the school's principal and other support staff can contribute because establishing an inclusive school community requires resources to enable educational team members to regularly engage in collaborative planning. The literature reveals that teachers' skills contribute significantly to the effective inclusion of students who use AAC, which indicates the essence of having relevant professional skills (Sonnenmeier et al., 2005; Soto et al., 2001). Calculator & Black (2009) observed that it is essential for teachers to be familiar with evidence-based procedures of determining the AAC skills to teach, the appropriate instruction process using AAC systems, and the assessment of AAC's progress in relation to students' mastery of objectives set for inclusion in general education classrooms.

The findings by Hunt et al. (2002), Soto et al. (2001) affirmed the importance of collaborative teaming involving SLPs, general educators, and parents. Various studies highlight the essence of collaborative teaming to foster all learners' participation in the general education curriculum (Calculator & Black, 2009; Sonnenmeier et al., 2005). Students' families should be part of all decision making on AAC methods, objectives, and goals in schools, and coaching parents and siblings is also crucial because of their familiarity with students who use AAC

(Alquraini & Gut, 2012; Calculator & Black, 2009). According to Chung and Douglas (2014), meeting with parents provides opportunities to reevaluate plans to determine areas to work on and potential solutions to be addressed to promote their children's academic achievements. Hunt et al. (2002) recommended that collaborative teaming is essential to enhance student-initiated interactions, reduce the burden on instructors, and increase classroom activities' engagement levels.

Improved classmates' interactions and willingness to contribute to the inclusion process by directly interacting with students using AAC is vital to successful inclusion (Chung et al., 2012). Chung et al. (2012) suggested that developing social closeness is a communication skill that can help to initiate interactions between students with disabilities and their peers by teaching social skills to enable students to satisfy their need to be socially connected with peers. Whereas, Andzik et al. (2016) recommended that adults create multiple communication opportunities for peers without disabilities to interact with students who use AAC. However, the strategies that teachers adopt matter significantly. Careful planning of interaction opportunities is required to enable students to access appropriate AAC systems (Chung et al., 2012). Education teams should take specific actions to support using aided communication systems in classroom activities (Andzik et al., 2016). Having planning tools is vital to specify the AAC system's role in facilitating students' access to and participation in the general education curriculum (Calculator & Black, 2009). Chung and Douglas (2014) also emphasized that educators' strategies should be evidence-based to enhance students' motivation to communicate. The more the strategies suit the students using AAC, the more feasible and reasonable it is to identify the goals and adapt the curriculum accordingly (Kent-Walsh & Light, 2003).

Positive Outcomes of Including Students Who Use AAC in Regular Classrooms

Including students who use AAC has the potential to improve interactions that engage in classrooms. Chung et al. (2012) reported AAC has the potential to promote communicative competence in inclusive education where students gain capacities to respond to more than yes/no questions and engage in conversations that are more than basic greetings, as well as improvements in social interactions among students using AAC and their peers. Kent-Walsh and Light (2003) found that students using AAC enjoyed being in school and exhibited notable social skills development and increased classroom interactions with classmates. Stoner et al. (2010) acknowledged that AAC has the potential to change the lives of students with complex communication needs and ensure they fit in inclusive educational settings. Ruppar et al. (2011) found that this is mainly when AAC instructions are grounded in life skills relevant to current and future natural contexts.

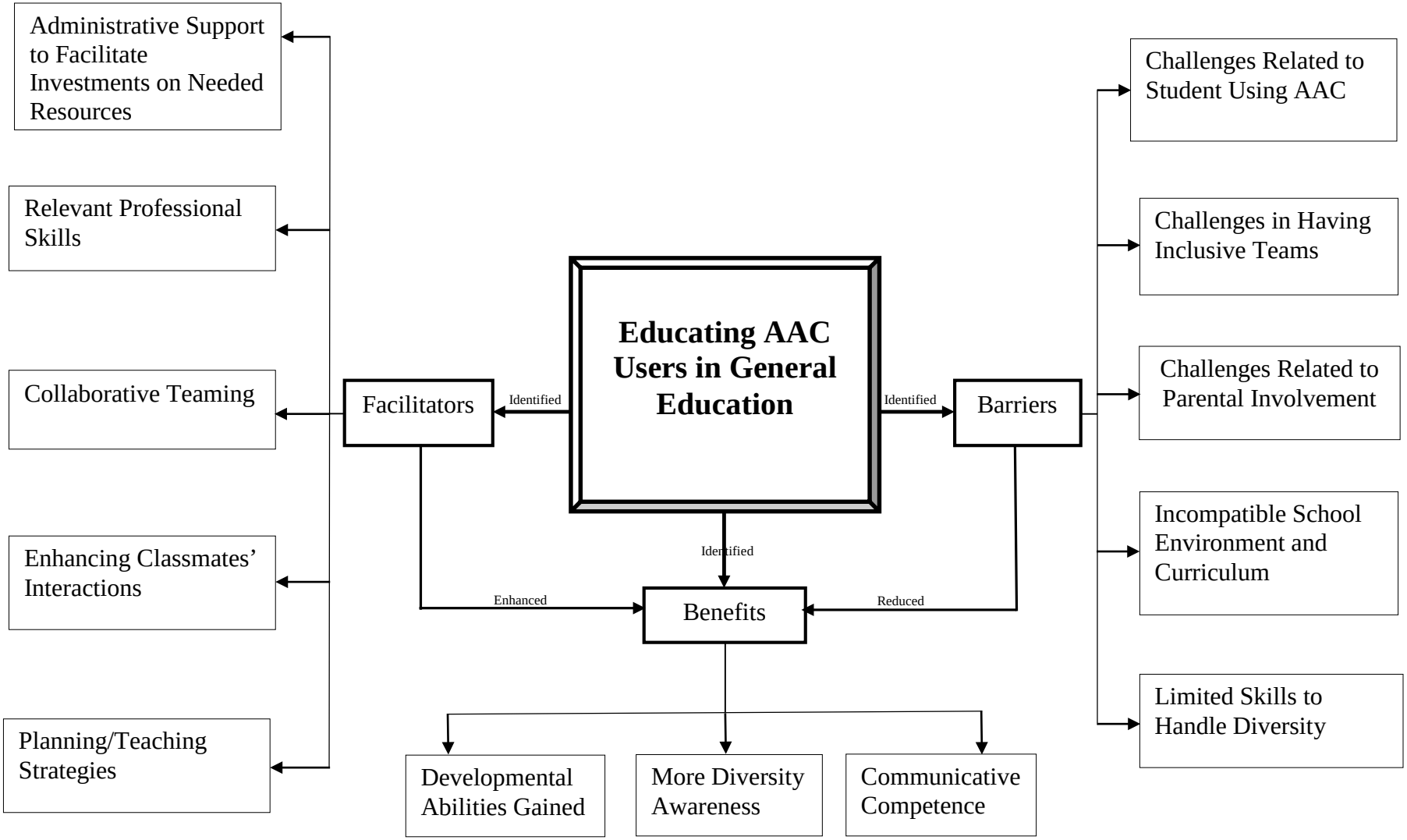
Including students who use AAC has also resulted in improved awareness of other students without disabilities. Kent-Walsh and Light (2003) found that teachers recognized that typically developing students gained awareness of students with disabilities and became more tolerant, compassionate, and accepting of diversity. It is also an opportunity for teachers to improve their understanding of themselves as teachers serving all learners (Finke et al., 2009). In their case study on AAC implementation, Stoner et al. (2010) observed that including a student with complex communication needs in general education classrooms developed new social relations and enhanced his intelligibility and subsequent comfort with the school staff when interacting during the classroom activities. Kent-Walsh and Light (2003) pointed out that these benefits can be highly consequential and that the inclusion may have long-term effects on students after interacting with peers using AAC. Stoner et al. (2010) noted that the awareness

about the importance of social interactions with AAC users was sustained among typically developing students as they progressed from middle school to college. According to Andzik et al. (2016), inclusive classrooms prepare learners to be active communicators who initiate communication and participate in balanced conversations. Instruction in general education classrooms provides access to natural opportunities for students to learn and use age-appropriate contexts and makes it possible to address functional literacy skills in everyday settings (Ruppar et al., 2011). Together, these studies suggest that including students using AAC in regular classrooms can build the skills that can enable students with complex communication needs to fit in a general education setting.

This review affirms that including students who use AAC in general education classrooms can be beneficial, but several hurdles often arise. Thus, it is crucial to adopt factors that facilitate inclusion. Figure 1 illustrates the barriers, facilitators, and positive outcomes of including students who use AAC in general education classrooms.

Figure 1

Barriers, Supports, and Positive Outcomes of Including AAC Users in Regular Classrooms



The Key Stakeholders Involved in Inclusive Education for AAC Users

SLPs and teachers are uniquely qualified for providing services to students with disabilities (ASHA, 2020). The roles played by SLPs and teachers are critical to ensure success in inclusion for students using AAC, as both of them can facilitate the learning process and the development of communicative competence of students with complex communication needs (ASHA, 2020). Principals' roles in inclusive settings are crucial as they are responsible for engaging in organizing, partnering, and interpreting in working with professionals and parents in the inclusive education delivery (Cobb, 2015). Additionally, parents play a significant role in creating the opportunities that enhance or hinder inclusion (Vlachou et al., 2016). Hence, the key stakeholders' roles can influence AAC users' education in regular classrooms, as discussed below.

Regular Classroom Teachers

Teachers play an essential role in implementing best practices to support the inclusion of students who use AAC. Binger et al. (2012) observed that teachers provide SLPs with information from different school environments contributing to the AAC intervention plans. Calculator and Black (2009) and Raghavendra et al. (2012) agreed that teachers play significant roles in promoting AAC use in inclusive education by modifying or engineering environments to create opportunities for students using AAC to participate in classroom activities. Teachers can also help students who use AAC to initiate and sustain friendships with typically developing peers, guide classmates to interact effectively with students who use AAC, and ensure that learners have access to their AAC system in classrooms (Calculator, 2009; Tönsing & Dada, 2016).

Studies on partner instruction in AAC have revealed that numerous communication partners, including teachers, lack the skills required to efficiently promote successful communicative interactions with students who use AAC (Douglas et al., 2013; Kent-Walsh & Mcnaughton, 2005). A study conducted by Howlin et al. (2007) examined the effectiveness of expert training for teachers of students who use the Picture Exchange Communication System (PECS) to communicate in the classroom to assess whether providing expert training to teachers would lead to increases in students' spontaneous communication. The research design was a randomized control trial (RCT) that involved eighteen classrooms from fifteen schools. Participants were elementary school teachers assigned to three groups: (a) immediate treatment, (b) delayed treatment, (c) no treatment group. The findings show evidence that students in the classrooms of teachers who received training in using PECS demonstrated significant improvements in communication initiation and the rate of AAC system use in the classroom compared to post-treatment and students in classrooms of teachers who did not receive expert training on AAC. The findings suggest that variability in classroom teachers' training and experience may impact the effectiveness of AAC interventions and students' communication outcomes in inclusive education.

Lund & Light (2007) examined the long-term outcomes for individuals who use AAC and the factors that may detract positive results. In their qualitative interview, the authors conducted open-ended interviews with parents of seven individuals who had used AAC for at least 15 years. Participants stated that teachers' negative attitudes toward AAC and their users were the most significant factor impacting successful inclusion. Participants shared experiences about teachers who did not want students using AAC to be in their regular classrooms. Consequently, the authors reported that negative attitudes affected all AAC users and their

families' outcomes, which led to reduced expectations of students using AAC in classrooms and limited their participation opportunities within the school activities. The findings illustrate that teachers' negative attitudes toward AAC and AAC users promote exclusion and impact inclusive programs' success and implementing best practices.

Speech-Language Pathologists (SLPs)

In schools, Suleman et al. (2014) described SLP services that mainly occur outside of the classroom as removing students from the classroom for communication interventions "pull out" or SLPs indirectly affecting the students' educational program by giving modeling or coaching services to the relevant teachers in the use of AAC strategies to develop specific skills as a "consultation model." As a result, there has been a move to the in-classroom intervention, which has received considerable attention as SLPs attempt to redefine their roles as SLP-educators serving the needs of students with complex communication needs in inclusionary settings (Archibald, 2017). The role of SLPs is critical in providing services for students using AAC in the target learners' regular environmental setting because only one discipline perceptive cannot drive service delivery decisions for those students with complex communication needs (Prelock, 2000). Wilcox et al. (1991) examined the effectiveness of in-class versus out-of-class intervention sessions for preschoolers with language delays. The aim was to promote the use of core words that were identified for each participant. Findings show that communication intervention in the classroom yielded increased use of the target words in the home, improved target words' generalization, and enhanced communication partners. Another positive outcome was the increase in weekly collaboration and sharing of workloads and resources between SLPs and teachers. These findings provide evidence for the effectiveness of delivering speech therapy services by school-based SLPs in the target students' regular environmental settings. Working in

a collaborative environment as an effective SLP-educator can serve students with communication disorders more effectively in the classroom (Archibald, 2017).

The roles played by SLPs in inclusive education can support progress on Individualized Education Plan (IEP) goals and academic standards; hence, the inclusive team members can focus on curriculum-based interventions when designing learning activities for students using AAC (Leader-Janssen et al., 2012). prepared activities within the classroom setting may improve the prescribed curriculum. For instance, students using AAC often struggle with figurative language. Creating classroom activities for targeting figurative language may not be a part of the curricula, but the SLP can support this particular area (2012). SLPs also have a vital role in providing training and support to classroom teachers to use appropriate teaching approaches when educating students using AAC (Calculator, 2009). According to Vicker (2009), SLPs moved into classrooms to provide some or all SLP services in regular classrooms; this change of location for SLP service delivery models from "pull-out" into classroom-based services occurred more extensively in some states, which add new roles for the SLPs in order to enhance students' learning outcomes.

However, the literature reveals some reports from individuals who use AAC experiencing health professionals who do not always hold positive attitudes towards interacting with people who have disabilities (Balandin et al., 2009; Hemsley et al., 2008). There are some instances where SLPs had been criticized by individuals who use AAC and their families (Balandin & Hines, 2011). In their qualitative study, Lund and Light (2007) interviewed families of seven young men who used AAC for at least 15 years. The study aimed to examine factors that may contribute to the positive or negative outcomes of using AAC. The participants reported negative attitudes from teachers and professionals, including SLPs, as a barrier to positive outcomes. The

identified negative attitudes of practitioners were toward AAC and their users. For instance, when addressing practitioners' negative attitudes toward AAC, Josh's mother stated that they met many SLPs who thought AAC is not related to their profession (Lund & Light, 2007). Findings from the study show how professionals' negative attitudes hinder AAC service provision to individuals who need it.

School Principals

In order to have an effective educational program for AAC users, school principals are encouraged to adopt unique leadership styles and assume new roles and responsibilities toward inclusive education (Sharma & Desai, 2008). Furthermore, school principals need to be knowledgeable about what needs to be changed to improve the school climate and how to deal with the school members' different skills and abilities (Scallion, 2010). Findings from the literature show that principals were blamed for various factors related to lower academic achievements among students with disabilities, including increased class sizes, inadequate remedial programs, obstructive staff, limited AAC resources for children falling behind (2010). Sharma & Desai (2008) stated that principals must always commit to a shared vision in the school, and their words and actions must reflect that vision. The authors suggested that the shared vision must be offered in operational and conceptual forms to support inclusive education.

Principals play significant roles in resolving issues related to resistance to change in their school. For example, some families may refuse to include their children who use AAC in inclusive education. Principals need to have basic mechanisms to deal with such challenges. If no attention is given to such issues, the concerns expressed by SLPs, teachers, and parents will likely impact other school members and result in resistance from even more workers to implement inclusive education for AAC users (Sharma & Desai, 2008). According to Leithwood

(1992), the roles of the school principals are characterized as having three main goals: (a) helping school members develop and sustain a collaborative and professional school culture; (b) enhancing educators' development; and (c) supporting the school community by solving problems together more effectively (Leithwood, 1992).

Parents of AAC Users

Granlund et al. (2005) suggested that parents may take on several roles during the process of a communication intervention. These roles and functions toward AAC systems need adaptation to reach a state of homeostasis (Mandak et al., 2017). These roles can view parents as decision-makers, parents as communication environment, parents as consumers; parents in crisis; and parents as trainers (Marshall & Goldbart, 2008). Whether and how these roles are adopted depends on multiple factors, including time, individual needs, and cultural differences. These findings have some similarities to Angelo's (2000) findings that families had increased roles and responsibilities toward their children following AAC device acquisition. However, there are cultural variations in families' viewpoints of their roles compared to those of specialists. Parents are often affected by outside factors that influence their families, such as an insufficiency of speech and language therapy, AAC systems, and financial pressures (Marshall & Goldbart, 2008). Professionals must be aware of these circumstances and demonstrate their awareness to AAC users' families because, like Jones, Angelo, and Kokoska (1995) stated, these pressures may result in families giving up on AAC systems.

Given the extra demands and responsibilities imposed by introducing AAC technologies, parents may demonstrate resistance to integrating AAC systems to maintain their existing family stability (O'Neill & Wilkinson, 2020). Alternately, when AAC provides a tool for expressive language that did not exist before, families may quickly adapt and make the AAC devices part of

the family homeostasis (2020). Despite how the family adapts, AAC technologies must be designed to reduce demands on parents and match existing routines to become integrated into their lives (Mandak et al., 2017). Professionals must understand that parents' roles need to be recognized on a family-by-family basis, as intragroup variations are as significant as inter-group variations (Hanson et al., 2013).

Special Education Teachers

In Saudi Arabia, special education teachers (SETs) have an essential role in supporting students with disabilities in gaining their education in regular classrooms (Alquraini, 2010). The philosophy of inclusion requires inclusive education teams, including SETs, to provide educational and related services in regular classrooms (Ripley, 1997). SETs often supports students with disabilities through a co-teaching model, assisting, or consulting with other inclusive team members (Wasburn-Moses, 2005). SET's roles involve teaching learners various academic skills such as reading and writing, aiding with vocational education and transition preparation, and exposing students to more advanced educational content-area and learning strategies (Edgar & Polloway, 1994; Sabornie & DeBettencourt, 1997; Schloss et al., 2006). Ostroff & Da Fonte (2018) assert that SETs can apply non-directive teaching approaches to support the use of AAC in classrooms, such as creating opportunities, arranging materials, and embedding technology in school activities. For instance, SETs can provide information about students' disabilities and adaptions in the curriculum, while general education teachers implement these adaptions in classroom activities (Janney et al., 1995).

Cross-Cultural Comparison

In Saudi Arabia, inclusive education has moved from a theoretical educational concept and principle to practical implementation, a crucial turning point in educational development

from all aspects, including curriculum activities, teaching methodologies, evaluation procedures, school environments, and school administrations (Al-Mousa, 2010). Changes in the Saudi educational systems, including students with disabilities in regular classrooms, were similar to what already occurred in the United States over the past 40 years (Murry & Alqahtani, 2015). The government of Saudi Arabia places significant emphasis on education. Hence, many reforms have been developed and implemented, leading to dramatic changes in the country's education sector over the years to make it more inclusive for students with disabilities (Alharbi & Madhesh, 2017). Through various policies and legislation, Saudi Arabia's government has ensured that education is free and accessible to all individuals in society regardless of their social status, presence, or absence of disability (2017). According to Battal (2016), 92% of special education services and related services were provided within the inclusive schools in Saudi Arabia, while only 8% were delivered in special institutions. Similarities and differences between the United States and Saudi Arabia concerning inclusion are discussed below.

Education in America and Saudi Arabia

Education in the United States of America and Saudi Arabia have a similar structure. Early childhood education is followed by primary school, middle school, secondary school (called high school in the United States), and postsecondary education (Pariona, 2017). Both countries do not require children to attend preschool, which can be an issue for some AAC users (2017). The early preschool program often is the first contact parents have with a professional such as SLPs. While children with obvious physical or sensory disabilities are usually identified and served within the health care system before children enter schools, many disabilities, including developmental delays, are not identified or may not emerge before a child starts school, which may lead to delay in introducing the child to AAC systems (Aron & Loprest,

2012). There is also another similarity in the education between the U.S and Saudi Arabia. Elementary schools in both countries provide instruction in the necessary skills of reading, writing, mathematics, geography, history, and physical education (Bulat et al., 2017; Pariona, 2017). Teaching different languages other than English is being introduced during the last few years in the elementary schools in some states in the U.S. Similarly, In Saudi Arabia, all students are required to study Arabic, English, and Chinese (Alshammari, 2020). Another similarity between the U.S and Saudi Arabia is that transition from one grade to the next depends on students' achievements and skills (Corsi-Bunker, 2015). Schools in both countries are using exams to decide when students ready to move to the next grade (2015).

Unlike Saudi Arabia, there is no national curriculum in the U.S (Alnefaie, 2016; Corsi-Bunker, 2015). However, in the U.S, each state and school district must develop and improve its curriculum to receive government assistance. Every state has its department of education and requirements regarding student attendance, curriculum, and schooling years (Corsi-Bunker, 2015). On the other hand, Saudi Arabian schools must follow the national curriculum framework. The same curriculums are implemented in all schools across the country (Alnefaie, 2016). The Ministry of Education is responsible for developing the required curriculum and other learning materials (2016). Another notable difference in the education between the U.S and Saudi Arabia is that American teachers rely more on formative assessment (e.g., giving a small quiz at the end of each lesson), whereas, in Saudi Arabia, Saudi teachers tend to use summative assessment by evaluating how much a student has learned throughout a course (Yusuf, 2017). Literature review shows that the assessment materials in Saudi Arabia encourage memorization, instead of knowing the subject, and do not assess complex skills such as problem-solving and critical thinking (Unruh & Obeidat, 2015).

Individualistic and Collectivist Cultures

Darwish and Huber (2003) stated that the individualist and collectivist cultures could be distinguished as follows. Individualistic cultures focus on supporting the individual's and his/her immediate family's self-interest (emphasizing individual rights, not group responsibilities), personal autonomy, individual decision making, and independence. On the other hand, collectivistic cultures affirm commitment to the group while the group, in turn, supports its members' well-being (Darwish & Huber, 2003). The group decision is considered superior to individual decisions and needs (Darwish & Huber, 2003). The literature review indicates that America is considered an individualistic society, whereas Saudi Arabia is classified as a collectivist culture (Buda & Elsayed-Elkhouly, 1998). In collectivist cultures, relationships with in-group members are characterized as intensive and interdependent, whereas there is more independence and self-reliance in individualist cultures (Darwish & Huber, 2003). Sinha (1988) concluded that individualistic societies usually possess more extraordinary skills in starting and leaving new social groups. Individuals can build "friendship" quickly, but by "friends," they mean non-intimate relationships (Sinha, 1988). Individuals who belong to collectivistic societies have fewer skills in making new "friends," but "friends" in their case means lifelong intimate relationships with numerous obligations (Darwish & Huber, 2003). It has been argued that parents from a collectivist culture might keep the kid out of sight from society as the disability relates to shame, while parents from individualist cultures treat the kid with a disability like any other (Asghar et al., 2020). In the case of social isolation due to feelings of shame, AAC helps parents tackle speech, language, and social communication disorders and enhance their kid's motivation to communicate wants and needs (ASHA, 2020).

Law of Inclusions

The Saudi government passed Law Number 224 in 2001—Special Education Programs and Institutes (RSEPI) (Al-Mousa, 2010). The RSEPI is closely aligned with the American legislation titled, Individuals with Disabilities Education Act (IDEA) (Murry & Alqahtani, 2015). Both laws ensure students with disabilities are provided with free appropriate public education that meets their needs (Al-Mousa, 2010; Lipkin & Okamoto, 2015). The IDEA and RSEPI require the schools to teach the students with disabilities in a regular education setting to the maximum extent (Alquraini, 2013). Both laws also require special education services such as IEPs and speech-language therapy services to be carried out in students' natural environments (2013). However, there are two significant differences between IDEA and RSEPI. First, The IDEA states the eligibility age to receive special education services from birth to 21 years old. In contrast, the RSEPI does not identify a specific age of individuals that should be served under this law (2013). Second, IDEA clearly defines procedural safeguards to protect children with disabilities and their parents' rights to access appropriate public education, whereas RSEPI does not include procedural safeguards (Fitzgerald & Watkins, 2006).

Individualized Education Plans (IEP)

IEPs are written education plans implemented in the United States and Saudi Arabia to ensure educational equity for individuals with disabilities (Alkahtani & Kheirallah, 2016; Christle & Yell, 2010). Both countries require providing IEPs for students with disabilities as long as they are eligible for special education services (Alkahtani & Kheirallah, 2016). The process of planning, writing, and implementing the IEP in schools is similar in these two countries (Alkahtani & Kheirallah, 2016; Rodger, 1995). The literature review revealed some challenges in implementing IEPs that are applicable to both countries, such as lack of parental

involvement, negative attitudes towards inclusion, difficulties with building collaborative teamwork, and writing appropriate educational goals and objectives (AL-Kahtani, 2015; Combs et al., 2010; Jung, 2011; Katsiyannis & Ward, 1992; Lee-Tarver, 2006).

Disability Model

In Saudi Arabia, society tends to see disability through the medical model. In contrast, in the United States, the social model of disability dominates other disability models and has influenced the education policy of students with disabilities (Alsharif, 2019; Anastasiou & Kauffman, 2013). Both models overlap in providing assistive technology for individuals with disabilities to reduce their condition constraints (Levitt, 2017). Nevertheless, the medical model views disability as a deficiency, and only a professional can fix it. On the other hand, the social model views disability as a difference, and the remedy can be found within a person with a disability (McCain, 2017). Hence, the medical model considers a top-down therapy method in which the professional has all the power and knowledge, and the individual with a disability is a receiver of this expertise (Keller, 2018). To remedy the conditions associated with a disability, the social model focuses on increasing interaction between individuals with disabilities and society, whereas the medical model views medical cures as a remedy. The medical model links the disability diagnosis to a person's physical body, while the social model sees the environment rather than the impairment that needs to change (Matthews, 2009). The International Classification of Functioning, Disability, and Health (ICF) uses a multi-dimensional approach and includes intrinsic factors (the person's functioning and disability), external factors (environmental and personal factors), and the relationship between these factors (Shepherd & McDougall, 2008). Raghavendra, Bornman, Granlund, and Bjorck-Akesson (2007) used the ICF in the field of AAC. Extrinsic factors such as the context of communication related to AAC are

of particular interest because they can improve or reduce community participation (Shepherd & McDougall, 2008).

Urban versus Rural Areas

The distinctions between the quality of urban and rural schools can be stark. In most urban regions, even in the most underdeveloped countries, education is in great demand, and the main obstacle facing schools is that urban schools are often overcrowded and lack adequate equipment, instructional materials, and furnishings (Moulton, 2001). On the other hand, educators do not prefer to serve in rural schools because they are unwilling to be posted to remote rural areas, particularly in communities that are not their own; this is especially true of female teachers (2001).

In the United States, Jung and Bradley (2006) conducted a study to examine the special education and related services in rural and non-rural schools. The researchers mainly explored special education services based on the geographical location in these areas. The research used existing data published by the National Center for Education Statistics (NCES). Findings show that children in large cities are more likely to receive special services outside for more than 75% of the school day. In contrast, children in rural areas were educated outside the regular classrooms between 1% to 10% of the day. Interestingly, school locations did not impact the frequency of communication between teachers and specialists. However, Moulton (2001) stated that communication between the district offices and schools is difficult in rural areas and that teachers and school principals do not receive any guidance or support.

In Saudi Arabia, families of children with disabilities, especially those living in rural areas, face many obstacles when seeking support (Alkhalifah & Aldhalaan, 2018). Although the number of children with autism is growing, there is a lack of special education services in rural

areas (2018). Alkhalifah and Aldhalaan (2018) pointed out some challenges related to families who live in rural areas, such as limited resources, long waiting times for appointments (the average wait time was 8-12 weeks for family-centered services), and costs of travel to receive services outside rural areas. Alfaqeeh (2015) observed that lack of services, staff shortage, lack of adequate training, and insufficient equipment are the main obstacles in primary health care centers in rural areas.

Language

A standard language can be described as a set of traditional practices, cultural and discursive, generally accepted as solutions to discourse problems (Kaplan, 2001). The standard language is usually obtained through individual participation in the norms of usage, and these norms are typically taught through educational settings (Kaplan, 2001). Unlike the standard language, a nonstandard language is a dialectal variation that has not historically benefited from institutional supports (Melis, 2002). Koch et al. (2001) investigated African American college students' perceptions of people who use Black English (BE) and Standard English (SE). The researchers used an audiotaped man speaking BE and SE in both formal and informal settings. Participants were asked whether they were willing to know or work with the speaker after watching the two audiotapes. Results show that participants were more interested in getting to know and work with the SE speaker than the BE speaker. Tan and Tan (2008) conducted a study to explore Singaporean students' views about nonstandard English. Findings indicate that students demonstrate more appreciation for Standard English used in classrooms, although nonstandard English plays an essential role in the Singaporean community.

In Saudi Arabia, Modern Standard Arabic (MSA) is considered the most common language used in education, books, formal speeches, newspapers, and movies (Al-Kabi et al.,

2016; Ibrahim et al., 2015). Colloquial Arabic (CA) is commonly used in the spoken form, which is recognized as communication for daily life (Diab & Habash, 2007). While some AAC systems include only MSA or CA, Al-Arifi et al. (2013) created the first AAC system (Touch-to-Speak app[1]) that includes both CA and MSA. The Touch-to-Speak app was an important development in Arabic AAC because the Saudi curriculum uses MSA, but the communication between students and teachers involves CA (Al-Arifi et al., 2013). Al-Zeer et al. (2014) conducted a study to examine the Arabic AAC app's usability for children with complex communication needs using eye-tracking as an access method. Findings show that participants who used MSA select messages easier than those who used CA because of familiarity with using MSA to communicate in their daily lives. These studies reveal that AAC users in Saudi Arabia are varied in terms of their preference toward MSA and CA.

High-Tech and Low-Tech AAC

High-tech AAC includes computerized devices such as speech-generating devices or Apple iPads[2] that use communication applications apps (Fulks, 2017). Low-tech AAC involves tools that are non-electronics, such as customized brag books, photographs, albums for pictures, symbols, and communication boards (Fried-Oken, 2008). Low-tech and high-tech AAC systems are used by individuals with complex communication needs in the United States and Saudi Arabia. Literature review unveils different types of high-tech used in the educational settings in the United States, such as Dynavox Series V[3] (Wilkins & Ratajczak, 2009), TouchTalk[4], Delta Talker[5], Liberator[6], EZ Keys[7] (Chung et al., 2012), and Eye Gaze Technology (Sam, 2020). Similarly, Tap to Talk[8], Tobii X120[9], Arabic Brain Communicator[10], IWriter Arabic Interface[11], and Brain-Computer Interfaces are high-tech AAC options used in Saudi Arabia (Al-Abdullatif et al., 2013; Al-Arifi et al., 2013; Al-Wabil et al., 2012). On the other hand, Picture Exchange

Communication System (PECS), AAC switches, communication boards, and pictures are some examples of low-tech AAC used in both countries (Al-Arifi et al., 2013; Al-Batayneh et al., 2019; Al-Wabil et al., 2012; Downey et al., 2004; Tincani et al., 2006).

Research Questions

The following research questions were addressed in this study:

1. What do stakeholders perceive as parameters for developing an educational program for students who use AAC in regular schools?
2. What interventions do stakeholders report as key considerations in maximizing AAC users' participation in school settings?
3. What aspects of education do stakeholders report as an opportunity to promote AAC users' learning and academic success in school settings?
4. What do stakeholders report as potential obstacles to positive outcomes in educating AAC users in general education?
5. Are there different perspectives among stakeholders regarding their skills as communication partners?

CHAPTER III

METHODS

This study followed a convergent parallel mixed design to identify parameters for designing and developing an educational program in school settings as reported by speech-language pathologists (SLPs), regular teachers, special education teachers, parents, and school principals. Qualitative and quantitative data were collected for this study through semi-structured interview and survey instrument, respectively. The rationale for using a mixed research design is discussed below.

Research Design and Rationale

Mixed research design is defined as collecting, analyzing, and mixing qualitative and quantitative data (Creswell & Creswell, 2017). This study utilized a concurrent nested approach called convergent parallel mixed methods. The design was considered a one-phase approach in which the qualitative and quantitative methods were implemented during the same timeframe, and both had equal weight (Creswell & Plano Clark, 2011). Quantitative and qualitative data were collected simultaneously, independently analyzed, integrated, and interpreted using parallel mixed analysis (Creswell & Plano Clark, 2011). Using a concurrent triangulation approach, the researcher gathered quantitative and qualitative data concurrently and then compared both databases to decide if there were data differences, convergences, or combinations (Creswell & Creswell, 2017).

Mixed methods research provides the strengths and compensates for the weaknesses of quantitative and qualitative approaches (Tariq & Woodman, 2013). Thus, it can be a powerful tool when addressing complex and multifaceted problems such as healthcare and educational interventions (2013). Data triangulation is possible within this research design, enhancing the

trustworthiness of the findings due to using multiple sources for data collection (Creswell & Creswell, 2017). A critical benefit of utilizing a mixed-methods design is that the design supports the inclusion of key stakeholders' lived experiences through the semi-structured interview and concrete, quantitative information in the survey instrument (Regnault et al., 2018).

The main goal of mixing qualitative and quantitative research components is to strengthen and expand the study's findings in a more meaningful manner than one model could achieve alone (Regnault et al., 2018; Tariq & Woodman, 2013). This method of inquiry was the most suitable for addressing the current research objectives. There is limited evidence about essential parameters for AAC practices and inclusive education in Saudi Arabia. One research model was insufficient to cover all of the inclusive education parameters for AAC users, particularly in different educational settings (Schoonenboom & Johnson, 2017). The descriptive survey was used to determine relevant considerations for enhancing AAC users' participation in general education, educational opportunities that can promote the AAC users' education, potential barriers to positive educational outcomes, and stakeholders' skills as communication partners. The semi-structured ethnographic interview generated relevant themes about critical parameters for developing educational programs for AAC users in Saudi Arabian schools.

Pragmatism is the philosophical justification used to support combining quantitative and qualitative research methods in a single study (Maarouf, 2019). It guides designing and conducting research in the best way to help answer the research questions regardless of the study's underlying philosophy (Biddle & Schafft, 2015; Glogowska, 2015). Pragmatism helps researchers decide between various inquiry models to address their research questions and determine which research methods are best suited to serve their research goals (Biddle & Schafft, 2015; Maarouf, 2019). That is, certain research questions are best answered using a qualitative

method and others using a quantitative approach. This study's pragmatic philosophy allowed for a systematic application of suitable qualitative and quantitative approaches to address each objective.

Grounded theory was employed as the research methodology. This methodology provides systematic procedures for shaping and handling rich qualitative and quantitative data (Charmaz & Belgrave, 2007). Grounded theory is used when the researcher aims to generate a theory, model, or general explanation for a process, interaction, or action (Creswell & Báez, 2020). In grounded theory, researchers collect multiple sources of data to provide an in-depth understanding of the research problem (e.g., interviews and surveys) in order to develop an in-depth description of the phenomenon (Creswell & Báez, 2020). A significant contribution of grounded theory is that it provides systematic procedures for researchers to examine, refine, and develop their intuitions and ideas about the data (Charmaz & Belgrave, 2007). The study outcome is a theory that may be a description and explanation of the parameters or, more likely, a diagram that indicates the significant steps in a theory or process (Creswell & Báez, 2020). Constructivist grounded theory is the model used in this study. The constructivist grounded theory supports data collection, data analysis, and it allows theory to stand in mutual relationships and follows an iterative process of constant comparison within and amongst the qualitative data (Charmaz, 2011; Gordon- Finlayson, 2010; Strauss & Corbin, 1990).

Procedure

Both the qualitative and quantitative research followed the same procedure. The current study utilized the purposeful sampling method, which is considered an element of the grounded theory approach to a study (Morse, 2010). Snowball sampling was utilized to select participants who have had experiences or characteristics relevant to the research questions (Bryman, 2016).

Snowball sampling involves existing study participants recruiting future participants from among their acquaintances (Sharma, 2017). Thus, the sample group grows like a rolling snowball, and sufficient data is collected to be beneficial for the research. This sampling method is frequently used when the potential participants are difficult for the researcher to reach (Etikan et al., 2016; Sharma, 2017). The participants were located in Saudi Arabia, whereas the researcher was conducting this study from the United States. The study was conducted via telephone, email, and the internet using Qualtrics[12] and Zoom[13] platforms due to distance. The study's recruiting processes utilized online research for stakeholders with specific titles (e.g., SLP, special education teacher). The following online methods were used to distribute the interview and survey invitations: (a) email, (b) Twitter[14] and Facebook[15] accounts that had followers of Saudi stakeholders, and (c) the cross-platform mobile messaging application WhatsApp Messenger[16].

The survey and interview were available in the primary and secondary languages of participants, which were Arabic and English. The participants had the option of choosing their preferred language. Interviews conducted via Zoom or phone were recorded using the application Voice Record Pro App[17] on iPhone. Before participating in the study, the participants agreed and signed the consent forms. Verbal agreement was also obtained from the participants prior to participating in the study. For the qualitative study, the researcher emailed the consent form to the participants and confirmed that they emailed the signed consent form back. For the quantitative study, the first page of the survey was the consent form. The participants had to indicate that they had read the consent information and agree to participate in the study before entering the survey. Participants who wanted an electronic copy of the consent form were asked to provide their emails so that the researcher could send them a copy.

In this study, a total of 17 stakeholders participated in the qualitative study. All participants took part in individual semi-structured interviews using Zoom and phone. In the quantitative study, a large sample (n = 283) completed the online survey.

Steps of Translation

The interview guide and survey instrument followed the same steps of translation. The interview guide and survey instrument were translated from English to Arabic following the WHO's steps (2020). The translation process included four steps: forward translation, expert panel back-translation, cognitive interviewing, and final version. Forward translation means that a bilingual person familiar with the field under study translated the data collection methods from English to Arabic (Groot et al., 1994). The expert panel helped resolve any inadequate expressions or concepts in the data collection methods (WHO, 2020). Back-translation involved rendering the data collection instruments back into English by an independent translator without seeing its original version (2020). Lastly, the thinking-aloud technique cognitively validated the data collection methods by using cognitive interviews (Trenor et al., 2011). The thinking-aloud protocol provided evidence that the participants interpreted the interview and survey items in the same way as the researcher intended (2011). The participants did not identify any ambiguous or confusing words when they provided feedback to improve the data collection methods before the final versions were made.

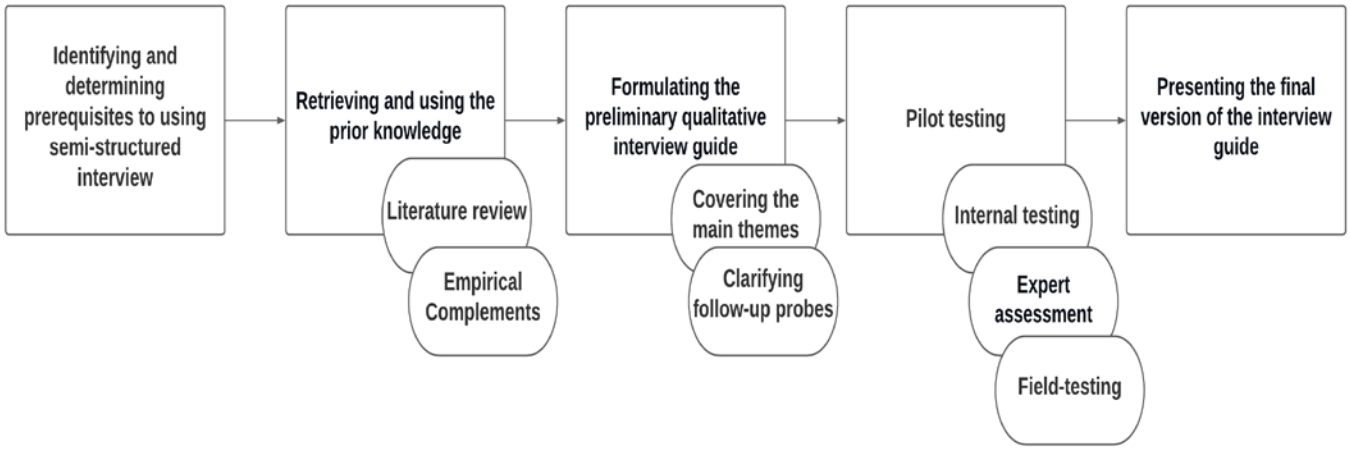
Qualitative Data Collection and Analysis

Phases of Developing the Ethnographic Interview Guide

The interview guide was developed based on the five-step process identified through systematic literature searches (Kallio et al., 2016). Figure 2 below shows the key phases that guided the development of the interview guide.

Figure 2

The Stages of Developing the Qualitative Semi-Structured Interview Guide



Note. The figure illustrates the five main stages and the seven sub-stages followed in developing the semi-structured interview guide for the current study.

Phase 1. Identifying the prerequisites for utilizing semi-structured interviews

The first step aimed to determine whether the semi-structured interview method was appropriate for collecting data concerning the identified research questions (Kallio et al., 2016). To achieve this goal, the researcher identified some aspects of the phenomenon based on prior knowledge before the interview guide was developed (Turner, 2010). The semi-structured interview method was suitable for the current study because it is highly recommended for examining people's opinions, perceptions, and complex phenomena, allowing stakeholders to express their diverse perspectives (Louise Barriball & While, 1994). The semi-structured interview guide was flexible, with both open-ended and closed-ended questions exploring the research question by collecting qualitative data to identify essential parameters for developing an educational program for AAC users (Doody & Noonan, 2013; Newcomer et al., 2015). Another reason for choosing the semi-structured interview was because it can facilitate comparability by

assuring that each question is answered by the participants (Louise Barriball & While, 1994). Its flexibility was suitable for seeking clarifications of interesting and relevant matters raised by the participants (Hutchinson & Wilson, 1992). Furthermore, the semi-structured interview was selected because it is more appropriate when the potential participants are not accustomed to expressing their perceptions, beliefs, values, or intentions about the issue under study (Åstedt-Kurki & Heikkinen, 1994).

In this study, the researcher used a one-on-one ethnographic interview to obtain rich, detailed data from the stakeholders (Byram et al., 1996; Westby et al., 2003). Ethnographic techniques allow the researcher to explore and explain other cultures while minimizing bias presented by preconceived ethnocentric ideas (Johnston et al., 1995). Ethnography strives to name and classify things as fundamental aspects of individuals' cognition and understandings (1995). The ethnographic approach also allowed the researcher to understand better how individuals perceive, understand, feel, and control the environment when dealing with AAC users (Frake, 1962). In addition, ethnography is useful for describing small groups of individuals' everyday activities and provides insight into interests, rules, and engagement styles (Griffin, 2000; Huberman & Miles, 2002). The ethnographic technique differentiates between the researcher's classification system and familiar language and that of the participant (Johnston et al., 1995). Hence, it allows for drawing out the contextual understandings and common knowledge upon which a participant's answers are based, without relying on previous assumptions about how the researcher views or defines things (1995).

Phase 2. Retrieving and using prior knowledge

The second phase of developing the interview guide focused on retrieving and using prior knowledge. This phase's goal was to obtain a comprehensive understanding of the research

problem under study, which required critical evaluation of existing knowledge and the potential need for complementary knowledge (Kallio et al., 2016). In the current study, an extensive literature review served as the basis for creating a predetermined framework for the interview guide (Krauss et al., 2009; Louise Barriball & While, 1994). The literature review was used to identify critical points of intervention with AAC users that could be beneficial to support their education in regular classrooms and to identify gaps in AAC practices. The empirical knowledge was obtained by consulting experts to understand the study phenomenon.

Phase 3. Formulating the preliminary interview guide

The third phase's purpose was to formulate the semi-structured interview guide as a data collection method by applying the existing knowledge in a consistent, coherent, and logical interview guide form (see Appendix F). The interview guide was designed to be loose (Åstedt-Kurki & Heikkinen, 1994) and flexible (Dearnley, 2005), which encouraged dialogue and discussion during the interview (Whiting, 2008). The interview guide questions were formulated to obtain the richest possible data (Turner, 2010). The questions were designed to be participant-oriented (Louise Barriball & While, 1994), not leading, and precisely worded (Åstedt-Kurki & Heikkinen, 1994; Turner, 2010). The interview guide was developed to obtain responses from the interviewees that were spontaneous, in-depth (Baumbusch, 2010), and unique (Krauss et al., 2009), and that provided accurate impressions of the senses (Dearnley, 2005).

The interview guide consisted of two levels of questions: main themes and follow-up probes. The main themes included the main content of the research topic, and within them, the interviewees were encouraged to express their perspectives and experiences openly without any restrictions. Thus, every interviewed person was asked about the main themes (Åstedt-Kurki & Heikkinen, 1994). Follow-up probes were utilized to make the central themes more easily

understood by the interviewees (Turner, 2010), to guide the interview towards the study's purpose (Baumbusch, 2010), and to obtain accurate, optimal, and rich data (Turner, 2010). The follow-up probes were both pre-designed and based on the interviewees' responses (Turner, 2010; Whiting, 2008).

Phase 4. Pilot testing of the semi-structured interview guide

The fourth phase's purpose was to verify the coverage and relevance of the preliminary interview guide's content (Kallio et al., 2016). The process also allowed assessment of the need to reformulate questions and test their implementation (2016). The interview guide's pilot test consisted of three techniques: a) internal testing, b) expert assessment, and c) field-testing.

Internal testing was conducted by evaluating the interview guide in collaboration with other researchers (Louise Barriball & While, 1994). This step helps to identify inappropriate or ambiguous interview questions and eliminate possible interviewer bias (Chenail, 2011). Specialists in AAC performed the expert assessment of the interview guide's comprehensiveness and appropriateness concerning the study's purpose (Louise Barriball & While, 1994). Field-testing was performed to test the interview guide with the potential participants. The researcher used the feedback from the participants to reformulate the interview guide to be more effective.

Phase 5. Presenting the final version of the interview guide

The last phase of the interview guide development was presenting the finished semi-structured interview guide in this dissertation. The interview guide presented in this paper was the outcome of the previous four phases of developing the interview guide (see Appendix F).

Process of Data Analysis in Qualitative Research

The researcher used a privacy-focused transcription software called Transcribe by Wreally (https://transcribe.wreally.com) to transcribe the recordings. The software supports both

English and Arabic languages, and it provides an audio player integrated with a text editor feature on the same screen. Hence, the researcher was able to type along while listening to the recordings, which ensured accuracy in the transcription. After transcribing the interviews, the qualitative study analysis followed the procedures recommended by Creswell and Báez (2020). The qualitative analysis consisted of five steps: (a) reading through all the data, (b) dividing the text into segments of information, (c) labeling segments of information with codes, (d) reducing redundancy and overlap between codes, and (e) collapsing codes into themes (Creswell & Báez, 2020). This method of analysis was based on an inductive to deductive approach (Azungah, 2018), which included identifying themes, codes, and categories from the data and then relating them into a theoretical framework to make sense of the findings and to ensure the appropriateness of the inductive analysis.

In this study, the data analysis process began with text files containing the interview transcripts and notes from the interviews. After preparing the data for analysis, the research began the analysis process by reading through all data to obtain a general sense of them. While reading, the researcher assigned a code label or term to each segment of text. This coding process was conducted by hand. The researcher marked the text with colored pens and highlighters. After that, the overlap between codes was reduced by combining codes and eliminating redundancies. Then, these codes became evidence for establishing themes and descriptions in the study findings. Several codes were used to build a theme, and these themes represented the major findings in the study. Each theme consisted of several codes that were associated with it (see Table 3 in the Results section). During the coding process, several considerations were taken into account: a) themes were conceptually interesting and clear, b) several codes gave evidence for the themes, c) quotations provided a clear picture of participants' voices, and d) different

perspectives from various stakeholders in the study (e.g., parents of AAC users, SLPs, and school principals) were represented.

Saturation is the methodological principle used to decide when there is enough data from the study to develop an accurate understanding of the study phenomenon (Saunders et al., 2018). Data saturation refers to the point in the study process when no new evidence is found in data analysis and the redundancy signals to the researcher that the researcher can cease the data collection process (Saunders et al., 2018). The researcher listed the themes in the results section based on the order of frequency (See Table 3).

Validity of the Qualitative Study

To assure the qualitative study's validity, the researcher used different validity checks to promote the quality and trustworthiness of the data (Creswell & Báez, 2020). First, the researcher conducted pilot tests with potential participants. In this study, the first two participants were asked if they would participate in the pilot testing. Both participants agreed to be interviewed and answered the four extra pilot questions. The researcher asked the participants the following pilot questions after completing the interview:

1. Is the interview too long? If yes, what questions would you like to be dropped?
2. Is the wording clear? If not, can you identify which ones were confusing?
3. Are there additional interview questions that should be asked? If so, what do you suggest?
4. Are there any questions unrelated in your opinion?

The interviews lasted 30 minutes. Participants indicated neither concerns nor recommendations for shortening or altering the interview questions or changing procedures. Based on the participants' feedback, the interview questions were determined to be sufficient to

obtain the information regarding the research topic, and the time needed to complete the interview was adequate. Participants described the wording of the questions as precise, clear, and unambiguous. The participants indicated that all the questions were related to the research topic.

Second, the researcher applied the post-positivist assumption using the triangulation approach. In this approach, the researcher used data from the various stakeholders interviewed to establish the qualitative themes (Creswell & Báez, 2020). In this study, five different types of individuals were used as sources for triangulation: a) parents, b) SLPs, c) general education teachers, d) special education teachers, and e) school principals.

Third, the researcher used the constructivist assumption by learning about the participants' views of preliminary findings through member checking (Creswell & Báez, 2020). In this study, the participants were invited to review the themes, codes, and transcriptions to ensure the accuracy of the findings. The researcher asked the participants to indicate whether or not the themes, codes, and transcriptions were consistent with their perceptions and what they said and if they would like to change or add anything to the shared document. Based on feedback from two participants and confirming the feedback with other participants, the researcher corrected and changed a code from "Community Instruction" to "Community Communication." The meaning of the code became clearer after the correction as the participants expanded on the interpretation of the code during the member-checking process.

Reliability of the Qualitative Study

To ensure the qualitative study's reliability, the researcher assessed intercoder agreement (Creswell & Báez, 2020). In this study, the researcher worked with two additional coders to analyze the interview data, provide codes for the database, and compare the coding results by calculating the extent of agreement on the codes. Then, the researcher met with the coders to

discuss the themes and codes identified in the analysis process. Lastly, the researcher (first coder) and the additional coders worked together to determine if an agreement existed. The goal was to achieve intercoder reliability of 85% to 90%, which is considered a perfect level of agreement (Miles et al., 2018). Agreement was defined as having both the researcher (first coder) and the additional coders use identical themes and codes. The coding discrepancies receiving intercoder reliability of less than 80% were discussed and resolved by the coders. In this study, for the first-time coding outcomes, a 75% agreement was initially reached. Then, the researcher and the additional coders met to discuss the discrepancies. After the discussion, redundant codes and a lack of shared understandings were resolved. The final coding attained 92% agreement. The process of assessing intercoder agreement also involved creating a codebook. The researcher created a codebook through an initial coding of the data, containing the codes' names, definitions, and sample quotations. The qualitative codebook aimed to provide a basis for agreement between the researcher and the additional coders on the set of codes and their definitions. The researcher then revised the codebook as the intercoder process proceeded with the two additional coders.

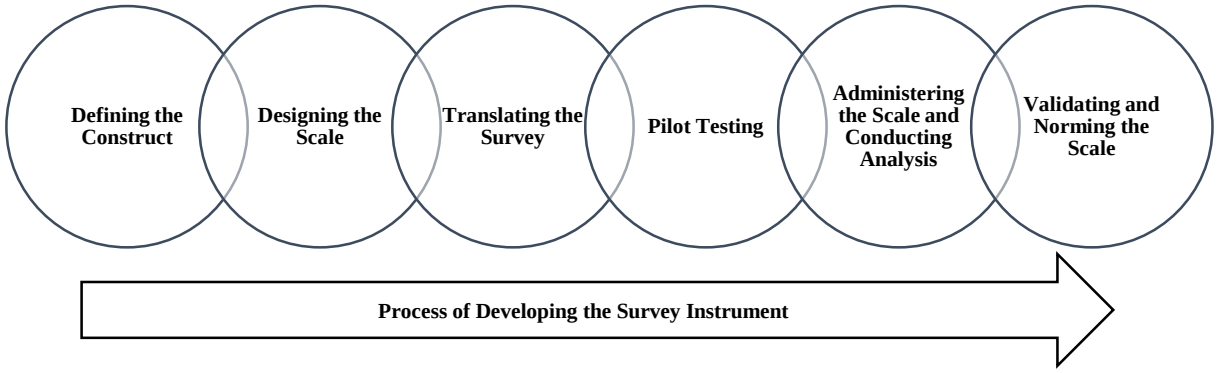
Quantitative Data Collection and Analysis

Phases of Developing the Survey Instrument

The researcher followed the five-step process for developing the survey instrument recommended by Spector (1992; see Appendix G). To have a culturally appropriate survey instrument, the researcher added a sixth step to translate the survey from English to Arabic based on the World Health Organization's (WHO) guidelines (WHO, 2020). Figure 3 illustrates the process of developing the survey instrument.

Figure 3

The Six-Step Process of Developing the Survey Instrument



Note. Spector (1992) suggested the five-step process to construct a survey scale. The translation process was based on WHO's guidelines (2020) for translating a survey instrument.

The first step focused on defining clearly and precisely what the survey was intended to measure (Spector, 1992). In the first step, the literature review was used as a foundational aspect of constructing the scale (Abell et al., 2009; DeVellis, 2016; Hinkin, 1998). This involved reviewing the existing literature that addressed various aspects of inclusive education for students who use AAC, assessing the content, and identifying gaps in the research (Clark & Watson, 2016; DeVellis, 2016). The literature review was discussed in Chapter 2, and the survey dimensions are as follows:

a) Key considerations in AAC: This dimension focused particularly on AAC interventions to promote the communication, language development, and participation of AAC users with developmental or acquired disabilities in school settings.

b) Opportunities in education for AAC users: This dimension consisted of key educational opportunities that can support active and meaningful learning and inclusion for AAC users.

c) Potential obstacles to positive outcomes: This dimension focused on barriers that can minimize or prevent positive outcomes of inclusive education for individuals who rely on AAC.

d) Communication partner skills: This dimension focused on the communication partners' core skills to ensure successful interactions with AAC users in inclusive education.

The second step involved designing and generating an item pool. The item pool was brainstormed, and it was subject to statistical analysis in the later steps (Spector, 1992). The process also involved creating the scale format, selecting responses, writing the instructions, and defining terms. De Vaus and de Vaus (2013) recommend moving from broad definitions to more concrete dimensions that lead to creating scale items. Thus, the scale dimensions and item pool were generated to reflect the objectives of the study. A 7-point Likert-type scale was employed as the survey response format with a complete sentence for each item. The participants indicated their level of agreement from Strongly Disagree to Strongly Agree. The 7-point scale is well-suited for electronic distribution and can result in a more precise measure of perceptions (Finstad, 2010; Lewis, 1993). Lastly, experts reviewed the survey items, and the researcher revised the items based on their feedback. Steps number five and six focused on the survey instrument's reliability and validity, which will be discussed in detail in the next sections.

Validity of the Quantitative Study

Besides using the thinking-aloud protocol during the translating process as mentioned below, the researcher also conducted exploratory factor analysis (Trenor et al., 2011; Williams et al., 2010) to determine the number of components that might fit together as a group (Spector, 1992). Hair et al. (1998) suggested the following correlation rule: ± 0.30 = minimal correlation,

± 0.40 = important correlation, and ± 0.50 = significant correlation. In this study, the researcher considered a correlation of more than 0.30 to be clustered into factors.

After completing the pilot test, the dimensionality of the 30 items from the survey was analyzed using maximum likelihood factor analysis. Initial analysis indicated that the items were not highly skewed (skewnesses between -1.09 and + .15). Three criteria were used to determine the number of factors to rotate: (1) the a priori hypothesis that the measure was unidimensional, (2) the scree test, and (3) the interpretability of the factor solution. The scree plot indicated that our initial hypothesis of unidimensionality was incorrect. Based on the plot, four factors were rotated using a Varimax rotation procedure. As shown in Appendix H, the rotated solution yielded four interpretable factors: key considerations in AAC, opportunities in education for AAC users, potential obstacles, and communication partners' skills. The key considerations in AAC factor accounted for 14.5% of the item variance, and the opportunities in education for AAC users factor accounted for 14.2% of the item variance. The potential obstacles factor accounted for 13.1%, and the skills of communication partners factor accounted for 9.4% of the item variance. The Kaiser-Meyer-Olkin measure verified the sampling adequacy for the analysis: KMO = .71, p = .001.

Reliability of the Quantitative Study

The initial survey instrument was administered to a large sample to complete the scale (Spector, 1992). Fifty-one stakeholders completed the survey during the pilot test as follows: parent (n = 8), SLP (n = 11), school principal (n = 8), general education teacher (n = 10), and special education teacher (n = 14). Cronbach's coefficient alpha was used to test the reliability of the survey items (Tavakol & Dennick, 2011). DeVellis (2016) pointed out that 0.65 is the acceptable minimum for alpha. Hinkin (1998) suggested deleting any item with a correlation

measure of less than 0.40 on the scale. These suggestions were used to decide which of the survey items should be deleted or retained.

The reliability of the survey instrument was confirmed through the SPSS Cronbach's alpha correlation procedure. The results showed strong factor loadings indicating excellent content validity. The overall correlation coefficient was .825, as indicated by Cronbach's alphas. Table 1 provides more details about the reliability coefficients for each survey's dimension.

Table 1

Survey Factors and Alpha Reliability Statistics

Component	Alpha Reliability
1. Key consideration in AAC	.860
2. Opportunities in education for AAC users	.848
3. Potential obstacles to positive outcomes	.670
4. Communication partners' skills	.922
Total Scale	.825

Process of Data Analysis in Quantitative Research

The researcher used Statistical Package for the Social Sciences (SPSS)[19] Version 28 to generate descriptive statistics for the survey items. Means, standard deviations, sample sizes, percentages, and p-values were reported. The researcher used means to compare the results from the four survey categories: critical considerations in AAC, opportunities in general education for AAC users, potential obstacles for positive outcomes, and communication partner skills. Based on each category's means, the researcher identified which group of the stakeholders had the highest mean on each survey item and which group had the lowest mean. Analysis of variance

(ANOVA) was conducted to determine any statistically significant differences between the means.

CHAPTER IV

RESULTS

This study aimed to identify optimal educational parameters for developing an appropriate education for AAC users in school settings as indicated by stakeholders. Once qualitative data were collected through semi-structured interviews, the participants were asked to complete an online survey. The online survey aimed to identify the key considerations and opportunities to maximize the AAC users' participation and academic success in general education settings, potential obstacles to positive outcomes in educating AAC users in general education programs, and stakeholders' perspectives regarding their skills as communication partners. This information is needed to develop an educational program in school settings that suits students who use AAC in Saudi Arabia. In this study, the following research questions were posed:

1. What do stakeholders perceive as parameters for developing an educational program for students who use AAC in regular schools?
2. What interventions do stakeholders report as key considerations in maximizing AAC users' participation in school settings?
3. What aspects of education do stakeholders report as an opportunity to promote AAC users' learning and academic success in school settings?
4. What do stakeholders report as potential obstacles to positive outcomes in educating AAC users in general education?
5. Are there different perspectives among stakeholders regarding their skills as communication partners?

These research questions were answered with both the results from the semi-structured interviews and the online survey from the quantitative study.

Qualitative Research Participants

Seventeen stakeholders in Saudi Arabia, who met the inclusion criteria of having a student who uses AAC in school settings, were interviewed. Table 2 provides a summary of the participating stakeholders' demographic information.

Table 2

Demographic Data for Stakeholders who Participated in the Semi-Structured Interview

Participant ID	Title	Highest Degree Received	Type of AAC System	Training on AAC	Familiarity Level
P0324	Speech-language Pathologist	Master's Degree	High-tech AAC (TouchChat App); Low-tech AAC (PECS)	Yes	Every Day
P0495	School Principal	Doctorate Degree	Not Sure	No	Less Than Once per Month
P0455	Parent	Bachelor's Degree	High-tech AAC (Kalami); Unaided AAC (Gestures Sign)	No	Every Day
P1945	Speech-language Pathologist	Bachelor's Degree	High-tech AAC (DynaVox with Hand Switch)	Not Sure	At Least Once per Week
P9584	Special Education Teacher	Bachelor's Degree	High-tech AAC (Grid 3)	Yes	At Least Once per Month
P4851	Special Education Teacher	Master's Degree	Low-tech AAC (PECS, Communication Boards, Communication Codebooks)	Not Sure	Every Day
P0384	School Principal	Master's Degree	High-tech AAC (Unidentified VOCA)	No	At Least Once per Month
P0495	General Education Teacher	Bachelor's Degree	High-tech AAC (DynaVox)	Yes	At Least Once per Week
P5482	Parent	Master's Degree	High-tech AAC (Unidentified VOCA)	Not Sure	Every Day
P9586	General Education Teacher	Bachelor's Degree	High-tech AAC (Proloquo4text); Low-AAC tech (Communication Boards)	Yes	At Least Once per Week
P6834	Parent	High School Degree	High-tech AAC (Tawasol App); Unaided (Gestures)	Yes	Every Day

Table 2 (continued)

P5012	School Principal	Bachelor's Degree	High-tech and Low-tech AAC (Unidentified AAC Systems)	No	Less Than Once per Month
P1030	Special Education Teacher	Master's Degree	High-tech AAC (Unidentified AAC App); Low-tech AAC (Communication Boards, Alphabet Board, Pictures/Symbols, PECS)	Yes	At Least Once per Week
P0951	Speech-language Pathologist	Bachelor's Degree	High-tech AAC (Touch-to-Speak with Tobii Eye Tracker, Go Talk)	Yes	At Least Once per Week
P9040	Parent	Bachelor's Degree	High-tech AAC (Proloquo2go); Low-tech AAC (Pictures, Communication Boards)	No	Every Day
P8570	Speech-language Pathologist	Bachelor's Degree	High-tech AAC (DynaVox, Tap Speak Sequence, Unidentified Visual Scene Displays App); Low-tech AAC (PECS, Communication Boards, Pictures, Pen and Paper)	Yes	At Least Once per Week
P4014	General Education Teacher	Master's Degree	High-tech AAC (Unidentified VOCA); Low-tech AAC (Communication Boards)	No	Every Day

Research Question 1: What do stakeholders perceive as parameters for developing an educational program for students who use AAC in regular schools?

The first research question was answered through the semi-structured interview. The final interview analysis revealed six themes, 22 sub-themes, and 76 codes. See Table 3 for a complete list of the themes, sub-themes, codes, and example quotes. Figure 4 provides a summary of the themes, subthemes, and codes. See Appendix J for a codebook that includes the complete definitions and examples.

Table 3

Parameters for Developing Educational Programs for AAC Users in Regular Schools Identified in Ethnographic Interview

Theme	Sub-theme	Code	Example
AAC Technologies	Supportive AAC	Promote Independence	"Some AAC systems have the ability to help my students to depend on themselves, while others [AAC] do not—especially my students who use PECS [Picture Exchange Communication System] non-electronic AAC that have no voice output."
		Suitable for Educational Use	"I mean that … students need to be able to use the devices across different subjects. Let me give you examples. They [AAC] should be able to help them [students] to write mathematical equations, draw maps, take photos, explain some sorts of biology subjects like plants and animals."
		Support Social Interactions	"She was able to use her device to communicate freely about the topic and make her own sentences […]. It was an amazing interaction with her classmates."

Table 3 (continued)

		Support Customization	"If the words or phrases used in the curriculum are not in the system, you should be able to add them. Otherwise, you know, you may run into an issue."
		Promote Communication Speed	"His [participant's child] expressive language is good, but he types the words letter by letter using the keyboard. It [his device] makes the communication slow and challenging."
		Technical Support	"There is a need for technical staff who can deal with repair issues and keep the AAC systems running efficiently in the school."
	Optimal AAC	Easy to Learn and Use	"I observed many teachers and parents had difficulties learning how to use the devices, and sometimes you need someone to set them [the devices] up in the classroom for you every time you want to communicate. Not all of them are easy to use."
		Intelligent AAC	"With the current development in technology, some communication devices have become more intelligent. You know, some of them [communication devices] can detect written errors and correct them automatically or suggest words and symbols by predicting what they [students] want to say. I feel that this sort of improvement in technology would help the students in classrooms."
		Reliable AAC	"If the AAC system crashes or is not working for any reason, the system resets itself and retrieves the latest backup automatically. They do not lose their work."
		Portable AAC	"In the school playground, he used the Wrist Talker with recorded messages on it. He enjoyed playing and running on the playground while pushing the buttons on his AAC … He really enjoyed it."

Table 3 (continued)

		High Interface Quality	"Using the device for something else, let's say completing an assignment, was not easy for her. She had to navigate through multiple pages and go back and forth between the pages on her device. It was a complex process. I would say she needs a device that is easy for her to interact with."
		Appropriate for Future Use	"As the students move to the next grades in the school, the speech therapists update the AAC system to include new words or symbols from the new curriculum."
	Culturally and Linguistically Appropriate AAC	Multiple Language Options	"You know, schools here [Saudi Arabia] teach multiple languages, so the device or application should enable the student to change the system language as needed."
		Culturally Sensitive Symbols/Pictures	"Not all the symbols on his device are appropriate to use. Some symbols have no meaning, or we may interpret them differently in our [Saudi Arabian] culture … The fingers crossed symbol, I think it means something like 'good luck,' in the Western cultures, but it has no meaning for us."
		Culturally Sensitive Language	"I always include my clients and their parents in selecting the vocabulary. It is important for me to do so. You know, these words can differ from culture to culture."
		Appropriate Voice Output	"It is very computerized sounding. It does not make her comfortable to use it in the classroom."
Theme	Sub-theme	Code	Example
Curriculum	Major Goals	Participation in Everyday Lives	"The computer course helped my son learn many technical skills, like sending and receiving email, sending short messages, communicating with others through social media, … and many others."

Table 3 (continued)

	Cognitive Development	"AAC users should learn skills that are relevant to them, something like problem-solving. They can use this skill in their everyday life, no matter what their future career is."
	Social Relationships	"Social interaction is one of the aspects that the educational curriculum should focus on developing and improving among them [AAC users]."
	Engagement in Leisure Pursuits	"Learning to communicate with AAC during leisure activities was an important goal."
	Employment Preparation	"I think that the role of schools must be more active in preparing AAC users for the future—I mean their future jobs. Schools with the capabilities available to them can create a difference that benefits the students and their parents and community."
Ideal Curriculum	Skills Development	"Currently, there is a gap between what they [school staff] teach them [students] and the future jobs. They need to learn different skills, skills that they can apply in employment contexts."
	Incorporate Communication Goals	"Communication skills should be incorporated effectively in the curriculum in a clear and understandable manner."
	Include AAC Users' Preferences	"We had a class called Extracurricular Activity where students chose on their own the skills and goals they want to work on. I wish they were given the same opportunity across all classes."
	Account for AAC Users' Differences	"There should be a link between the subjects of the curriculum and the behaviors. We should transfer the knowledge in the curriculum into desirable behavioral actions. This would help them [AAC users] to satisfy their individual needs at every academic stage."

Table 3 (continued)

Literacy Education	Allocating Enough Time	"The large number of students in a classroom and the small number of classes devoted to teaching reading prevent many AAC users from exercising their right to read."
	Literacy Materials	"The literacy curricula are not adequately designed to meet the needs of AAC users. They are designed to suit students who do not have any disabilities or language problems."
	Instructional Methods	"We conduct workshops continuously to train teachers on methods of teaching reading and writing that are useful and enjoyable for students. But we still need to know the most appropriate strategies for teaching literacy to students who use AAC."
Supports for Curriculum Implementation	Implementation Guidelines	"We mainly rely on a speech and language pathologist in our school who helps many of us teach the curriculum and deliver the information in a better way to students who use AAC. So one of the things that I will take into account when designing an educational program is having clear guidelines for the educational team."
	Continuing Professional Development	"The consultation and training that I received from the speech and language pathologists helped me to adjust some lessons as I went through, so I feel that I implemented the changes as needed."
	Ongoing Evaluation	"There is no perfect curriculum. The evaluation process should be comprehensive and transparent. Everyone participates in it, including the student who uses AAC."

Table 3 (continued)

Theme	Sub-theme	Code	Example
AAC Implementation	Considerations for Schools	Staff Training	"Every teacher needs training on how to use AAC in the classroom—on how to communicate with them [AAC users]. I think this is an important step for a successful inclusive education."
		Setting Shared Expectations	"Do not forget that teachers may have different expectations than the speech therapist, and you need a solution to this problem."
		Social Opportunity	"Keeping them connecting with others is very important. They learn many social and cultural things from interacting with others … Being isolated or not having a chance to interact with people around them will not help them grow."
		Learning Activities	"Having meaningful learning activities could significantly impact their achievement in a positive way."
		Leadership Roles	"We rely on the school principals to provide us with resources needed for using AAC in the school … Their roles are important. Without their support, we may not be able to do anything."
		Multiple Modes of Communication	"If something goes wrong, the device is broken or not working, or whatever, we use sign language or communication boards."
	Considerations for Home	Family Member Training	"Some parents do not have sufficient knowledge of this type of device, and it is better to have them as a part of the training plan to increase the effectiveness of the educational program."
		Participation in Implementation	"We ask the students to use their device in the classroom, but we should also make sure that the parents are using the device with them at home."
	Facilitating Implementation	AAC Infrastructure	"Chargers are available for students in the classroom to charge their devices."

Table 3 (continued)

		Building Confidence	"Many teachers feel anxious when using the equipment or helping a student use a device, so you may find them trying to avoid implementing it."
		Presenting the Positive Impact of AAC	"When the work team saw the positive results from using the AAC app in the regular classroom, everyone was encouraged to do the same with other students who did not get the same opportunity."
	Success Indicators	AAC Usage Frequency	"Using the device continuously and not leaving it on the shelf in the classroom, I think, is clear evidence of the success of the educational program and treatment plans."
		Academic Performance	"Her math skills were not as strong as required compared to her classmates … so the team felt that if the device was used effectively, this would lead to her continuing to progress to higher levels in mathematics."
		Participation Levels	"The opportunity is provided for the AAC users to spend most of their time learning and participating in the educational process inside the regular classroom … by providing all treatment services to them in the classroom."
		Partner Interaction	"Partner interactions with AAC users are important … My students become more aware of AAC. They help her when she needs help. They know how to interact with her effectively."

Theme	Sub-theme	Code	Example
Collaboration	Household Members	Family System	"Cooperating with parents helps improve educational programs in line with their [student] needs."

Table 3 (continued)

	Household Employee	"You often find that the private drivers are the ones who drive the student to school or attend therapy sessions instead of the father, so it is important to cooperate with them instead of forgetting the idea of cooperation because the parents are absent."
	Family Diversity	"Elder brothers are in the position of fathers in some families, and they bear the responsibilities of the fathers ... The same is true for elder sisters in the families, so understanding the nature of the family and the roles that each person plays helps in achieving better education."
	Managing Change	"The father may move to a new job, away from his child for some reason, so the wife will act as the first caregiver for the child. In this case, there must be plans to deal with such changes to keep the education going."
	Maintaining Success	"Parents play a role in preserving what their child learns, whether regarding educational lessons or the use of the device."
Schoolmates	Knowledge of AAC	"Their classmates lack the simplest information about AAC, and they need to be educated."
	Interaction Strategies	"Skills like modeling, waiting, looking at the student and not at the device when talking … are needed inside or outside the classroom in order to help them."
School Staff	Interprofessional Approach	"I cannot do everything alone. We must share experiences through a team that includes experts in different scientific disciplines."

Table 3 (continued)

	Community	Public Awareness	"They face difficulty in speaking and dealing with the community around them. Saudi society is not accustomed to seeing a person speaking using AAC applications … We must raise the level of awareness in the community so that they are not exposed to pressures, such as isolation."
		Community Communication	"Students are not in school all the time. They go to markets, mosques, amusement parks, which allows them to communicate with others and meet their needs. So, the community environment creates opportunities in their education and development of their skills."

Theme	Sub-theme	Code	Example
Inclusivity of AAC Users	Key Principles	Non-Oral Communication Right	"AAC is their voice, and it is their way of speaking. Everyone should deal with them accordingly."
		Participation Right	"The educational program considers their personal and public rights, allowing them to participate without restricting their freedom or treating them differently from others because they carry a communication device with them."
		Access Facilitation	"Access to the communication device must be available to them always and at any time. It is our role to make sure that the devices are ready and available for use."
	Factors in the Community	Attitudes Toward AAC	"Maintaining positive attitudes in terms of interacting with them [AAC users] and not thinking negatively towards them can help in creating a healthy relationship among the community members."

Table 3 (continued)

	Physical Environment Adaptations	"AAC users sometimes face difficulty in entering or leaving the buildings because they are not built in a way that suits their physical capabilities. You find many school buildings are rented, as they were intended for housing and not to be a school."
AAC User–Stakeholder Communication	Communication Style	"We always use indirect language, and we leave the other person the responsibility to think and know the meaning as a kind of respect. But such a communication style is not suitable for AAC users when interacting and talking with them."
	Effects of Educational Interventions	"Knowing the effect of inclusive education on them from their own point of view is always an important thing. What we see may be different from what they see and feel."
	Communication Abilities	"The device is not enough … They may not have the ability to know all the words in the device. Our communication with them will make us recognize those words that they use and which they do not use. And then, we teach them those words that they do not know or remove them from the device."
	Familiarity with AAC	"Undoubtedly, the more familiar you are with AAC, the more appropriate educational services you will be able to provide."
Active Participation	Participation Patterns	"We always use checklists to monitor their participation and its intensity."
	Participation Constraints	"They are often faced with constraints that limit or prevent them from participating in public schools."

Table 3 (continued)

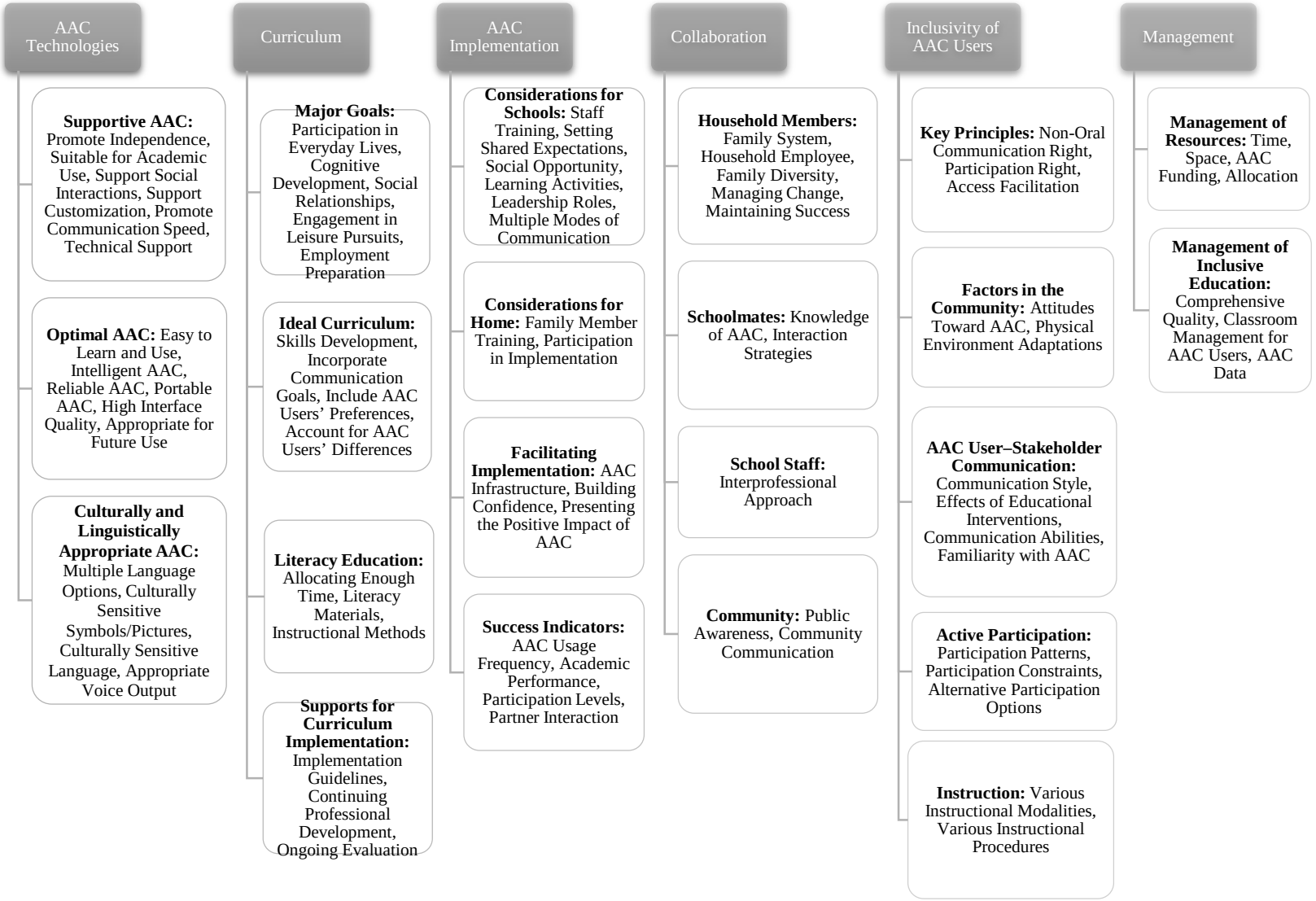
		Alternative Participation Options	"I think that the educational program should not be limited to participating in the class only. Rather, there should be an option to participate outside the classrooms, for example, via online forums, because I have noticed my students who use AAC like to communicate more through writing."
	Instruction	Various Instructional Modalities	"While teaching them face-to-face is beneficial in terms of knowing their needs and providing them with assistance directly, distance education has proven its success during this period in meeting their needs and is no less important than traditional education, in my view."
		Various Instructional Procedures	"One of the important things as well is to move away from the traditional method of conveying information to the students who use AAC. Students will focus better if they use interesting methods, such as storytelling, which mainly aim to convey the information in an interesting way."
Theme	Sub-theme	Code	Example
Management	Management of Resources	Time	"The principals must help us to manage or reduce the caseloads … When you teach more than twenty classes per week, of course, you will not find enough time to plan and design educational materials that suit the capabilities of AAC users."
		Space	"Solving the problem of not having available seats is one of the things that must be taken into account when creating an educational program."
		AAC Funding	"These devices and applications are expensive. There must be excellent financial management that takes into account the needs of students as well as managing the financial support well to avoid financial waste."

Table 3 (continued)

	Allocation	"The ability of school staff in the educational program to allocate resources to help the AAC users to learn."
Management of Inclusive Education	Comprehensive Quality	"The teaching staff changes every year, and with it, the quality changes as well. If there are standards that are adhered to and reviewed every year to ensure that they are applied, we will maintain a high level of quality in our schools."
	Classroom Management for AAC Users	"Classroom management in school is a skill and art that the teacher can use to provide the AAC users with new, good, and positive learning skills. If there is a misconception of class control, the teacher either destroys the AAC user psychologically or turns him into a careless person. Classroom management is the key to teaching. Without it, education will not take place."
	AAC Data	"There must be a database showing the number of AAC users and the types of AAC used because this will greatly help us in planning and improving the educational process."

Figure 4

Summary of Themes, Subthemes, and Codes



Quantitative Research Participants

Participants were 283 stakeholders who had a student using AAC in school settings in Saudi Arabia. Stakeholders were categorized based on their roles. Twenty-five percent of the participants indicated their role as special education teachers (n = 70), 23% of the participants were general education teachers (n = 66), 18% of the participants were parents (n = 52), 18% of the participants were school principals (n = 52), and 16% of the participants were SLPs (n = 43).

The participants were asked to respond to a question regarding their educational level. Among the participants, 56% had a bachelor's degree (n = 158), 34% had a master's degree (n = 96), 5% had a doctorate (n = 14), 3% completed a high school degree (n = 10), 1% had less than a high school educational level (n = 3), and 1% did not have formal education (n = 2).

In addition, the participants reported whether or not they had training on AAC. Forty-nine percent of the stakeholders indicated they had not received training on AAC (n = 138), 32% of the stakeholders received AAC training (n = 91), and 19% of the stakeholders were not sure whether or not they had training on AAC (n = 54).

Furthermore, stakeholders reported the type of AAC system used with the students who relied on AAC. Forty-nine percent of the stakeholders selected both high- and low-tech AAC as the type of AAC system used (n = 138), 26% reported high-tech AAC (n = 74), 18% indicated low-tech AAC (n = 51), and 7% of the stakeholders were not sure about the type of AAC system used (n = 20).

Lastly, the participants were asked to indicate how often they interact with an individual who uses AAC. Thirty-six percent of the participants interacted at least once a week with an AAC user (n = 102), 28% reported daily interaction (n= 79), 16% of the stakeholders interacted with an AAC user at least once a month (n = 46), 9% of the stakeholders had less than one

interaction with an AAC user per month (n = 25), and 11% of the stakeholders were not sure about how often they interact with an AAC user (n = 31).

Research Question 2: What intervention aspects do stakeholders report as key considerations in maximizing AAC users' participation in school settings?

The second research question was answered using the online survey. This survey dimension was comprised of 10 statements and focused on AAC interventions to enhance the communication, language development, and participation of AAC users with developmental or acquired disabilities in school settings. See Table 4 for a complete list of statements, means, and standard deviations. All survey responses were reported and analyzed using statistical analysis software (IBM SPSS Statistics Version 28) to find the overall mean scores and standard deviations based on a 7-point Likert type scale (1 = Strongly Disagree, 2 = Disagree, 3 = Somewhat Disagree, 4 = Neither Agree nor Disagree, 5 = Somewhat Agree, 6 = Agree, 7 = Strongly Agree). See Figure 5 for percentages of agreement among the stakeholders on each statement.

Table 4

Mean and Standard Deviation by Statements of Key Considerations in AAC

Statement	Mean	Standard Deviation
1. Using a team approach will maximize the participation of AAC users in school settings.	5.93	0.46
2. Ensuring access to learning experiences and social interactions will maximize the participation of AAC users in school settings.	5.86	0.52
3. Providing early intervention will maximize the participation of AAC users in school settings.	5.82	0.65
4. Setting appropriate expectations will maximize the participation of AAC users in school settings.	5.87	0.67
5. Providing AAC supports to meet changing needs will maximize the participation of AAC users in school settings.	5.75	0.75

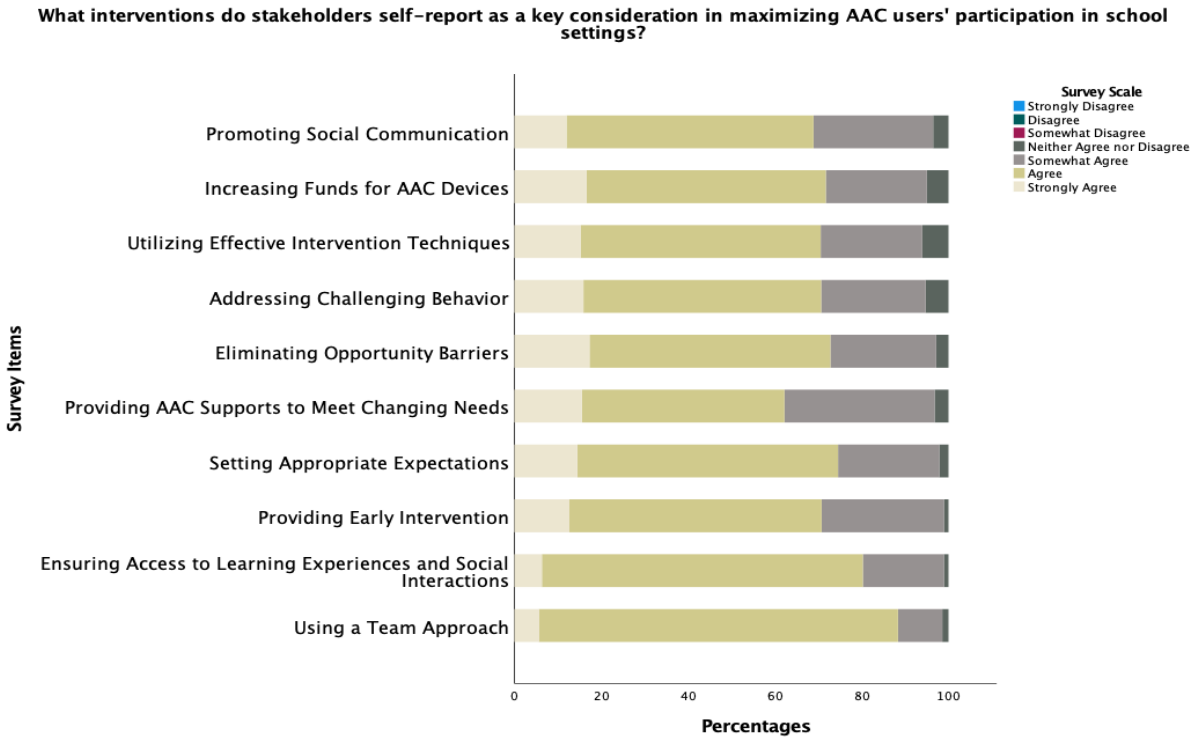
Table 4 (continued)

6. Eliminating opportunity barriers will maximize the participation of AAC users in school settings.	5.88	0.72
7. Addressing challenging behavior will maximize the participation of AAC users in school settings.	5.81	0.76
8. Utilizing effective intervention techniques will maximize the participation of AAC users in school settings.	5.79	0.78
9. Increasing funds for AAC devices will maximize the participation of AAC users in school settings.	5.83	0.76
10. Promoting social communication will maximize the participation of AAC users in school settings.	5.77	0.69

The 10 survey statements were analyzed to provide insight into the AAC interventions needed to maximize the participation of AAC users in school settings. Statement 1, which asked if using a team approach will maximize the participation of students using AAC in school settings, obtained the highest score with a mean score of 5.93 (SD = 0.46). Statement 6 was about eliminating opportunity barriers to enhance AAC users' participation. This statement had a mean score of 5.88 (SD =0.76). Statement 4 inquired about setting appropriate expectations and had a mean score of 5.87 (SD = 0.67). Statement 2 had a mean score of 5.86 (SD = 0.52) and asked whether ensuring access to learning experiences and social interactions would maximize AAC users' participation in school settings. Statement nine has a mean score of 5.83 (SD = 0.76) and is about increasing funds for AAC devices. The remaining five statements had mean scores that ranged from 5.81 to 5.75, and standard deviation scores (variability) ranged from 0.65 to 0.78. Based on the mean scores and standard deviations, all participants rated the 10 statements in the first dimension of the online survey from "Somewhat Agree to Strongly Agree."

Figure 5

Percentages of Agreement Among Stakeholders Regarding AAC Intervention Options as Key Considerations to Maximize AAC Users' Participation in School Settings



Note. The percentage of each response is shown at the bottom of the 100% stacked bar chart.

The 100% stacked bar shows that using a team approach had the highest agreement percentage rate among stakeholders as a key consideration to maximize the participation of AAC users in school settings (83%, n = 235), followed by ensuring access to learning experiences and social interactions (74%, n = 210). Setting appropriate expectations had the third-highest percentage of agreement, with 60% of the respondents agreeing it was a key to enhancing the participation of students who use AAC in school settings (n = 170).

Furthermore, the statement "eliminating opportunity barriers" had the highest strong agreement among the stakeholders (17%, n = 49), followed by increasing funds for AAC devices (17 %, n = 49) and addressing challenging behavior (16%, n = 45).

The stacked bar chart also shows that stakeholders somewhat agreed with the following key considerations in AAC to maximize the participation of AAC users in school settings: providing AAC supports to meet changing needs (35%, n = 99), providing early intervention (29%, n = 82), and promoting social communication (28%, n = 79).

Lastly, 6% of the respondents neither agreed nor disagreed with the statement regarding utilizing effective intervention techniques (n = 17), addressing challenging behavior (5%, n = 14), and increasing funds for AAC devices (5%, n = 14). Interestingly, none of the subjects disagreed with any of the AAC intervention options listed in the first dimension of the online survey as a key consideration to maximize the participation of students who use AAC in Saudi Arabia.

Research Question 3: What aspects of education do stakeholders report as an opportunity to promote AAC users' learning and academic success in school settings?

The third research question was answered using the second dimension of the survey instrument. Table 5 below summarizes the results of the second survey dimension, which included a group of 10 statements about the educational opportunities to enhance the AAC users' learning and academic success in schools. On item 10, respondents somewhat agreed that preparing AAC users for employment and vocational activities would improve AAC users' education in schools (m = 5.80, SD = 0.78). Participants reported that developing knowledge and skills valued in society would improve the education of AAC users in school settings (m = 5.78, SD = 0.76). Item 8 was about identifying educational activities that were a good match for AAC users in schools, and it had a mean score of 5.75 (SD = 0.79). Participants somewhat agreed that fostering memberships and relationships with peers and school members would improve the education of AAC users in school settings (m = 5.72, SD = 0.78). The remaining six survey

items all had mean scores that ranged from 5.28 to 5.71, and standard deviation scores ranged from 0.73 to 0.89.

Table 5

Means and Standard Deviations of Rated Opportunities to Promote AAC Users' Learning and Academic Success in School Settings

Survey Statement	Mean	Standard Deviation
1. AAC users' education in schools would be improved by developing an appropriate individualized education program.	5.73	0.75
2. AAC users' education in schools would be improved by developing collaborative teaming.	5.71	0.73
3. AAC users' education in schools would be improved by developing comprehensive and individualized planning for AAC users through person-centered planning processes such as Making Action Plans (MAPS).	5.28	0.89
4. AAC users' education in schools would be improved by designing high-quality instruction (e.g., Universal Design for Learning and Curriculum Accommodations).	5.55	0.79
5. AAC users' education in schools would be improved by fostering membership and relationships with peers and school members.	5.72	0.78
6. AAC users' education in schools would be improved by providing individual communication support that enables participation in a range of communication activities.	5.67	0.84
7. AAC users' education in schools would be improved by employing AAC users in school settings as educators, consultants, or AAC service providers.	5.49	0.88
8. AAC users' education in schools would be improved by identifying educational activities that are a good match for AAC users.	5.75	0.79
9. AAC users' education in schools would be improved by developing knowledge and skills that are valued in society.	5.78	0.76
10. AAC users' education in schools would be improved by preparing AAC users for employment and vocational activities.	5.80	0.78

The following stacked bar chart resumes the frequency of the responses to each survey item. The responses were distributed among four different options from the scale: Strongly Agree, Agree, Somewhat Agree, and Neither Agree nor Disagree. None of the participants selected the scale options Somewhat Disagree, Disagree, or Strongly Disagree. The stacked bar chart indicates that the majority of the subjects agreed with the 10 items with an agreement percentage ranging from 45% to 56%, followed by Somewhat Agree, ranging from 22% to 36%. Strongly agree ranged from 7% to 16%, and Neither Agree nor Disagree ranged from 5% to 22% across all items in the second survey dimension. The statement “preparing AAC users for employment and vocational activities” and “developing an appropriate individualized education program” had the highest agreement percentage (56%, n = 159), followed by developing collaborative teaming (55%, n = 156), fostering membership and relationships with peers and school members (54%, n = 153), and identifying educational activities that are a good match for AAC users (53%, n = 150). The remaining survey items had an agreement percentage ranging from 35% to 53%.

Somewhat Agree had the second-highest percentages of agreement. Subjects were somewhat agreed with the statement “designing high-quality instruction” at an agreement percentage of 36% (n = 102), followed by developing comprehensive and individualized planning for AAC users through person-centered planning (35%, n = 99); employing AAC users in school settings as educators, consultants, or AAC service providers (31%, n = 88); providing individual communication support that enables participation in a range of communication activities (30%, n = 85); and developing collaborative teaming (29%, n = 82).

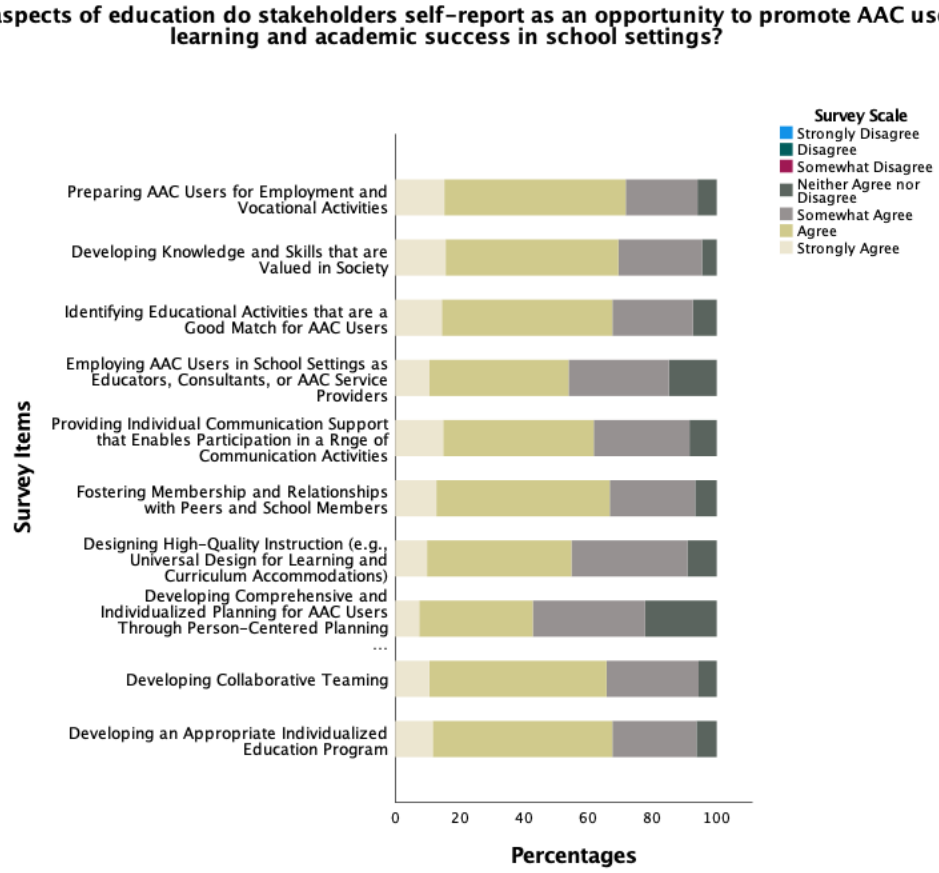
After that, the option Strongly Agree had the third-highest agreement. The survey item “developing knowledge and skills that are valued in society” had the highest strong agreement

among the survey items (17%, n = 48), followed by preparing AAC users for employment and vocational activities (15%, n = 43), providing individual communication support that enables participation in a range of communication activities (15%, n = 43), identifying educational activities that are a good match for AAC users (14%, n = 40), fostering membership and relationships with peers and school members (13%, n = 37), and developing an appropriate individualized education program (12%, n = 34).

Lastly, Neither Agree nor Disagree had the lowest score percentage among the survey scale options scales. Approximately 22% of the subjects were neutral regarding the statement "developing comprehensive and individualized planning for AAC users through person-centered planning," which had the highest percentage score among the survey items (n = 62), followed by employing AAC users in school settings as educators, consultants, or AAC service providers (15%, n = 43); designing high-quality instruction (9%, n = 26)); providing individual communication support that enables participation in a range of communication activities (9%, n = 26); and identifying educational activities that are a good match for AAC users (7%, n = 20).

Figure 6

Percentages of Agreement Among Stakeholders Regarding Rated Opportunities to Promote AAC Users' Learning and Academic Success in School Settings



Note. The graph indicates the percentages of each response to the survey items, and all the bars have the same length.

Research Question 4: What do stakeholders report as potential obstacles to positive outcomes in educating AAC users in general education?

The fourth research question was answered through the third dimension of the online survey, which had five statements. The third dimension was about barriers that can negatively affect the positive results of inclusive education for AAC users in school settings. As shown in

Table 6, Statement 1 had a mean score of 5.81 (SD = 0.77) followed by; Statement 5 (m = 5.78, SD = 0.71), Statement 3 (m = 5.70, SD = 0.75), Statement 4 (m = 5.64, SD = 0.77), and Statement 2 (m = 5.66, SD = 0.74).

Table 6

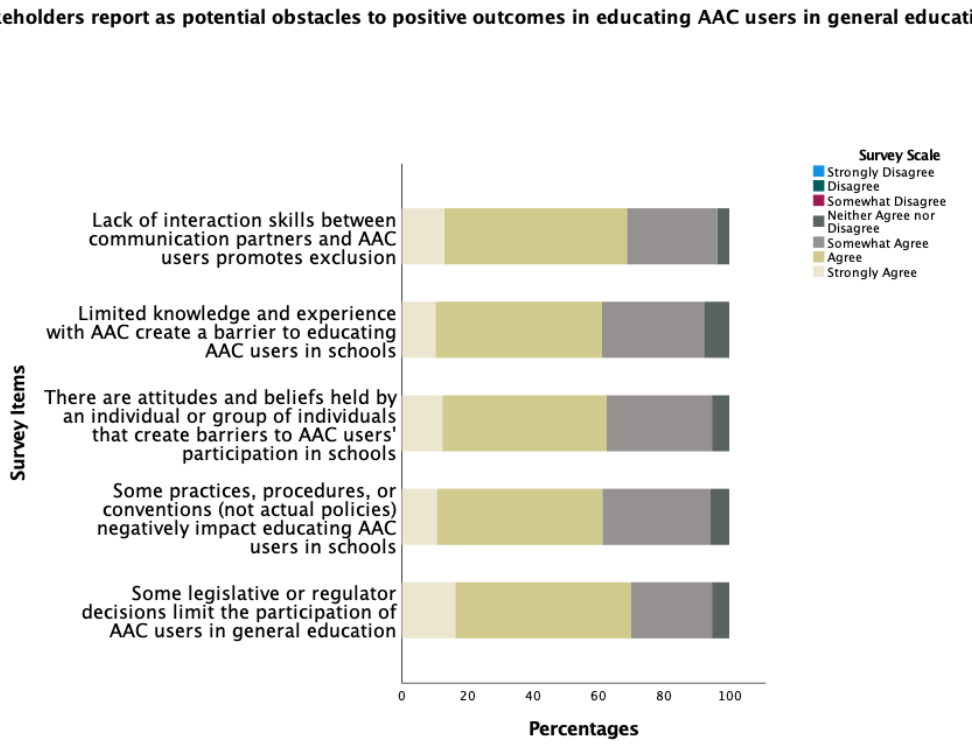
Means and Standard Deviations of Rated Potential Obstacles to Positive Outcomes in Education AAC Users in School Settings

Survey Statement	Mean	Standard Deviation
1. Some legislative or regulatory decisions limit the participation of AAC users in general education.	5.81	0.77
2. Some practices, procedures, or conventions (not actual policies) negatively impact educating AAC users in schools.	5.66	0.74
3. There are attitudes and beliefs held by an individual or group of individuals that create barriers to AAC users' participation in schools.	5.70	0.75
4. Limited knowledge and experience with AAC create a barrier to educating AAC users in schools.	5.64	0.77
5. Lack of interaction skills between communication partners and AAC users promotes exclusion.	5.78	0.71

SPSS was used to generate a stacked bar chart (see Figure 7) to identify the percentages of responses to each survey item on the numerical horizontal axis. The stacked bar chart indicates that the majority of the participants selected the response Agree, with an agreement percentage ranging from 50% to 55%. The response Somewhat Agree had the second-highest percentages, ranging from 33% to 25%, while the response Strongly Agree was third-highest, with a strong agreement percentage ranging from 11% to 16%. Lastly, the response Neither Agree nor Disagree was fourth, with a percentage ranging from 4% to 8%.

Figure 7

Percentages of Agreement Among Stakeholders Regarding Potential Obstacles to Positive Outcomes in Educating AAC Users in General Education



Note. The 100% stacked bar chart focuses on the percentage composition of responses to each survey item and the relative differences among the items.

Research Question 5: Are there different perspectives among stakeholders regarding their skills as communication partners?

A one-way analysis of variance (ANOVA) was conducted to evaluate the relationship between the role of stakeholder groups and the change in the Communication Partner Skills Scale scores. The independent variable, the stakeholder category, included five groups: SLPs, special education teachers, school principals, parents, and general education teachers. The dependent variable was the change in the scores on the Communication Partner Skills Scale. The

ANOVA was significant at the .05 level, F (4, 283) = 25.74, p = .001. The strength of the relationship between the stakeholder groups and the change in the Communication Partner Skills Scale scores as assessed by η2 was a large effect, with age accounting for 27% of the dependent variable variance.

Follow-up tests were conducted to evaluate pairwise differences among the means. Because Levene's test of equality of error variances was not significant, we chose to conduct post hoc comparisons with the Bonferroni test. There was a significant difference in the means between SLPs and the following participant categories: parent, school principal, general education teacher, and special education teacher. The SLP group had the highest scores on the Communication Partners' Skills Scale, whereas the other participant groups (parents, special education teachers, general education teachers, and school principals) had the lowest scores on the same scale. Thus, the SLPs' perspectives about their skills as communication partners were significantly better than other stakeholders. The means and standard deviations for the five stakeholder groups are reported in Table 7.

Table 7

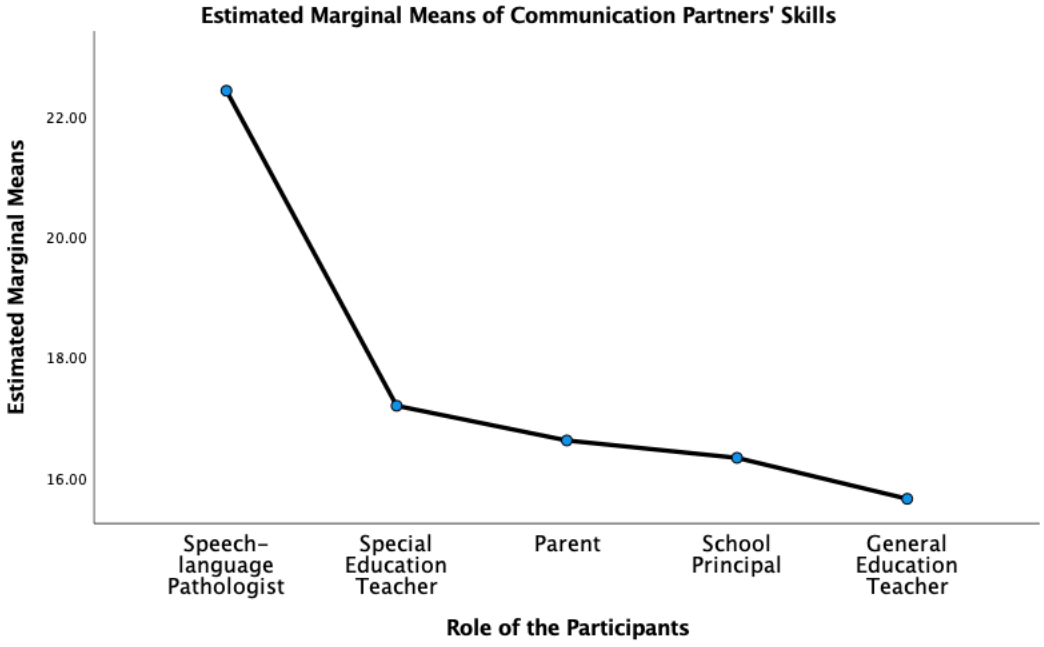
Means and Standard Deviations for the Five Participant Groups Regarding Their Skills as Communication Partners

Role of the Participant	*M*	*SD*
Speech-language Pathologist	22.42	4.40
Special Education Teacher	17.28	3.52
Parent	16.62	3.27
School Principal	16.32	4.16
General Education Teacher	15.65	3.14

Figure 8 below illustrates the relationships between the five stakeholder groups and the Communication Partners' Skills Scale scores.

Figure 8

The Relationships Between the Stakeholder Group and the Communication Partners' Skills Scale



CHAPTER V

DISCUSSION

Educating students who use augmentative and alternative communication (AAC) in regular schools has become a necessity called for by regulations and laws to preserve their educational rights and provide them with the opportunity to be educated alongside their peers who do not rely on AAC to communicate with others. Therefore, the purpose of this study was to fill the gap that currently exists in research, which lacks clear parameters for designing educational programs appropriate for teaching AAC users in schools. This study aimed to provide help to educational programs in schools to review and modify the educational parameters of their programs by taking advantage of current knowledge to improve the education of AAC users. In this chapter, the findings will be interpreted and explained as well as the significance of these findings for designing appropriate educational programs and making changes in the current educational programs in schools to achieve the best learning outcomes among AAC users. In addition, new insights and observations that emerged from the current study will be presented.

In this study, the following research questions were posed:

1. What do stakeholders perceive as parameters for developing an educational program for students who use AAC in regular schools?
2. What interventions do stakeholders report as key considerations in maximizing AAC users' participation in school settings?
3. What aspects of education do stakeholders report as an opportunity to promote AAC users' learning and academic success in school settings?

4. What do stakeholders report as potential obstacles to positive outcomes in educating AAC users in general education?
5. Are there different perspectives among stakeholders regarding their skills as communication partners?

The first research question was answered using semi-structured interviews. The findings from the interviews revealed six themes (AAC technologies, AAC implementation, management, inclusion of AAC users, curriculum, and collaboration). The discussion is presented according to the six major themes that were identified. Questions 2, 3, 4, and 5 were answered using an online survey. The online survey had four dimensions (key considerations in AAC, opportunities in education for AAC users, potential obstacles to positive outcomes, and communication partner skills). Each survey dimension will be discussed below.

Interview Themes

AAC Technologies

In this study, the first theme is AAC technologies. The participants set several parameters that they believed contribute to the design and development of appropriate educational programs. These parameters enable AAC users to attend and learn without being pulled out of the regular classrooms and placed in special classes isolated from their peers who do not use AAC. These parameters also allow educators to provide educational information and experiences to AAC users and provide AAC interventions inside regular classrooms.

In regular schools, students and their teachers rely mainly on verbal and written communication to speak, convey information, and participate in various educational activities. It is worth pointing out that verbal and written language is one of the most complex types of

communication due to the many requirements needed to deliver messages correctly, such as grammatical and morphological rules, the ability to correctly pronounce sounds, clear tone of voice, speed of understanding, and responding to linguistic symbols. If a student has a disability, such as severe cerebral palsy, that limits their ability to communicate with others verbally, they will miss out on many of the communication methods used in regular schools. Thus, AAC technologies help solve this dilemma and allow people with communication disabilities to communicate with others verbally or in writing. AAC technologies are also used in schools to help integrate its users into regular classrooms and have the same educational opportunities available to other students who do not have disabilities. AAC technologies vary in terms of their quality, capacity, and efficiency, and they have not yet reached the level that the stakeholders desire to support integrating its users into regular classrooms in schools. For instance, one of theme was about the suitability of AAC technologies to be used for educational purposes. In the qualitative interview, one of the participants said that "some of the fill-in-the-blank questions require words that are not available on the application." However, there is still a great opportunity for companies and individuals producing AAC technologies to develop AAC technologies to keep pace with the modern educational process in regular schools.

Many AAC devices and software that were made more than 10 years ago remain in use. However, as time goes by, AAC technologies must be developed and replaced with new AAC technologies that can provide real support that keeps pace with the continuous changes in the educational process and programs and the nature of communication styles inside or outside schools. For example, a second-grade student has an average weight of 62 pounds, so it is unreasonable to be given a device that weighs 9 pounds, which is equivalent to 15% of his weight. To date, many AAC devices have been produced without taking into account the needs

of students in inclusive educational programs in schools. Though they may have some positive features, such devices do not support including students who use them in regular classrooms. To ensure a successful inclusive experience for AAC users, AAC technology developers must take into account educational parameters that are commensurate with the needs of AAC users, educators, and their families.

Cultural and linguistic diversities along with students' diverse social environments are anticipated in school settings, and AAC technologies must take into account the diversity of its users. Saudi Arabia has historically been a country comprised of cultural and ethnic diversities. AAC technologies' influence on culture is particularly important because culture is derived through our communication with each other. Students' cultural and linguistic diversities are often created by their mode of communicating and interacting with other students at schools, where they spend most of their day. Thus, AAC technologies have a significant ability to shape the cultural characteristics of their users, as these devices are considered their mode of communicating with others in the schools. Until today, most AAC devices, especially high-tech AAC, are manufactured in Western countries and then imported to Saudi Arabia for use with students. The SLPs and other inclusive team members work on programming and improving these imported AAC devices to suit the cultures of Saudi Arabia. However, these modest efforts are insufficient to fully adapt the AAC devices to the mixture of cultures and languages that vary widely in Saudi Arabia, as the stakeholders indicated that AAC technology lacks appropriate Arabic vocabulary. Therefore, as stakeholders confirmed, AAC technologies (hardware and software) must be culturally and linguistically appropriate to use them effectively in the schools.

AAC Implementation

The parameters indicated in the AAC implementation theme suggest the following conclusions to the researcher. First, it is clear that training educators and family members in implementing and using AAC is vital for designing and developing a successful education for AAC users in schools. It was observed during the interviews that some educators and family members reported not fully understanding how to use AAC technologies or even knowing the benefits of implementing them for communication and educational purposes. It is worth pointing out that the current inclusive educational programs in Saudi Arabia were designed and developed when the demand for AAC and educational services was low. Therefore, these inclusive educational programs must adapt to the new demand for AAC services, which is seen now in the country. Schools must incorporate an AAC training program for their staff into their educational programs to make sure that they maintain a minimum AAC skills level of practice before teaching students who use AAC. The schools will probably never entirely be comprised of AAC experts, but at least the school staff who directly work with AAC users need to demonstrate basic AAC knowledge and skills to have a successful inclusive education. Family members also play a significant role in teaching their children AAC skills. Providing them with AAC training is vital not only for AAC use at home but also in schools.

The AAC technologies vary widely, from the simplest technologies to the most sophisticated. There is currently a tendency to introduce technologies in various fields of education within schools. At the same time, AAC technologies still have an important place–depending on how they will be used in the schools–among these educational technologies. Therefore, it is vital to identify the most appropriate, effective, sustainable, and reliable AAC technologies and levels of utilization in different educational activities. The AAC hardware

infrastructure must be in place with supporting elements such as AAC mounting systems, electricity, and AAC technical services. The most appropriate AAC technologies to use in inclusive education were identified in the results section of this study, as the stakeholders described the AAC technologies' features for use in schools. However, stakeholders should consider the specifications when selecting an AAC technology for school use, such as memory and speed of selecting messages and symbols. In addition, selecting an appropriate AAC technology for educational uses involves identifying the educational goals, the role of educators and students, the role of textbooks and other external sources of learning materials, and the modalities of classroom activities.

Stakeholders must think about where and how AAC technologies should be used in schools to determine how different educational objectives are better served by different AAC technologies (e.g., AAC devices on wheelchairs). Should AAC devices be connected to the internet to have access to online learning materials and platforms? Should AAC devices be connected by external tools, such as an eye-gaze device, keyboard, or head mouse? In order to facilitate AAC technologies' use as robust communication tools in inclusive education, stakeholders must first consider preparing its infrastructure in the schools. Otherwise, the AAC technologies may not be implemented successfully.

Management

AAC technologies, particularly high-tech devices, are complex devices that need highly skilled management to obtain the maximum benefits in inclusive education programs. Therefore, it is crucial to plan how to manage inclusive education and school resources, such as funding for and data from AAC technologies. For instance, the yearly maintenance and technical support costs for healthy AAC devices can be costly compared to the initial investment in AAC hardware

and software. The absence of competitors in the Saudi market can also increase maintenance and support costs. Donated and outdated AAC devices are actually expensive, as they require more maintenance compared to new ones. Thus, excellent management must be central in the design and development of a successful educational program for AAC users in schools.

Inclusion of AAC Users

Students who use AAC must have full access to functioning AAC devices to participate in school activities. However, AAC alone is not a solution for including students with communication disorders in regular classrooms. AAC is only a tool, and no AAC device can fix a poorly designed educational program or compensate for negative believes and practices toward AAC users. If the stakeholders are going in the wrong direction, AAC may get them there faster. Inclusive education must be designed and developed to preserve AAC users' rights, taking into account community factors, such as attitudes, ensuring full participation, instructional methodologies, educational objectives, and roles of stakeholders, before appropriate AAC devices for inclusive education are even selected. For example, if the teaching style used in the academic program is traditional lecture where the AAC users are passive spectators, using AAC technologies will not positively impact the inclusion of its users. If the AAC users are left to function independently without communication partners to support them in the classrooms, inclusive education will not achieve its desired goals. Thus, stakeholders should look at the educational programs for AAC users as a process in which AAC users' needs are identified and supported.

Curriculum

Stakeholders need to rethink the school curricula in terms of its content, learning objectives, implementation strategies, and instructional methodologies to align the school

curricula with the needs of AAC users. It was never satisfactory to only be effective in supporting AAC users to master curriculum content and basic learning skills, but now the matter is even more critical. Knowledge alone is subject to change or revision at any moment. Thus, stakeholders reported that they believe that the capability of AAC users to think critically, exercise problem solving, evaluate evidence, make suitable judgments, and work with others to get a sense of their changing environment is the only reasonable goal for education. AAC users often feel that learning materials that use sounds, videos, and animations are more like real-world learning experiences than those presented in the traditional school textbooks. Thus, stakeholders need to consider the parameters mentioned in the curriculum theme as a pathway for AAC users to obtain effective learning and help them participate more effectively in the learning process.

Collaboration

Inclusive education for AAC users should be improved through collaborative practices that support AAC students and give greater attention and care to enhance their education. Collaboration is a keyword in educating AAC users, as stakeholders are expected to work together and share knowledge to work towards shared goals. In regular classrooms, students often work individually and perform educational tasks that promote competition. Teaching AAC users in such school environments may leave them unprepared to participate in group activities, use their AAC devices to share ideas with peers, or even accept various perceptions and opinions. Since AAC devices can overcome communication barriers and facilitate conversations between AAC users and others around them, they also have the potential to enhance collaborative practices in the school environment. AAC has the capacity to open a range of opportunities in the classroom for collaborative activities and practices. However, AAC alone cannot create collaborative environments; hence, stakeholders must create a rich collaborative

environment that encourages AAC users and stakeholders to work as a team toward common goals.

Survey Dimensions

AAC Intervention

School is where AAC users spend a significant portion of their time. Therefore, they need a variety of opportunities to learn and use AAC technologies at school. The interviews indicated that the stakeholders desired full interaction and participation for AAC users in regular classrooms and were optimistic about the use of AAC in the schools. At the same time, the interviewees noted that a large portion of AAC users did not have full access to different AAC intervention strategies, which they believed contributed to their exclusion. Thus, AAC users' ability to succeed in regular classrooms should not be judged until they have full access to appropriate AAC intervention and strategies. In this study, AAC interventions such as addressing challenging behaviors, eliminating opportunity barriers, and promoting social communications were identified as key to maximizing AAC users' participation in school settings. Such AAC intervention services and strategies are key parameters for developing and designing an appropriate educational program for AAC users in schools. In inclusive education, AAC interventions should focus strongly on improving AAC users' learning experiences and communicative competence. It is not surprising that students who use AAC may demonstrate difficulties in writing, reading, communicating with teachers and peers, and participating in classroom activities if they are not taught these skills in inclusive classrooms. In inclusive education, AAC interventions must be well developed to facilitate the full participation of AAC users in different school environments.

Opportunities in School

In the 21st century, many schools worldwide are influenced by modernizing societies and new learning needs. These schools have taken on teaching lifelong learning skills, improving skills and knowledge needed for occupations, and other life skills needed for personal purposes and everyday life. Such learning opportunities would also be beneficial for AAC users. Recently, due to the coronavirus outbreak, schools have used social media, telecommunication technologies such as TV, and many other types of technologies as a mode of delivery for classroom content. This switch from the traditional style of learning into a modernized style of learning should be taken as a lesson on how to take advantage of many educational opportunities around us to enrich the learning experiences of AAC users. Several stakeholders offered evidence of high-quality education after utilizing these technologies for educational purposes. Lastly, to increase flexibility in the educational program, stakeholders need to pay attention to individual differences among students and in their progress toward achieving the educational objectives. When teaching AAC users, stakeholders must be flexible and mindful, as it is more likely that they will need to modify or replace their instructional and learning objectives to adapt to the changing needs of AAC users and provide them with more learning options as they progress.

Overcoming Potential Obstacles

AAC has been used to overcome communication barriers and support the participation of AAC users who otherwise could not attend regular classrooms because of their communication disabilities. However, stakeholders agreed that potential barriers such as regulator decisions, conventions, attitudes, limited knowledge of AAC, and lack of skills to interact with AAC users are factors that promote exclusion. Reducing potential barriers is vital to ensure that AAC users

achieve full participation in school settings. Interventions are needed to reduce the obstacles in practice, attitude, and policy that limit the participation of students who use AAC. Several studies describe negative attitudes and beliefs towards people with complex communication needs (Lund & Light, 2007; McCarthy et al., 2002; Todman, 2000). However, only a few studies (Hyppa-Martin et al., 2016; Hyppa-Martin & Reichle, 2018) have examined techniques to enhance positive attitudes and increase social acceptance of students who use AAC. Overcoming the potential obstacles is vital since the stakeholders reported that these obstacles limit the positive outcomes of inclusive education for AAC users.

Communication Partner Skills

Human conversations are highly dependent on the communication skills of the participants in interactions. In schools, AAC users and stakeholders face almost continual interactions, as they are required in classroom activities. During interactions that include students who use AAC, the success of the conversation exchange relies significantly on the communication skills of the involved partners. In this study, only SLPs demonstrated a high level of communication partner skills, whereas parents, teachers, and school principals indicated a lack of communication partner skills. Students who use AAC interact with SLPs and other stakeholders, such as parents and general education teachers. This highlights the importance of providing other stakeholders with adequate training on communication partner skills. Those stakeholders must successfully engage in conversations with AAC users, understand how to send and receive messages with AAC users, and maintain healthy interactions. If the stakeholders continue to lack communication partner skills, the educational programs will not achieve their desired outcomes.

Next Steps: Making the Change Happen

In order for the changes discussed to occur, educational programs and practices need a meaningful and sustainable change to support AAC users' learning in general education classrooms. Based on the interpretation of the findings of this study, the researcher developed a multielement plan to accomplish this change. The main elements of the plan are described below.

Improvement Planning

Every school in Saudi Arabia must develop a plan for improving the educational program for AAC users under the supervision of the Ministry of Education. This plan would provide a fundamental framework based on the parameters identified in the current study to guide continuous improvement work. Planning must be a collaboration between the stakeholders and Ministry of Education staff. Plans may vary from one educational program to another, as long as the plans address the parameters for educating AAC users in fundamental ways that enhance teaching, learning, and AAC users' outcomes. The stakeholders must work closely with the Ministry of Education leaders and staff, examine various plans, and provide feedback on how these plans can be more active and sufficiently grounded in evidence. Community members, such as close friends and neighbors, are also needed to come together, share their suggestions and ideas, and learn from each other.

Closing the Gaps

AAC users need additional appropriate attention. Particular strategies are needed to increase support for students who use AAC by acknowledging their unique needs and situations, including but not limited to AAC training, communication partner training, assistive technology, stakeholders' engagement, and appropriate policies.

Continuing Professional Development

Various approaches to education and development must be used in schools across Saudi Arabia. These involve using AAC coaches or lead SLPs, scholars, various forms of workshops focused on teaching literacy and numeracy courses to AAC users, ongoing stakeholder meetings both virtually and in person, regular school visits to examine augmentative or alternative practices to enhance AAC users' participation, among others. The main goal is to embed professional development in the continuing work of stakeholders and schools. Professional development should focus on critical areas, including strategies for implementing AAC in the classrooms, adapting the instruction, mentoring progress, and classroom management.

Materials

Making the change happen depends on the Ministry of Education approving and providing various learning materials to promote efficient teaching and learning for AAC users and making improvements or revisions to the curriculum to address the needs of all students, including students who use AAC. Expert panels on AAC technologies, education of their users, literacy, and curriculum must be formed to put guidance in place for stakeholders around the implications of scientific research for effective practice. Then, all schools in Saudi Arabia can obtain online access to a wide range of necessary materials for stakeholders, including guidelines on AAC implementation in schools, guidelines for teaching AAC users in classrooms, demonstration videos, webcasting materials for download, and other valuable materials that are linked to professional development for stakeholders in essential areas.

Use of Research and Data

Any plan must be based on practices and policies that are backed by scientific evidence and data. Schools should be encouraged to utilize action research and existing literature as well

as their own data to guide their practices. Higher education institutions, such as universities, should support schools' efforts by providing them with assistance in research strategies and materials, evaluating the schools' plans and telling them what works best for AAC users, and improving the schools' data to improve their planning.

Limitations

Some limitations of this study should be considered when interpreting its results and planning future research. The current research results reflect the perspectives and experiences of a small sample of well-educated stakeholders, and they cannot be generalized to all stakeholders of students who use AAC in Saudi Arabia. Stakeholders of AAC users from linguistically and culturally different backgrounds were unrepresented in the qualitative study sample. In addition, the results of this study do not include viewpoints of other family members, such as grandparents, siblings, and uncles, or the student using AAC, who may have different perspectives and opinions. Moreover, it is possible that the stakeholders who were willing to share their perspectives were more likely to be very involved. Stakeholders who decided not to respond to the invitation to participate in the study may have had different perspectives and experiences with inclusive education programs for AAC users in school settings or may have decided not to educate AAC users in regular classrooms. Stakeholders with limited resources and internet access may have lacked the ability to participate in the current research or may have missed the study invitations through social media accounts and emails. The deference effect could be present in this study. However, participation was strictly voluntary, and participants could withdraw from the study at any time without recourse. Another possible limitation is that participants might know each other, which may have biased the results as they talked among

themselves. The effort to control this was made by ensuring confidentiality and that responses would not impact their relationship with their institutions.

The follow-up questions used within the semi-structured interviews are another possible limitation of this research. The researcher's decisions about the particular follow-up questions posed for each interviewee could have affected their responses. Follow-up questions were intended to further examine points raised by interviewees and provide rich data reflecting their individual perspectives, but there was little variability between stakeholders in the particular follow-up questions asked. Although mixed methods were used to enhance the study rigor and the quality of collected data, supplementary strategies, such as classroom observations and follow-up surveys, may increase the strength of the study results and should be considered in future research. Lastly, the interpretation of qualitative data can be viewed as less rigorous research, but the researcher paid careful attention to a predetermined protocol for coding and collapsing data into themes with random inter-coder reliability checks.

Future Directions

The current study successfully identified the optimal parameters for designing and developing an appropriate educational program for AAC users in school settings in Saudi Arabia. Further research is needed to examine the challenges that stakeholders might face while implementing these parameters to develop educational programs or change the existing programs and how stakeholders overcome these challenges. Additionally, there is a need to examine the efficacy of the educational programs developed based on the identified parameters using measures of implementation outcomes, such as checklists. Future studies should also consider gaining perspectives from different stakeholders such as grandparents, siblings, and Ministry of Education leaders and staff. Furthermore, researchers should also consider utilizing qualitative

case study research that involves in-depth exploration of AAC users' perspectives by using various data collection methods such as photographs, observations, document reviews, and storytelling. Case studies could give a valuable and unique viewpoint on individual experiences with inclusive education programs and the parameters that the AAC users consider as a priority.

Further research needs to be conducted using extensive surveys to assess the perspectives of a large sample of a range of different stakeholders. For instance, the AAC implementation parameters in school settings identified in the current study (e.g., shared expectations, leadership roles, building confidence) could be applied to design a systematic questionnaire to obtain information from a large sample of important stakeholders. Lastly, further research is needed to better understand the perspectives of stakeholders of AAC users from diverse cultural and linguistic backgrounds in Saudi Arabia.

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APPENDICES

APPENDIX A

INSTITUTIONAL REVIEW BOARD (IRB) APPROVAL LETTER

WICHITA STATE UNIVERSITY
OFFICE OF RESEARCH

Date: April 14, 2021

Principal Investigator: Erin O'Bryan

Co- Investigators: Mohammed Almutairi

Department: CSD

IRB Number: 4987

Title: Identifying Optimal Educational Parameters for Augmentative and Alternative Communication Users: Stakeholders' Perspectives

This letter is to certify that based on the exemption categories and conditions pursuant to Title 45, Code of Federal Regulations Part 46 (45CFR46.104) the Wichita State University Institutional Review Board (IRB) has determined that your research qualifies for a Category 2 exemption. This exemption applies only to the proposal as written and currently on file with the IRB. Any change potentially affecting human subjects must be approved by the IRB prior to implementation and may disqualify the proposal from exemption.

A determination that research is exempt from the requirements of HHS/OHRP regulations does not imply that investigators have no ethical responsibilities to subjects in such research. Depending on the nature of the study, investigators performing exempt studies may need to make provisions to obtain informed consent, protect confidentiality, minimize risks, and address problems or complaints.

Please keep this letter with your protocol files as documentation of IRB exemption approval. If you have any questions, you may contact me at IRB@wichita.edu.

Sincerely,

Linda Steinacher

Linda Steinacher
IRB Administrator

Wichita State University, Wichita, Kansas 67260-0007 Telephone: (316) 978-3285 Fax: (316) 978-3750

APPENDIX B

PARTICIPATION INVITATION LETTER (INTERVIEW)

WICHITA STATE UNIVERSITY

Volunteers Needed for a Research Study on Augmentative and Alternative Communication

مطلوب متطوعين لإجراء دراسة بحثية حول التواصل الداعم والبديل

Purpose of the study

- The study aims to identify crucial parameters for developing an appropriate educational program for augmentative and alternative communication (AAC) users in regular schools.

Procedures

- If you decide to participate, you will be asked to participate in a remote interview, either via Zoom (audio-only meeting) or over the phone that takes about 30-45 minutes total to complete. Your responses will remain anonymous and confidential.

You May Qualify to Participate if You

- Are a Speech-Language Pathologist, a General Education Teacher, a Special Education Teacher, a Parent, or a School Principal who has one or more students using AAC in Saudi Arabian school.
- Are 18 years old or above.

If you agree to participate in this interview, please e-mail Mohammed Almutairi at:

maalmutairi@shockers.wichita.edu

Questions? Email Mohammed Almutairi (maalmutairi@shockers.wichita.edu) or Erin O'Bryan, PhD, CCC-SLP (erin.obryan@wichita.edu).

Thank you,
Dr. Erin O'Bryan & Mohammed Almutairi

الغرض من الدراسة

تهدف الدراسة إلى تحديد المعايير الهامة لتطوير برنامج تعليمي مناسب لمستخدمي التواصل الداعم والبديل في المدارس العامة.

إجراءات

إذا قررت المشاركة، سيُطلب منك المشاركة في مقابلة عن بعد إما عبر الزوم (صوتي فقط) او الهاتف. تستغرق المقابلة حوالي ٣٠ – ٤٥ دقيقة لإكمالها. ستبقى ردودك مجهولة وسرية.

أنت قد تكون مؤهل للمشاركة إذا كنت

* اختصاصي أمراض النطق واللغة، مدرس صف عادي، مدرس تربية خاصة، مدير مدرسة، أو أحد الوالدين ولديك طالب او طلاب يستخدمون التواصل الداعم والبديل في المدرسة في المملكة العربية السعودية.
* عمرك ١٨ سنة او فما فوق.

إذا كنت توافق على المشاركة في هذه المقابلة، أرسل ايميل الى محمد المطيري:

maalmutairi@shockers.wichita.edu

أسئلة؟ أرسل بريدًا إلكترونيًا إلى محمد المطيري (maalmutairi@shockers.wichita.edu)
أو الدكتورة ايرين اوبريان (erin.obryan@wichita.edu)

شكرا لك،
الدكتورة ايرين اوبريان ومحمد المطيري

APPENDIX C

PARTICIPATION INVITATION LETTER (SURVEY)

WICHITA STATE UNIVERSITY

Volunteers Needed for a Research Study on Augmentative and Alternative Communication

مطلوب متطوعين لإجراء دراسة بحثية حول التواصل الداعم والبديل

Purpose of the study

- The study aims to identify crucial parameters for developing an appropriate educational program for augmentative and alternative communication (AAC) users in regular schools.

Procedures

- If you decide to participate, you will be asked to complete one survey online that takes about 15 minutes total to complete. Your responses will remain anonymous and confidential.

You May Qualify to Participate if You

- Are a Speech-Language Pathologist, a General Education Teacher, a Special Education Teacher, a Parent, or a School Principal who has one or more students using AAC in Saudi Arabian schools.
- Are 18 years old or above.

If you agree to participate in this survey, click on the following link:

TAKE THE SURVEY

Questions? Email Mohammed Almutairi (maalmutairi@shockers.wichita.edu) or Erin O'Bryan, PhD, CCC-SLP (erin.obryan@wichita.edu).

Thank you,
Dr. Erin O'Bryan & Mohammed Almutairi

الغرض من الدراسة

تهدف الدراسة إلى تحديد المعايير الهامة لتطوير برنامج تعليمي مناسب لمستخدمي التواصل الداعم والبديل في المدارس العامة.

إجراءات

إذا قررت المشاركة، سيُطلب منك إكمال استبيان واحد عبر الإنترنت يستغرق حوالي 15 دقيقة لإكماله. ستبقى ردودك مجهولة وسرية.

أنت قد تكون مؤهل للمشاركة إذا كنت

* اختصاصي أمراض النطق واللغة، مدرس صف عادي، مدرس تربية خاصة، مدير مدرسة، أو أحد الوالدين ولديك طالب يستخدم التواصل الداعم والبديل في المدرسة في المملكة العربية السعودية.
* عمرك ١٨ سنة فما فوق

إذا كنت توافق على المشاركة في هذا الاستبيان، فانقر فوق الرابط التالي:

قم بإجراء الاستبيان

أسئلة؟ أرسل بريدًا إلكترونيًا إلى محمد المطيري (maalmutairi@shockers.wichita.edu) أو الدكتورة ايرين اوبريان (erin.obryan@wichita.edu)

شكرا لك،
الدكتورة ايرين اوبريان ومحمد المطيري

APPENDIX D

ETHNOGRAPHIC INTERVIEW CONSENT FORM

Ethnographic Interview Consent Form

Purpose: You are invited to participate in a research study to help us to identify the optimal parameters for developing an inclusive education program for students who use augmentative and alternative communication (AAC) in school settings. As the effectiveness of any inclusive education for AAC users depends on its combination of educational parameters, identifying the combination of parameters is crucial to AAC users' academic success. Therefore, the study aims to obtain expert opinions that can help us identify these parameters to enhance the education and learning experiences of AAC users in regular schools.

Participant Selection: You were selected as a possible participant in this study because you are a Speech-Language Pathologist, a General Education Teacher, a Special Education Teacher, a Parent, or a School Principal who has a student using AAC in school settings in Saudi Arabia. Approximately 15 participants will be invited to join the study.

Explanation of Procedures: If you decide to participate, you will be asked to join an audio-only Zoom meeting or telephone call with the researcher. The Zoom and phone interview will be recorded via the Voice Record Pro application. Recorded interviews will be saved and secured in a file on the researcher's personal password-protected computer, and the file will be locked with a secure password. The interview consists of seven questions, with possible follow-up questions. All the interview questions are focused on AAC users' education in school settings (e.g., Tell me about how AAC users currently participate in general education programs?). We anticipate that the interview will last for approximately 30-45 minutes.

Discomfort/Risks: There are no anticipated risks associated with participating in this study. However, if you feel uncomfortable with a question, you may skip it.

Benefits: The project's intended benefits are primarily for the interview participants, the participants' community, and AAC users in school settings. The only data collected during the interview are those needed to develop or improve an inclusive education program suited for AAC users, AAC services, and AAC users' participation in their schools.

Confidentiality: Every effort will be made to keep your study-related information confidential. However, in order to make sure the study is done properly and safely, there may be circumstances where this information must be released. By signing this form, you are giving the research team permission to share information about you with the following groups:

- Office for Human Research Protections or other federal, state, or international regulatory agencies;
- The Wichita State University Institutional Review Board.

The researchers may publish the results of the study. If they do, they will only discuss group results. Your name will not be used in any publication or presentation about the study.

Voice recorder files from the interviews will be deleted after transcribing data. Interview transcripts will be retained for further analysis and used in future studies for a minimum of 5 years. Interview transcripts will not contain identifying information such as name, birth date, or email.

Refusal/Withdrawal: Participation in this study is entirely voluntary. Your decision whether or not to participate will not affect your future relations with Wichita State University. If you agree to participate in this study, you are free to withdraw from the study at any time without penalty.

Contact: If you have any questions about this research, you can contact myself, Mohammed Almutairi, at: maalmutairi@shockers.wichita.edu, or Dr. Erin O'Bryan, at: erin.obryan@wichita.edu.

If you have questions pertaining to your rights as a research subject, or about research-related injury, you can contact the Office of Research at Wichita State University, 1845 Fairmount Street, Wichita, KS 67260-0007, telephone (316) 978-3285.

You are under no obligation to participate in this study. Your signature below indicates that:

- You have read (or someone has read to you) the information provided above,
- You are aware that this is a research study,
- You have had the opportunity to ask questions and have had them answered to your satisfaction, and
- You have voluntarily decided to participate.

You are not giving up any legal rights by signing this form. You will be given a copy of this consent form to keep.

Please sign and email this consent form back to Mohammed Almutairi at maalmutairi@shockers.wichita.edu.

_____

Printed Name of Subject

_____ _____

Signature of Subject Date

_____

Printed Name of Witness

_____ _____

Witness Signature Date

APPENDIX E

SURVEY CONSENT FORM

Survey Consent Form

I am Mohammed Almutairi, a graduate student in the Department of Communication Sciences and Disorders at Wichita State University. We are contacting you because you are a Speech-Language Pathologist, a Regular Classroom Teacher, a School Principal, a Special Education Teacher, or a Parent of an individual who uses augmentative and alternative communication (AAC) in Saudi Arabia. We are recruiting research participants to help us to identify the optimal parameters for developing an educational program for AAC users in school settings. If you decide to participate, you will be asked to complete a survey that will take about 10 minutes. In addition to the survey questions, we will request that you identify your educational status, AAC training, type of AAC systems, and your level of familiarity with AAC users.

There are no personal benefits or anticipated risks to participating in this study. However, if you feel uncomfortable with a question, you may skip it. Participation is voluntary, and you can stop taking the survey at any time.

We will work to make sure that no one sees your survey responses without approval. Collected data is stored on servers maintained by Qualtrics. But, because we are using the Internet, there is a chance that someone could access your online responses without permission. In some cases, this information could be used to identify you.

If you have any questions, please contact Mohammed Almutairi (maalmutairi@shockers.wichita.edu) or Dr. Erin O'Bryan (erin.obryan@wichita.edu). For questions about the rights of research participants, you may contact the Office of Research and Technology Transfer at Wichita State University, 1845 Fairmount Street, Wichita, KS 67260-0007, and telephone (316) 978-3285.

You are under no obligation to participate in this study. By selecting "Yes" below, you are indicating that:

- You have read (or someone has read to you) the information provided above,
- You are aware that this is a research study,
- You have voluntarily decided to participate.

I have read the above and agree to participate in this survey. Yes No
I am age 18 or over. Yes No
I would like to have a copy of the Consent Form emailed to me. Yes No
Please print a copy of this consent form for your records.

APPENDIX F

SEMI-STRUCTURED INTERVIEW GUIDE

Thank you so much for your interest in this research and for taking the time to answer my interview questions. I am interested in stakeholders' perspectives on educating AAC users in general education programs. I am seeking expert opinions on this topic.

I want to record our interview to better transcribe the conversation without missing any critical details that you provide. Just as a reminder, participation is entirely voluntary, and you have the right to terminate the interview at any time. You also have the right to stop answering any part of the interview questions and resume answering any part of the interview questions later.

In order to protect your privacy, I will not link any of your interview responses with your identity when I publish or talk about this research. I will not report names or identifying information, and all information you share with me will remain confidential. Emails will be collected to email you a copy of the interview transcript so that you can review our conversations from the interview.

The interview is designed to take about 30 to 45 minutes. However, if you want to take more time, that is fine.

Before we start our interview, do you have any questions for me?

*Gather email, title, highest degree received, type of AAC system, training on AAC, and familiarity level.

Questions/Statements About Parameters for Improving the Education of AAC Users in Regular Schools:

1. What does "inclusive education for AAC users" mean to you?
2. Tell me about how AAC users currently participate in general education programs?
3. Imagine you want to design an ideal inclusive education program for AAC users in school settings to meet the needs of AAC users and your needs. Describe what that educational program would look like.
4. What aspects of any general education program could help promote AAC users' learning and participation in the general education curriculum and activities?
5. Do you think these aspects you identified to improve AAC users' education in regular school settings are crucial? Why?
6. Is there anything else that you would like to add to this topic?

Follow-up Questions were Asked During the Interviews:

1. What aspect of [….] do you think has helped AAC users in schools?
2. What made you think [….] would help enhance AAC users' participation in schools?
3. You mentioned [….] what do you feel about that?
4. Do you have any thoughts or ideas about [….]?
5. What is it like when [….]?
6. What does this represent?
7. What did that [….] look like?
8. Can you tell me more about [….]?
9. What do you mean by [….]?
10. Can you give me an example of [….]?
11. Are you saying that [….]?
12. What would be the result if [….]?
13. What choice would you have made if [….]?
14. How would you go about [….]?
15. How do you feel if [….] happens?
16. Why do you believe that [….]?

Thank you for taking the time to participate in this project. The information you provided will help design educational programs suitable for AAC users and match the stakeholders' priorities and preferences related to AAC users' education in general education. I may get in touch with you after looking at your interview transcript to accurately capture your views. Do you have any questions?

APPENDIX G

ONLINE SURVEY

Definition of Augmentative and Alternative Communication (AAC): AAC includes all forms of communication (other than oral speech) that are used to express thoughts, needs, wants, and ideas, which include all forms of AAC such as unaided AAC systems (e.g., gesture and body language) and aided AAC systems (e.g., speech-generating devices and touching pictures) (ASHA, 2020).

1. How would you describe your role?
    - Parent
    - Speech-language Pathologist
    - School Principal
    - General Education Teacher
    - Special Education Teacher
2. What is your highest level of education?
    - No formal education
    - Less than high school
    - High school degree
    - Bachelor's degree
    - Master's degree
    - Doctorate degree
    - Other (please specify): _____
3. Have you received training on AAC?
    - Yes
    - No
    - Not sure
4. Type of AAC system used:
    - High-tech AAC
    - Low-tech AAC
    - Both high and low-tech AAC
    - Not sure

5. How often do you interact with an individual who uses AAC?
    - Every day
    - At least once per week
    - At least once per month
    - Less than once per month
    - Not sure

Please complete the survey by selecting the degree to which you agree.

Scale: 1. Strongly Disagree, 2. Disagree, 3. Somewhat Disagree, 4. Neither Agree nor Disagree, 5. Somewhat Agree, 6. Agree, 7. Strongly Agree.

Category	**Survey Items**	**1** Strongly Disagree	**2** Disagree	**3** Somewhat Disagree	**4** Neither Agree nor Disagree	**5** Somewhat Agree	**6** Agree	**7** Strongly Agree
Key Considerations in AAC	1. Using a team approach will maximize the participation of AAC users in school settings.							
	2. Ensuring access to learning experiences and social interactions will maximize the participation of AAC users in school settings.							
	3. Providing early intervention will maximize the participation of AAC users in school settings.							
	4. Setting appropriate expectations will maximize the participation of AAC users in school settings.							
	5. Providing AAC supports to meet changing needs will maximize the participation of AAC users in school settings.							

Category	Survey Items	1 Strongly Disagree	2 Disagree	3 Somewhat Disagree	4 Neither Agree nor Disagree	5 Somewhat Agree	6 Agree	7 Strongly Agree
	6. Eliminating opportunity barriers will maximize the participation of AAC users in school settings.							
	7. Addressing challenging behavior will maximize the participation of AAC users in school settings.							
	8. Utilizing effective intervention techniques will maximize the participation of AAC users in school settings.							
	9. Increasing funds for AAC devices will maximize the participation of AAC users in school settings.							
	10. Promoting social communication will maximize the participation of AAC users in school settings.							
Opportunities in Education for AAC Users	11. AAC users' education in schools would be improved by developing an appropriate individualized education program.							
	12. AAC users' education in schools would be improved by developing collaborative teaming.							
	13. AAC users' education in schools would be improved by developing comprehensive and individualized planning for AAC users through person-centered planning processes such as Making Action Plans (MAPS).							
	14. AAC users' education in schools would be improved by designing high-quality instruction							

Category	Survey Items	1 Strongly Disagree	2 Disagree	3 Somewhat Disagree	4 Neither Agree nor Disagree	5 Somewhat Agree	6 Agree	7 Strongly Agree
	(e.g., Universal Design for Learning and Curriculum Accommodations).							
	15. AAC users' education in schools would be improved by fostering membership and relationships with peers and school members.							
	16. AAC users' education in schools would be improved by providing individual communication support that enables participation in a range of communication activities.							
	17. AAC users' education in schools would be improved by employing AAC users in school settings as educators, consultants, or AAC service providers.							
	18. AAC users' education in schools would be improved by identifying educational activities that are a good match for AAC users.							
	19. AAC users' education in schools would be improved by developing knowledge and skills that are valued in society.							
	20. AAC users' education in schools would be improved by preparing AAC users for employment and vocational activities.							
	21. Some legislative or regulator decisions limit the participation of AAC users in general education.							

Category	Survey Items	1 Strongly Disagree	2 Disagree	3 Somewhat Disagree	4 Neither Agree nor Disagree	5 Somewhat Agree	6 Agree	7 Strongly Agree
Potential Obstacles	22. Some practices, procedures, or conventions (not actual policies) negatively impact educating AAC users in schools.							
	23. There are attitudes and beliefs held by an individual or group of individuals that create barriers to AAC users' participation in schools.							
	24. Limited knowledge and experience with AAC create a barrier to educating AAC users in schools.							
	25. Lack of interaction skills between communication partners and AAC users promotes exclusion.							
Communication Partners	26. I have utilized the strategies and skills required for being a communication partner.							
	27. I know how to provide opportunities for AAC users to encourage AAC practice and use.							
	28. I know how to maintain and develop AAC supports for a specific AAC user and can troubleshoot as required.							
	29. I can ensure proper positioning to support access to AAC.							
	30. I understand how to use appropriate interaction strategies to accommodate an individual who relies on AAC.							

APPENDIX H

SUMMARY OF EXPLORATORY FACTOR ANALYSIS RESULTS FOR THE SURVEY INSTRUMENT (N = 53)

	Rotated Factor Loadings			
Item	Key Considerations in AAC	Opportunities in Education for AAC Users	Potential Obstacles	Communication Partners' Skills
Using a team approach will maximize the participation of AAC users in school settings.	0.83			
Ensuring access to learning experiences and social interactions will maximize the participation of AAC users in school settings.	0.92			
Providing early intervention will maximize the participation of AAC users in school settings.	0.82			
Setting appropriate expectations will maximize the participation of AAC users in school settings.	0.81			
Providing AAC supports to meet changing needs will maximize the participation of AAC users in school settings.	0.66			
Eliminating opportunity barriers will maximize the participation of AAC users in school settings.	0.52			

Addressing challenging behavior will maximize the participation of AAC users in school settings.	0.87			
Utilizing effective intervention techniques will maximize the participation of AAC users in school settings.	0.86			
Increasing funds for AAC devices will maximize the participation of AAC users in school settings.	0.64			
Promoting social communication will maximize the participation of AAC users in school settings.	0.45			
AAC users' education in schools would be improved by developing an appropriate individualized education program.		0.91		
AAC users' education in schools would be improved by developing collaborative teaming.		0.87		
AAC users' education in schools would be improved by developing comprehensive and individualized planning for AAC users through person-centered planning processes such as Making Action Plans (MAPS).		0.90		
AAC users' education in schools would be improved by designing high-quality instruction (e.g., Universal Design for Learning and Curriculum Accommodations).		0.86		

AAC users' education in schools would be improved by fostering membership and relationships with peers and school members.		0.73		
AAC users' education in schools would be improved by providing individual communication support that enables participation in a range of communication activities.		0.46		
AAC users' education in schools would be improved by employing AAC users in school settings as educators, consultants, or AAC service providers.		0.36		
AAC users' education in schools would be improved by identifying educational activities that are a good match for AAC users.		0.58		
AAC users' education in schools would be improved by developing knowledge and skills that are valued in society.		0.86		
AAC users' education in schools would be improved by preparing AAC users for employment and vocational activities.		0.93		
Some legislative or regulator decisions limit the participation of AAC users in general education.			0.36	

Some practices, procedures, or conventions (not actual policies) negatively impact educating AAC users in schools.			0.43	
There are attitudes and beliefs held by an individual or group of individuals that create barriers to AAC users' participation in schools.			0.55	
Limited knowledge and experience with AAC create a barrier to educating AAC users in schools.			0.68	
Lack of interaction skills between communication partners and AAC users promotes exclusion.			0.56	
I have utilized the strategies and skills required for being a communication partner.				0.82
I know how to provide opportunities for AAC users to encourage AAC practice and use.				0.91
I know how to maintain and develop AAC supports for a specific AAC user and can troubleshoot as required.				0.80
I can ensure proper positioning to support access to AAC.				0.74

I understand how to use appropriate interaction strategies to accommodate an individual who relies on AAC.				0.87

APPENDIX I

TRANSCRIPTION GUIDELINES AND SYMBOLS

Description	Symbol or Guideline
Short pause for 1-3 seconds	Comma (,)
Extended pause for more than 3 seconds	Ellipsis (…)
Illustrate what someone said	Quotes (“ ”)
Words added to the transcription by the author to add clarity	Brackets [ ]
Emphasizing a word in a sentence	(CAPITALIZED)
Repeating the same words	Dash (–)
Nonverbal Communication (e.g., laughter)	Transcribed in parentheses. *Example:* (laughter)
Removing identifiers from transcription	Blank out the information with description of the relationship in parentheses. *Example:* We have in _____ (my school).
Repetitions of words and phrases	Repetitions were treated as a single word or phrase. *Example:* I think-I think (I think), that-that (that).
Unnecessary filler sounds (e.g., um, uh, huh)	Ellipses in Brackets […]
Punctuation	• Period at the end of a complete sentence, phrase, or fragment. • First word of every new sentence is capitalized. • Proper nouns are capitalized.

APPENDIX J

CODEBOOK

THEME	**AAC Technologies:** Describes the characteristics of AAC devices, including their features to support communication in school or non-school environments, the appropriateness of their features and content to the users' culture and identity, experiences with the AAC devices, and the most desirable features that make up an ideal AAC.	
SUB-THEME	**Supportive AAC:** Describes the experience of the interaction with the AAC devices and systems and the supportive AAC features that make up robust AAC systems to promote effective communication and interaction between the user and the system or between the user and other individuals.	
Code	Definition	Example
Promote Independence	Describes physical and system features of AAC that maximize the AAC users' abilities to function and communicate with others more independently. This could include: • More symbol and vocabulary options. • Different access methods (e.g., direct selection, undirect selection using switches). • Physical design (e.g., lightweight, device size, and shape). • Speakers • Portability (e.g., neck strap, carrying bag, carrying handle).	• *A lot of symbols on her device. She selects whatever she wants to tell me … She did not have all of these symbols when she was using communication boards.* • *I can hear her voice from a long physical distance in the school. The sound volume of the device is pretty good.* • *He can scroll through topics like sports or foods and select from them during the classroom activities. He touches the screen or pushes the switches.* • *He communicates without my assistance. There were preprogrammed stories on his device that he selected from to share with his classmates.* • *His iPad has a carrying case. He can take his iPad mini from the classroom to the cafeteria with no need to ask someone for help.*

Suitable for Educational Use	Describes the ability of AAC systems to be used to perform different educational tasks such as drawing. This includes recognizing the difference between the school language and the home language and the age differences of AAC users in different school grades.	• *Some of the fill-in-the-blank questions require words that are not available on the application. He knew the answer but could not find the word to say it.* • *In school, the curriculum requires the student to speak a classical language. While the student does not use it when talking with his family, the device must be able to differentiate between the language used in school and at home.* • *The exam question asked her to match the words to the correct symbols, but she cannot draw a line to connect them using the AAC application. There was no option for drawing on the application.* • *As you know, young students in the primary stage are in the stage of acquiring and learning the language through the literacy curriculum, so the device must consider the use of simple words appropriate for their age to help them learn the language.*
Support Social Interactions	Describes the ability of AAC systems to support the communicative interaction process between the AAC user and other members of an organization. This could include knowledge that emerges from the meaning of AAC symbols and vocabulary.	• *When I asked her, "How was your weekend?" she immediately typed her story and told the class about her visit to her old grandpa's village.* • *She also uses the device to send emails to her teachers.* • *We always listen to music together on her device … She loves music (laughs). We make comments on what she likes.* • *I think it has mutual benefits for both [AAC user and the receiver], you can use the device to interact in a meaningful way with people around you—that is a part of it, to use it to interact with others in the school.*
Support Customization	Describes the flexibility of the AAC system to be modified to suit	• *You can customize any button to launch a message or story. You can*

	the AAC user, communication partners, or specific tasks.	*put these messages into any button. You have twenty-five buttons per screen, so you can really create a cool device to use it for the classroom.* • *You can have access to the six symbol libraries and images and the digital voices, and select all what you want—really the sky is the limit.* • *When he clicks "I want," it launches a page with things he wants, and I added these things based on his preference and the curriculum.* • *If you have a student who has difficulties navigating two screens due to physical or perhaps attention span, like my student, you can combine them into one screen.*
Promote Communication Speed	Describes the ability of an AAC device to support the AAC user to convey information and respond to other individuals at a good communication speed. This could include some AAC features that can speed up the AAC use, such as word predictions, spelling corrections, and shortcuts.	• *There was a huge gap in time between the moment she received the question and answered it, which took away time in the classroom.* • *The shortcuts and word predictions feature on her device help her to communicate faster.* • *She sometimes struggled to take notes fast enough to keep up with the teacher.* • *She spent time correcting the spelling before she pushed the button, so you know, it takes a longer time than traditional communication.*
Technical Support	Describes the availability of assistance for maintaining the hardware and software systems and resolving technical problems that AAC users or stakeholders face when dealing with AAC devices.	• *I tried to contact the tech support, but, unfortunately, they did not even exist.* • *They asked me to wait for one week until I got the device fixed because they were busy fixing other devices. You know, my child did not go to school during that week. We were really frustrated.*

		• *We have no technical support staff in the school, so we send the broken devices to the nearest maintenance shop.* • *These devices are complicated. It is hard to find someone who knows how to fix them. They can be damaged at any time. Software errors are common and can be devastating. I wish we had onsite specialists to fix them quickly.*
SUB-THEME	**Optimal AAC:** Describes the most favorable features of AAC technologies that make them suitable for educational uses.	
Code	Definition	Example
Easy to Learn and Use	Describes the optimal AAC systems as easy to use and learn to facilitate mutual communications without deliberate efforts. The AAC systems allow stakeholders and students who use AAC to build on their prior knowledge when learning the system. This could include AAC systems with clear and intuitive symbols, text labels, and clear instructions.	• *I quickly learned how to use the app. It is not complex and has very simple language with clear instructions on how to operate the system.* • *If the student is not at ease with the AAC device, the device won't be used in the classroom and maybe anywhere else.* • *She had difficulties with understanding written language. But it was easy for her to combine several symbols to communicate.* • *The app requires a very simple experience. You know, ____ (participant's child) learned quickly how to navigate the pages and select symbols.*
Intelligent AAC	Describes AAC that functions as an intelligent device to augment and assist the users across all educational tasks. Intelligent AAC can collaborate with users, work alongside AAC users, learn from their behavior, and build on their capabilities by automatically producing solutions. This could include innovations such as artificial intelligence and machine learning.	• *I wish there was a reminder or something on her device that can help her to keep track of all the assignments she needs to do.* • *The volume of sound and the screen brightness adjust automatically when she moves from one place to another in the school.* • *Some of the apps and devices made here [Saudi Arabia] are very basic. Incorporating artificial*

		intelligence into AAC is something they need to consider.
Reliable AAC	Describes the reliability of AAC as having a suitable hardware and software quality that performs well without breaking down. This includes reliable AAC hardware and software.	• *Because of the frequent use of AAC devices in the school and with different classmates, these devices are more susceptible to breakage and damage.* • *After I updated the app, I kept receiving an error message each time I signed in. We need a reliable AAC.* • *When my student touched a symbol, it took him to a screen to edit that symbol, although we were not in edit mode.* • *At first, I couldn't make my own classroom communication boards. I mean, I could, but they were never saved or showed up.*
Portable AAC	Describes AAC devices' portability as lightweight, adequate size, and easy to carry around and keep. This includes using the AAC to communicate in a new environment without requiring major effort or rework.	• *It should be easy for a young child to carry from home to school.* • *My student has a physical disability. It is hard for him to move it from place to place.* • *He needs someone to help him carry the device in the school while I am not with him.* • *He did not need to carry the device; it was attached to his wheelchair.*
High Interface Quality	Describes the interaction quality between the AAC user and the AAC device. This could include the quality of graphical design, the ease of navigating the system, and the overall impression of how the AAC user interacts with the AAC system. It also includes how pleasant the AAC system was to	• *Symbols were small—hard to click on them.* • *I was wishing for an AAC app that depicted actions through movement to teach him the animal movements lesson. There was no movement at all, just a voice.*

	use in the school or home. This does not include non-electronic AAC devices that do not have an interface.	• *The pictures were not consistent—a mix of color pictures and black and white pictures.* • *There was a picture of a camel with no lips, so this AAC app does not really give the student a good visual model.*
Appropriate for Future Use	Describes the suitability of AAC for use in the future. This could include how AAC users can use the system in different school grades and environments in the future.	• *It [AAC] should encourage him to continue to progress in school.* • *In grade 6, it becomes more difficult for him to perform tasks in lessons like perimeter, area, and volume … His AAC does not support this. I am sure he will continue to have the same difficulties as he moves to the next grades.* • *The app is great for kids, but not for an adult.* • *I should be able to add new vocabulary to the boards continuously and use them.*
SUB-THEME	**Culturally and Linguistically Appropriate AAC:** Describes providing more options within AAC systems, including its languages, symbols, vocabulary, and voice output. These options must reflect the AAC users' culture and identity and the organization members' culture.	
Code	Definition	Example
Multiple Language Options	Describes the availability of different AAC system languages that allow the AAC users to adjust the system to their preferred language.	• *There is still a need for more AAC systems for Arabic speakers.* • *She just completed the third grade. She's going to the fourth grade where she will have an English class.* • *I had several bilingual students on my caseload.* • *It can be frustrating when there is only one language available on the system.*
Culturally Sensitive Symbols/Pictures	Describes AAC user interpretations of AAC symbols and pictures that do not reflect their culture and value.	• *I prefer characters that are dressed in traditional Saudi dress so that it makes more sense for us.* • *Symbols should serve the needs of Saudi culture and its religion.*

		• *Symbols that reflect the lifestyle of my students, like Saudi foods, clothes, morals.* • *Pictures used to illustrate verbs are not suitable. The verb "clean" is represented by a photo of a woman scrubbing the floor with a brush. It is not appropriate.* • *Some of the Westernized symbols in these apps are not appropriate for our culture and education.*
Culturally Sensitive Language	Describes the sensitivity of words and expressions used in AAC to differences that exist in the AAC users' cultural and linguistic context. This could include words that reflect the culture of the individuals who speak it, the differences attributed to their regional dialects, and the differences in the meaning of words that vary across Saudi regions.	• *No AAC supports the Hejazi dialect [Arabic spoken in the west of Saudi Arabia]. You cannot tell which region the AAC user belongs to, unless you ask the student or the parents.* • *Each type of bread has a different name in each region, but the device has only one name, which is bread.* • *To the center, in the region of the Najd, which includes the Qassim Province, things are completely different. Probably impossible for people from the Hijaz region to understand what the people of AL Qassim say, and some letters are pronounced completely differently.* • *The Hijaz region is distinguished from other regions by the diversity of its dialects. The people of Jeddah may not understand some of the speech of the people of Al Taif [Saudi cities], which is about seventy kilometers away from Jeddah.* • *We have students from different regions. Some words have similar meanings across all the regions, and some words only the residents of that region can understand.*

Appropriate Voice Output	Describes the voice output of AAC devices that require a keyboard or switch for input. The voice output of these devices should retain acceptable speed, ideally, and a natural form of human spoken communication in which the voice output reflects, as far as possible, the AAC users' identity (e.g., age and gender).	• *Her AAC device sounds robotic.* • *To be honest with you, my child prefers to speak at home rather than using his device. Even though her speech is highly unintelligible, he feels that the voice of his device does not sound right–does not match with his voice.* • *It sounds like Siri.* • *The range of voices of the app is good, but sometimes, it suddenly speeds up in voice delivery.* • *Not to mention the voices do not sound realistic.*
THEME	**Curriculum:** Describes written and unwritten materials used to convey information to AAC users in the schools.	
SUB-THEME	**Major Goals:** Describes the most important objectives of the school curriculum that stakeholders envision for AAC users.	
Code	Definition	Example
Participation in Everyday Lives	Describes the curriculum goals in helping AAC users engage in activities they do every day as part of their everyday lives.	• *Curriculum should serve as a connection to everyday experiences.* • *We need to consider where AAC can be used in their daily lives and link the curriculum to support these different environments where the students go and use the AAC. In this way, you are really going to have an excellent curriculum.*
Cognitive Development	Describes the goals of the curriculum in supporting the development of cognitive skills in AAC users. This includes cognitive process skills, such as problem-solving and thinking, and higher-level functions, such as language and imagination.	• *The curriculum should allow the students to immerse themselves in learning the AAC language.* • *For example, focus on critical thinking skills.* • *One of the goals of the curriculum is to develop their imagination.*

Social Relationships	Describes the goals of the curriculum in promoting meaningful social connections between AAC users and individuals who have regular interactions with them.	• *I noticed that the social interaction skills of students who used AAC were weaker than other students.* • *There is no doubt that his integration with other students helped in using the device better. He is now more willing to talk to others, which is something we were not used to before.* • *Social relations must be studied within the curriculum … we MUST teach them how to build and maintain their relationships and not lose sight of this aspect, especially with AAC users.*
Engagement in Leisure Pursuits	Describes activities included in the curriculum that are not related to work. These activities aim to promote feelings of happiness and pleasure in order to enhance functional communication and AAC use.	• *Leisure activities are no longer just a time for entertainment. They should be aimed at in an integrated curriculum.* • *There is a positive reaction from parents towards the activities that are being carried out, which is why the administration has found a strong demand from them to enroll their children in ___ (school), because students who graduate from the school become equipped with strong AAC skills and intellectual and linguistic skills.*
Employment Preparation	Describes the curriculum goals in getting AAC users ready for their desired future career by developing key skills, abilities, and behaviors.	• *I think that the role of schools must be more active in preparing AAC users for the future—I mean their future jobs. Schools with the capabilities available to them can create a difference that benefits the students and their parents and community.* • *Expanding vocational training in the schools to accelerate economic development and help them overcome the unemployment problem that the AAC users suffer from more than others.*

		• *It has a job readiness curriculum that prepares them [AAC users] for employment.* • *Schools have a partner role in their development. We must have a clear vision of the future and what the labor market requires and help them overcome barriers to get a job that suits their linguistic and physical abilities. This is what a good educational program should look like.*
SUB-THEME	**Ideal Curriculum:** Describes characteristics of the best curriculum that would meet AAC users' different needs and abilities, such as skills development, incorporating communication goals into the curriculum, including students' preferences, and accounting for student differences.	
Code	Definition	Example
Skills Development	Describes a curriculum that takes into account developing and promoting the personal skills of AAC users to prepare them for their future careers. These skills could include: • Life skills (e.g., thinking skills). • Academic skills (e.g., reading and writing skills). • Digital skills.	• *Life skills are one of the most important modern inputs in developing any curriculum. It is surprising that curriculum development is pursued without considering this aspect and taking it as a necessary factor in the context of this development process. A good educational program should avoid this mistake.* • *For example, writing administrative reports is an important skill. Many disciplines that the labor market currently needs require these skills.* • *Digital skills are essential in opening the door to a wide range of opportunities. And if AAC users learn these skills, they can be more prepared for employment, productivity, and success.*
Incorporate Communication Goals	Describes integrating communication goals based on the needs and abilities of AAC users into the curriculum as a part of the learning materials.	• *Communication skills are the area where my students need the most support. All the classes my students attend should help them to improve in these skills, like*

		skills on how to operate the AAC device in the classroom. • *It should be part of the curriculum to teach the students how to use their devices to make comments or answer questions.* • *I had a student who had difficulties with processing language. I was careful not to ask him to do several steps at one time. Sometimes I used some cues to remind him, you know, because of his language ability.*
Include AAC Users' Preferences	Describes the need to incorporate AAC users' specific learning preferences into the curriculum by understanding their preferences for receiving the information.	• *Each learner has their preferred things in learning … Providing a suitable education for every AAC user means a fundamental shift in education from a "one size fits all" to a system based on "curriculum appropriate for each student."* • *Students learn everything that suits their preferences and style, and if we had taught AAC users according to their preferences, we would have excellent students.* • *My child understands things better when I explain things to him in an interesting way, you know, like playing games or reading story books that have pictures. I would love to have an educational program that considers this.*
Account for AAC Users' Differences	Describes the need for the curriculum to take into account the individual differences of AAC users. This could include cognitive, physical, and behavioral differences.	• *Some students want to finish classes quickly to pursue their hobbies. So, the decline in enthusiasm for learning is the biggest risk students face, and in our school, we try to provide students with an encouraging and stimulating environment to receive knowledge … so there is more entertainment.* • *The problem is that in our school, we are not yet prepared to deal with individual differences.*

		Students in the same class are all equal in terms of their ability to remember, memorize, and understand things. We do not differentiate between them in physical and cognitive abilities, believing that this is equality.
SUB-THEME	**Literacy Education:** Describes teaching and learning the skills of reading, writing, listening, and speaking in the schools.	
Code	Definition	Example
Allocating Enough Time	Describes giving sufficient time to teach literacy as a part of the curriculum in the school. This literacy time must be adequate for AAC users to learn literacy skills in the school.	• *The curriculum for teaching reading and writing has recently been reduced in the elementary level. It used to be eight classes per week. Now it is only seven classes per week, and the length of the class was reduced. It was fifty minutes per class. Now it is only forty-five minutes per class. Any educational program with AAC users should increase the number of literacy classes, not reduce them.* • *For some literacy lessons, a full class was allocated to teach them. Now they are reduced to five or ten minutes.* • *The solution is to separate subjects from each other in the Arabic course—giving writing, expression, and reading their right, and allocating a book for spelling that contains spelling rules. This is the right way to study literacy. The curriculum should be changed, and the Arabic language should not be merged into one book without enough time for AAC users to learn things.* • *The time allocated to literacy classes should be enough because most AAC users have reading and writing problems.*

Literacy Materials	Describes written and unwritten materials that are more likely to promote literacy practices and learning among AAC users. This could include adapted books and assistive technologies.	• *Frankly, they face difficulties in terms of the curriculum. Most of them are abstract meanings that require having good sensory skills. I am specifically talking about students who had hearing impairments using AAC.* • *Adapt literacy books for AAC users in a way that suits their cognitive needs and abilities and helps develop their capabilities.* • *Assistive technology options, like audiobooks and highlighters, could help them in the literacy classes.*
Instructional Methods	Describes the teaching strategies used to convey literacy information to AAC users. This includes utilizing literacy teaching methods that are evidence-based.	• *Learning from books is not enough … Teachers need to be familiar with the scientific articles that are published frequently to find out what is the best method of teaching literacy, especially when dealing with AAC users.* • *I use Jolly Phonics. It is a great strategy for teaching the sounds of letters. I have noticed that students become proficient in reading after a very short period. This is my experience.* • *During the past weeks, I reviewed almost all the Saudi curricula for teaching English from the fourth grade to the third year of high school, I was impressed by the curricula, because they follow the latest interactional standards, but the outputs are still below the standards. I think that the problem is due to the weakness of teaching methods.*
SUB-THEME	**Supports for Curriculum Implementation**: Describes a planned approach to integrating the curriculum into the classroom to help ensure AAC users' success in the school.	
Code	Definition	Example

Implementation Guidelines	Describes outline of rules and indications issued by an authorized party on the process of delivering the curriculum to students who use AAC. This could include guidelines on instructional methods and assessment options used with AAC users in schools.	• *We need clear guidelines that keep us on the same page so no one gets confused.* • *Any educational program that will be designed must have clear guidelines.* • *There should be CLEAR rules for explaining the curriculum or evaluating students who use AAC. I think this is a very important matter, and we need to pay attention to it if we want to make them participate effectively in public education.*
Continuing Professional Development	Describes developing knowledge and skills for implementing the curriculum with AAC users. This could include consultation and training.	• *We all notice the attention that this group [AAC users] receive from society in terms of providing all possible supports for them. This is why I said it is important as well to have a specialized counselor that you can ask and get answers to your questions.* • *The curriculum is not static, so it is useful to have training available that can help us apply any recent changes in the curriculum to suit their [AAC users] needs.*
Ongoing Evaluation	Describes the continuous process of examining the effectiveness of the curriculum and making timely changes in the curriculum as necessary to prevent the occurrence of later learning difficulties among AAC users.	• *I think frequent review and assessment will help guide the teachers to apply the learning materials in an appropriate way.* • *The results of the curriculum evaluation may result in reconsideration of the educational objectives or may lead to change in some or all of the elements of the curriculum.* • *We need to continually discover problems in the curriculum and fix them so that students who use AAC can be able to participate in public education.* • *We must identify the strengths and weaknesses of the curriculum and address the weaknesses in a way*

		that serves the needs of students who use AAC.
THEME	**AAC Implementation:** Describes considerations, facilitators, and success indicators to be thought over carefully when implementing high-tech AAC or low-tech AAC either at school or home	
SUB-THEME	**Considerations for Schools:** Describes implementation aspects that need to be taken into account for integrating AAC into the school settings.	
Code	Definition	Example
Staff Training	Describes teaching school staff about the use of AAC and communication strategies when working with AAC users in different school environments. This includes: • providing staff with basic information on AAC (e.g., what it is, AAC types), • training on how to make the AAC devices available at all times for students who use them, and • communication strategies, such as modeling.	• *AAC is not going to be used effectively in the school if the staff is not well trained to provide the supports that the students may need.* • *Many administrators and teachers have not heard of AAC. They have not received any training during their university studies. As a speech and language pathologist, I always feel that I have an important role in educating them—educating them on those devices and apps—and this is what I am doing now.* • *In our school, all the team members know about AAC, but I feel that they may need additional training, especially when we purchase a new app or device that they have never seen before.*
Setting Shared Expectations	Describes mutual understandings among stakeholders regarding the AAC users' needs, wants, abilities, problems.	• *When a school has a team that carries acceptable expectations among its members, it is a useful point in favor of the educational process.* • *You may encounter a problem with the principal, who believes that the student who uses AAC*

		cannot benefit from education in the regular class. • *When the principal has different expectations as well as the teacher and the student and the parents, this creates an atmosphere of imbalance.*
Social Opportunity	Describes the adequacy and availability of chances for AAC users to interact with other school members, including teachers, peers, service providers, and school administrators.	• *As a team, we were able to create a lot of activities for them [AAC users] to use their devices with their colleagues.* • *Educators need to provide them [AAC users] with enough interaction opportunities for them to engage in a meaningful way with others and practice using their system.* • *If there is no opportunity for them to use their devices with others, then AAC won't be used in the school. We are the ones who should create these opportunities for them.*
Learning Activities	Describes the availability of adequate learning activities that foster learning and AAC use in the school environment. This could include lectures, readings, watching demonstrations or videos, and educational games.	• *Learning opportunities should be distributed equitably among the learners, including AAC users.* • *The classroom is overcrowded with students, and learning resources are a limitation. Students who use AAC may not be learning enough.* • *Variation in teaching methods also creates variation in learning opportunities.*
Leadership Roles	Describes administrators' supportive practices to the educational team members and AAC users in the context of smoothing the implementation of AAC in the school. This includes an understanding of AAC funding, AAC users' rights, awareness of challenges of implementing AAC in classrooms, and understanding of	• *Administrative challenges sometimes seem difficult to overcome, and a good school principal should know how to effectively communicate with teachers and support their efforts in helping students who use AAC.* • *School principals are responsible for evaluating the educational process and coordinating the conduct of any training with the Ministry of Education to meet the*

	needed training for implementation.	*need for inclusion. I think receiving supports from them will make a difference.* • *There are some administrative procedures when you want to get funding support. The administration and its flexibility in dealing with these requests would contribute to improving the opportunity to use them [AAC devices] in the school.*
Multiple Modes of Communication	Describes using different ways to employ communications between the AAC users and their peers and school staff in the school. This includes different forms of aided and unaided AAC, such as sign language and speech-generating devices.	• *If something went wrong, the device is broken or not working, or whatever, we both use sign language or communication boards.* • *I asked him to use his device in the class. I told him, "This is your voice."* • *The staff was trained on using the speech-generating devices and understanding gestures, like yes and no.* • *She nodded her head if the answer was yes or true, or she used her AAC application.* • *The visual schedule was really helpful and fun. Even other students in the class love it.*
SUB-THEME	**Considerations for Home:** Describes implementation aspects that need to be taken into account for integrating AAC into the home.	
Code	Definition	Example
Family Member Training	Describes the action of teaching the family members how to use the AAC device.	• *Training the student to use the device in the classroom must also include training for the parents.* • *The family is not isolated from the educational process. They must also be taken care of in terms of training and education.* • *Before I got training on using the device, I was trying to learn some things by searching the Internet.*

		So, training has a role in my ability to help my son.
Participation in Implementation	Describes family members' involvement in the process of using AAC at home or school. This includes modeling the use of AAC in real conversations at home with the student and actively incorporating the device into the family routines and activities.	• *Parents are willing to take part of the responsibility. The mom said that she was modeling AAC for her daughter at home.* • *If the students are not using it at home, it is hard to convince them to use it in the classroom.* • *Because the parents use the device with her—when they tell her stories at home—she has achieved outstanding success in reading classes.*
SUB-THEME	**Facilitating Implementation:** Describes activities and practices that would increase the use of AAC in the school and home.	
Code	Definition	Example
AAC Infrastructure	Describes a set of equipment and software that AAC users and school staff can use to increase their capability to utilize AAC in their environment.	• *Seats and tables should be designed to support people with physical disabilities.* • *I just finished setting up a lab that could be used to produce and print communication boards.* • *Hanging visual aids on the walls can serve as reminders or communication aids … It was a really helpful resource for my students.* • *Sometimes you need to re-engineer the whole school to suit the AAC use.*
Building Confidence	Describes the development of a sense of ability and confidence to use the AAC device. This includes helping with identifying and solving problems that arise while implementing AAC.	• *Identifying aspects that affect our self-confidence in teaching students who use AAC will solve many problems.* • *In fact, I was not at ease when they initially said that I would teach a class that contains two students using AAC … I had no experience with that.*

		• *When we get the appropriate support to know and solve the problems that we face when we use the AAC devices in the classroom, this contributes to moving forward and not stopping using them.*
Presenting the Positive Impact of AAC	Describes the process of illustrating and explaining the valuable outcomes of using AAC in the school or home to the student and the stakeholders to enhance motivation to implement AAC.	• *Many people are unaware of the benefit of using AAC, so I always provide them with information and explanations about the benefit of it. As soon as they know the benefits, they start using the device.* • *He had many friends at school after using the app, and this helped me make a decision to use it wherever we go.* • *If school staff does not know the potential benefits of using AAC in the classroom, this creates barriers that reduce the chances of it being used.*
SUB-THEME	**Success Indicators:** Describes elements that indicate progress toward successful implementation of AAC.	
Code	Definition	Example
AAC Usage Frequency	Describes an improvement in the frequency of AAC use in the school or home.	• *He is now more engaged in the classroom than before, which proves that through training the team, we were able to help him use AAC more.* • *Constantly commenting on activities, communicating with peers … This is a very nice thing to see happening in front of you … It is nice to see the result of the work that lasted for months.* • *When I don't see him using the AAC application, I know immediately that something needs to be corrected in our plan. So we work as a team to discover and correct it and help him talk*

		instead of just listening in the classroom.
Academic Performance	Describes an improvement in the educational achievements among the AAC users. This includes the academic and AAC goals that an AAC user has achieved successfully.	• *The ability to read improves—reading and writing become faster than before after the successful use of AAC in the classroom.* • *She has the ability now to go further than simply answering yes or no, but rather explains the reason for the answer and clarifies her point of view, and this makes me very happy.*
Participation Levels	Describes an improvement in the engagement level of AAC users in the school. This includes both full and partial engagement.	• *But AAC services are provided in the speech and language therapy room and not in the classroom. So, I do not consider this as a full engagement. AAC services should be provided in the classrooms if we want to have a successful educational program.* • *She was fully involved in the regular class. She participated in all the activities in the classroom. This improvement in her participation can tell us that the program was successful.* • *A good educational program allows the AAC users to participate fully in all activities, not only in some of them.*
Partner Interaction	Describes the communication and social support for AAC users wanting to participate in the school environment. Communication partners include peers and school staff such as teachers, speech and language pathologists, and occupational therapists.	• *Classmates always encourage him to use different modes of communication.* • *During the educational activities, I notice her actively communicating with the group, and they also have conversations with her. I would love to see the same thing with any educational program.* • *I plan the lesson so that it gives them opportunities to work in small groups that allow them to support and interact with the AAC*

		users. If there is no interaction with them [AAC users] … the educational program is not successful.
THEME	**Collaboration:** Describes working with others in a joint action that is in the interest of stakeholders and individuals who use AAC.	
SUB-THEME	**Household members:** Describes relatives or non-relatives who have lived in AAC users' homes and are expected to interact with AAC users. This includes how household members interact and support/cooperate with the AAC users and the diversity among families in Saudi Arabia.	
Code	Definition	Example
Family System	Describes the people who are members of an AAC user's family or are part of their family system. This could include parents, siblings, grandparents, cousins, uncles, and other extended family members.	• *When I am not at home, his brothers know very well how to use the AAC application.* • *Cooperation must take place with all family members and look at them as one thing and not separate from each other, as everyone should be aware of and know the status of the AAC user.* • *As you know, in some families, you find that the uncle is the one who plays the role of the father if the father is busy in his work, and some consider cousins as brothers, so everyone must be included in the intervention.*
Household Employee	Describes individuals who work on a full or part-time basis to provide services within the AAC users' residences. This could include health aides, maids, and private drivers.	• *Most of the families now have maids who do basic housework. We must cooperate with them because they are expected to play a basic role in the home to serve the students who use AAC.* • *In the event that there is a nurse who takes care of a student with a physical disability at home, it is preferable for her to join the work team, as this will benefit the educational process.*

Family Diversity	Describes varying characteristics of the family members. This includes family practices such as communication and parenting roles as well as structural characteristics such as ethnicity and socioeconomic status.	• *The nature of the language that is used varies according to the position of the person in the family.* • *Some parents have jobs and excellent incomes. They can buy expensive AAC applications and devices, while some cannot.* • *We have conservative families who may not want their daughters to use an iPad … we must work with them as partners and help them understand AAC.*
Managing Change	Describes the process of dealing with the changes that occur within the household members of AAC users, such as changes in family roles and new workers joining the residence.	• *The father may move to a new job, away from his child for some reason, so the wife will act as the first caregiver for the child. In this case, there must be plans to deal with such changes to keep the education going.* • *The educational programs need to be flexible in dealing with the changes that occur within the family.* • *And when we train the housemaid, she may be changed by the family or her work period may end. We need constant follow-up for any unexpected change.*
Maintaining Success	Describes the roles of household members in preserving what the AAC users have learned or accomplished and preventing decline.	• *For example, I have created many opportunities for him to communicate at home, and this greatly has benefited him and improved his use of AAC.* • *Any success that is achieved must not be lost. Parents have a great role to play in preserving it, especially during holidays.*
SUB-THEME	**Schoolmates:** Describes students around the AAC users who are enrolled in their schools and expected to interact with them.	
Code	Definition	Example
Knowledge of AAC	Describes a recognized need for AAC knowledge and skills	• *Before we integrate them, we must teach others about the way they communicate and the importance*

	acquired by schoolmates through education.	*of AAC as a method of nonverbal communication.* • *Their lack of knowledge of AAC methods may make the integration and social interaction of AAC users more difficult in the classroom.* • *The educational program should include teaching classmates on AAC and providing them with the most important information about it.* • *If you do not know something, you will have difficulty dealing with it. The same thing happened when we applied inclusive education. There is a lack of knowledge on the part of students.*
Interaction Strategies	Describes facilitative interaction strategies and skills that can support the communication of students who use AAC.	• *Cooperating with students, especially by making them aware of communication methods with AAC users, is one of the most important pillars of success for any educational program.* • *Communication with AAC users requires interaction skills that facilitate the communicative process and do not make it more complicated, so we must work with students to implement them.* • *We also need to work alongside schoolmates to make sure that they can maintain a successful interaction with the students who use AAC.*
SUB-THEME	**School Staff:** Describes how school staff works at a school in relation to AAC users. This includes teaching staff and non-teaching staff.	
Code	Definition	Example
Interprofessional Approach	Describes team members from different disciplines working together to have better education and AAC services for students who use AAC in schools.	• *Poor communication and lack of collaboration between teachers and special education service providers have greatly affected the quality of their education.*

		• *One of the things that I think we need is to have a multidisciplinary team working side by side to serve the students.* • *Schools do not have a multidisciplinary team, and they need referrals to specialists outside the schools, which makes education within the school more difficult.* • *In planning with teams, talents are discovered, and great potentials appear that could otherwise be hidden from the leader.*
SUB-THEME	**Community:** Describes people who reside in the same area where AAC users live who share common interests such as norms, values, religion, and customs. This also includes neighborhood shopping centers, mosques, and entertainment centers.	
Code	Definition	Example
Public Awareness	Describes raising awareness of AAC among community members and informing the general public about how AAC users communicate using their communication devices.	• *Expanding community awareness of the issues and rights of people who use AAC through brochures and seminars.* • *Schools should not be seen as separate organizations … if AAC users are not fully integrated into Saudi society, you should expect a lack or difficulty in integrating them into the school.* • *We need to raise awareness in Saudi society and clarify the role of AAC in helping them to talk and express what is inside them.*
Community Communication	Describes learning opportunities in natural community environments (non-school environments) that provide AAC users real-life experiences and promote successful integration into their community.	• *The opportunities to communicate in the community are just as important as the opportunities in the school. They need to practice what they learned from school in the community environment.* • *Interacting with the community is an important matter in our culture, so they must be trained in social situations related to their culture and interests. These opportunities are more available in the community environment.*

		• *We need to create opportunities for cooperation with community institutions such as religious and entertainment institutions to train them and provide them with opportunities to participate with others.*
THEME	**Inclusivity of AAC Users:** Describes the practices of including students who use AAC and treating them equally, fairly, and appropriately in school and non-school environments.	
SUB-THEME	**Key Principles:** Describes rights that should be upheld and the essential inclusive practices, attitudes, and beliefs that address the inclusion of AAC users.	
Code	Definition	Example
Non-Oral Communication Right	Describes the students' right to use all forms of aided and non-aided AAC to convey information without saying a word verbally.	• *Their capabilities should not be underestimated because they do not communicate verbally like others. Rather, we must consider these tools the same as oral communication and a right that must be respected.* • *There should be an acceptance of AAC and no distinction between it and oral communication. The goal is to convey the message. We must not focus on how the message is sent, verbally or by assistive device, but rather whether it was understood or not.* • *No one should take their AAC from them or prevent them from using it for any reason whatsoever. Unfortunately, you can find some who do not believe in AAC.*
Participation Right	Describes the AAC users' right to be fully involved in school and non-school environments similar to those who do not use AAC.	• *All opportunities for participation must be available, regardless of the style or method of communication used.* • *Nothing should stand in front of them as a barrier that prevents them from participating … Their participation is a right guaranteed by the law.*

		• *We trust their abilities and give them the full right to make decisions that concern them. And we involve them in discussing social and other problems so that we can make sure that they get fair treatment like others and are not ignorant people.*
Access Facilitation	Describes strategies and skills needed for providing adequate access to AAC, curriculum, and facilities to enable students who use AAC to benefit from them to the greatest extent possible.	• *Access to the communication device must be available to them always and at any time. It is our role to make sure that the devices are ready and available for use.* • *The sports curriculum is a hindrance to their access to sports, as there is no diversity in sports, only soccer. And this applies to most schools. Soccer may not suit their physical or mental abilities, and it may not be enjoyable for them.* • *Facilitating their access to what they need is one of the pillars of inclusion that must be provided in an educational program.*
SUB-THEME	**Factors in the Community:** Describes factors that may positively or negatively influence AAC users' participation as members of the school community.	
Code	Definition	Example
Attitudes Toward AAC	Describes stakeholders' feelings and perceptions toward AAC as reflected in their behavior toward them or their users.	• *There is a possibility of negative behaviors towards them because they speak in a different way than other students, which may lead to isolation and unwillingness to engage with other students.* • *Bullying in schools is one of the problems that we work continuously to address. Being different and communicating with AAC may increase the chance of bullying. A good educational program has a good plan to deal with such a negative attitude and prevent it before it happens.*

		• *My son faced difficulties in the classroom. At first, some of his classmates expressed their shyness about becoming his friends (sad voice tone) … because he talks using AAC, so the attitudes may create barriers if they are negative.*
Physical Environment Adaptations	Describes changes in physical factors that AAC users can experience through their senses. This includes adaptation to school transportation and other physical places in the school, such as classrooms, lunchroom, bathrooms, and common areas, to suit their needs.	• *Our school bus is not equipped to transport students who have physical disabilities, some of whom use AAC. This situation is similar to all schools that I know. Students have to come to school with their parents or with a private driver.* • *The toilets in some schools are not prepared for their capabilities. The cafeteria is also not prepared. They should have priority … any educational program must be well prepared to support them.* • *There is no elevator in our school. We always have to put them in a classroom on the ground floor throughout the school day and until they graduate. This hinders them from using the laboratories on the top floor.*
SUB-THEME	**AAC User–Stakeholder Communication:** Describes creating an effective communication environment between the AAC users and stakeholders by using appropriate means of communication to obtain a mutual understanding.	
Code	Definition	Example
Communication Style	Describes the importance of understanding the difference between the traditional Saudi communication style and the AAC users' communication style to create an inclusive communication environment that promotes efficient communication.	• *The good thing is that we use body language a lot to convey different messages, and this can be of great help to them.* • *We are accustomed when we talk with others to talk about many topics in a fast and unorganized manner. It is our method that we are used to, but that may create a problem when communicating with AAC users.*

		• *It should be noted that we use many abstract words when talking to others. We must try to avoid using abstract words when talking to them as much as possible.*
Effects of Educational Interventions	Describes communicating and understanding the positive and negative impacts of inclusive education on AAC users and stakeholders.	• *During inclusive education, we should not neglect their feelings and opinions but involve them in evaluating education. We should communicate with them continuously to find out any new impact.* • *Educating them in regular classrooms may also affect teachers in the practical and psychological aspects, so we must communicate with each other and speak with absolute transparency.*
Communication Abilities	Describes understanding the communication abilities and disabilities of AAC users and its impact on their participation in inclusive education.	• *Teachers need to get to know more about their [students who use AAC] communication problems and the impact they have on their understanding of lessons.* • *Even with the use of AAC, there are some problems that affect communication, which we need to identify and then address.* • *She told me that she had difficulty understanding some of the words in the reading book, and I consulted a speech therapist about it. I think communicating with them and understanding their communication problems is very important.*
Familiarity with AAC	Describes having a good knowledge of AAC among stakeholders to build an inclusive communication environment that fosters the inclusion of AAC users.	• *Many school principals do not know about what AAC is or its role in improving their ability to speak and understand.* • *Anyone involved in making decisions about them must have some knowledge and understanding of AAC.* • *It is important to create a healthy communication environment that serves and helps students in all*

		parts of the school. This will not happen if the members of the school, some of them, do not know how those students communicate.
SUB-THEME	**Active Participation:** Describes ways of facilitating effective participation that support AAC users' right to engage in inclusive education.	
Code	Definition	Example
Participation Patterns	Describes identifying areas of participation where students who use AAC engage or do not engage (e.g., play activities, social activities).	• *Some games that require advanced language abilities, such as solving puzzles, may affect them negatively because you are asking something beyond their capacity.* • *A good program is able to identify areas of weakness that need strengthening and identifying what is difficult for them to participate in.* • *Discussing more than one topic used to limit his ability to participate. When it is only one topic, and it has a relationship to his interest, his participation occurs more frequently.*
Participation Constraints	Describes factors that limit or restrict the implementation of AAC in inclusive education or at home as well as solutions to overcome these constraints and promote the participation of AAC users.	• *Some restrictions prevent the school-owned communication tools from being taken outside. They are not allowed to take the PECS from the school to their home, so I bought one for my son.* • *I noticed that he could not participate with his classmates by writing on the whiteboard due to difficulty in balance when standing. So I made a small board that he and his classmates used without the need to stand.* • *We need a smooth program that does not impose restrictions because their disabilities are classified as severe.*
Alternative Participation Options	Describes providing more participation choices to enable students who use AAC to choose between different options to	• *If AAC users face difficulty participating in any activity, teachers need to offer other options for participation and not*

	complete the educational activities. These options should lead to an equivalent learning opportunity.	*deny them or push them to participate in the activity that they do not want to participate in for any reason.* • *If the AAC user has difficulties holding a paintbrush or is not good at painting or whatever, there should be an alternative activity ready to go.* • *Participation options should be varied from one class to another to give them more chances of participation, especially in large classes where their chances to get support from their teachers are limited.*
SUB-THEME	**Instruction:** Describes teaching approaches used to convey information to the students in the school environments.	
Code	Definition	Example
Various Instructional Modalities	Describes using different modes of course information delivery that meet the needs of AAC users. This includes face-to-face, online, and video modeling instructions.	• *I used for the first time a new teaching method through video modeling, and I found that it is very effective in teaching them many lessons, as they can see the skill that I want to teach more than once. I regretted that I did not know it before.* • *I think that the Corona crisis has changed our concept towards electronic education. Through the Madrasati platform, I was able to offer better lessons. I believe that we must adopt distance learning as a primary mode in educating students, especially AAC users, who sometimes face difficulties in attending school.* • *Now she attends her lessons online. I wish this option had existed before because sometimes she was absent from school for some circumstances, and she did not find a way to make up for what*

		she lost. But now she learns any time she wants.
Various Instructional Procedures	Describes using different methods for sharing information during the instruction with AAC users. This could include storytelling, conversations, and a practical description.	• *I also use the discussion method in the classroom. My student could make sentences by writing letter by letter, and then he shared what he wanted to say with the members of the discussion group.* • *I put the steps for solving the mathematical equation in the form of sequential points, as if you are giving a cooking recipe. This method provides them with a comprehensive description of what is required of them and helps them learn better.* • *Not all students learn the same way, and therefore the best method must be determined that suits AAC users. Oftentimes, what suits AAC users, you find it's also suitable for all students in the class.*
THEME	**Management:** Describes the actions of planning, implementing, and supervising structures to execute inclusive education for AAC users.	
SUB-THEME	**Management of Resources:** Describes whether time, space, AAC funding, and resources are present and ready to be used and accessed.	
Code	Definition	Example
Time	Describes effective time management so that stakeholders have sufficient time to provide education and intervention services to AAC users.	• *When you have one or more students who are using AAC, you need more time to spend on teaching them and helping them with things they are facing difficulty with.* • *I sometimes find myself running out of time because I spend more time providing one-to-one assistance for my students who use AAC, and this is time consuming.* • *Time is one of the most important factors. If you have enough time, you can make sure that they learn*

		what you want from them. This may require excellent time management and understanding from all school staff for this matter.
Space	Describes managing classroom spaces to provide enough places for accepting and containing AAC users in schools.	• *The school principal told me that there was no seat available for my son at that time. The school accepts a very limited number of students who use AAC, and we waited nearly a year for a seat to be available for him.* • *The number of students in the classroom is very large. The tables are lined next to each other so that students face the teacher. Any good educational program should change this situation to a better organization that takes into account the needs of AAC users.* • *The program is characterized by having a consistent organization and planning of spaces within the classroom to accommodate all AAC users who wish to join the school.*
AAC Funding	Describes overseeing and handling AAC funding to ensure AAC devices and materials coincide with the demand for use.	• *I am [parent] the one who paid for the iPad and the AAC application.* • *Also, any educational program should have the ability to support the costs of AAC.*
Allocation	Describes the process by which the schools manage their resources effectively. This includes planning so that the right resources are allocated to the right educational tasks.	• *In any school, there are hundreds of diverse resources. School members should understand the process of how to manage and employ them efficiently to achieve the best learning outcomes.* • *It is important to avoid failing to manage school resources so that they are organized and used in a way that enhances success.* • *Good ability to use the educational resources in school activities is vital for creating any educational program for AAC users.*

SUB-THEME	**Management of Inclusive Education:** Describes creating and maintaining the inclusive education environment within the schools to support, enhance, and assist effective learning for AAC users.	
Code	Definition	Example
Comprehensive Quality	Describes having comprehensive quantifications of the quality of AAC services, inclusive education practices, and involved stakeholders to manage and sustain the desired level of excellence in the school.	• *There should be clear criteria for assessing the quality of the inclusive education for students who use AAC and the AAC services provided to them in the schools so that they are based on what meets their needs of all kinds.* • *We need to continuously ensure the quality of educational services and treatments for AAC users to ensure that the required level is maintained.* • *It is important to have a comprehensive and clear quality assessment of all elements of the education, including stakeholders.*
Classroom Management for AAC Users	Describes strategies used to create and maintain an ideal classroom to help AAC users function at their highest levels.	• *But some educators still lack the classroom management skills for handling participation, interaction, and control, especially in the primary schools, and for attending to individual differences between students.* • *Teachers must have classroom management skills as they are an integral part of teaching skills.* • *AAC users, some of them, have behavioral problems, so you need to have good classroom management abilities in order not to get things out of control.*
AAC Data	Describes need for acquiring, keeping, and using high-quality AAC data efficiently. This could include but is not limited to the prevalence of AAC users, AAC resources and materials, AAC users' success, and their types of disabilities.	• *Any educational program needs a clear and useful data system that shows the level of progress achieved by the AAC users in all educational, social, linguistic, and other aspects. This data is stored in the school and used to follow up the educational progress of AAC users and support their success.*

		• *There is no doubt that schools need a data system that clarifies the available and unavailable AAC systems, what type of AAC was used and demonstrated its effectiveness, and what was not used or benefited from.* • *It will be useful if each educational program contains a database where data is collected from all stakeholders, including parents, instead of relying solely on their academic achievement.*

APPENDIX K

END NOTE

[1] Touch-to-Speak is an AAC application for Arabic speakers made by researchers at King Saud University, Saudi Arabia.

[2] iPad is a tablet computer offered by Apple, Inc., located in Cupertino, CA, USA.

[3] Dynavox Series V is a speaking software that can work on operating systems such as Microsoft Windows and Vista. It is developed by DynaVox in Pennsylvania, USA.

[4] Touch Talker is a communication tablet developed by Lingraphica in New Jersey, USA.

[5] Delta Talker is a computer keyboard with an audio feature made by Prentke Romich Company in Ohio, USA.

[6] Liberator is a high tech-communication device with an eye gaze system developed by Liberator Ltd, United Kingdom.

[7] EZ Keys is a software keyboard with speech output made by Words Plus Inc. in Alabama, USA.

[8] Tap to Talk is an application that turns smartphones and tablets into AAC developed by Assistyx LLC in California, USA.

[9] Tobii X120 is a standalone eye tracker device developed by Dynavox in Pennsylvania, USA.

[10] Arabic Brain Communicator is a brain-controlled typing system that facilitates communication for people with motor disabilities made by King Saud University, Saudi Arabia.

[11] IWriter is an eye gaze typing Arabic interface developed by researchers at King Saud University, Saudi Arabia.

[12] Qualtrics is software for collecting and analyzing research data owned by Qualtrics Software Company in Washington, USA.

[13] Zoom is a cloud platform that enables users to communicate using video, audio, and chat developed by Zoom Video Communications, Inc. in California, USA.

[14] Twitter is social networking service developed by Twitter, Inc. in California, USA.

[15] Facebook is an online social media application owned by Facebook Inc. located in Menlo Park, California, US.

[16] WhatsApp is a mobile application that allows users to send text messages provided by WhatsApp Inc., located in California, USA.

[17] Voice Record Pro is a professional recorder for voice memos developed by Dayana Networks Ltd in Vancouver, Canada.

[18] Microsoft Excel is spreadsheet software developed by Microsoft Inc. located in Redmond, Washington, US.

[19] SPSS is a statistical analysis software produced by SPSS Inc., located in Illinois, USA.