

**Using Key-Word Signing to Support Learners in South African Schools:  
A Study of Teachers' Perceptions**

Anel McDowell and Juan Bornman

Centre for Augmentative and Alternative Communication, University of Pretoria,

Author Note

Juan Bornman <https://orcid.org/0000-0001-9685-3750>

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Correspondence concerning this article should be addressed to Juan Bornman, Centre for Augmentative and Alternative Communication, University of Pretoria, Private bag X20 Hatfield, 0028 South Africa. Tel: +27 124202001.juan.bornman@up.ac.za

### **Abstract**

Key-word-signing (KWS), an unaided augmentative and alternative communication (AAC) strategy, has an important role to play in the education system. To date, limited research exists regarding the use of unaided AAC strategies in the school environment, especially in low- and middle-income countries. To address this research gap, the current study aimed to explore the perceptions of South African teachers towards the use of KWS strategies in the educational context. The study used a descriptive paper-based survey comprised of both closed and open-ended questions that was completed by 101 special education teachers. The sample was drawn from 10 public and independent schools for learners with special education needs in five urban school districts within South Africa's Gauteng province. These schools accommodate students with a broad spectrum of disabilities and are likely to include learners with complex communication needs. The participants identified various factors and challenges that influenced the use of KWS within the education system (e.g., school culture, parents and other team members, community awareness, learner-related considerations, and training needs). These factors and challenges are assessed and discussed in relation to both local and international norms. Recommendations are made regarding expanding both an understanding and acceptance of unaided AAC strategies as a further means to support learning in the educational context.

*Keywords:* Augmentative and alternative communication (AAC); Keyword signing; Manual signing; Perceptions; Teachers; Unaided approaches

Communication is both a fundamental human need and an intrinsic human right, spanning different contexts such as the home, school, recreation and leisure, health care, social media and employment. For learners with complex communication needs, however, communication needs and rights are not always realized or even necessarily addressed. Augmentative and alternative communication (AAC) can assist these learners to optimize their potential by supporting their communication and educational needs to increase classroom participation (Bornman & Tönsing, 2017). AAC comprises aided communication methods (which require an external aid or device such as alphabet boards, picture communication books, or speech-generating devices); and unaided methods, which (Lloyd et al., 1997) require only the body to communicate a message and may be sub-divided into non-linguistic and linguistic systems. Non-linguistic systems consist of a limited set of manual signs that can be used for day-to-day communication and include vocalizations and gestures. Gestures are generally understood within a certain culture and include body movements like pointing, head nodding, shaking, or mime (Bornman & Tönsing, 2017). Non-linguistic systems also include informal or idiosyncratic gestures which are fabricated gestures that communicate specific concepts. In a classroom environment, however, the full repertoire of non-linguistic systems is often too limited to impart educational concepts (e.g., numeracy); in such cases, non-linguistic and linguistic systems may be combined (von Tetzchner & Martinsen, 1992).

Linguistic systems are generative (i.e., rule-governed to create unlimited messages) and include sign language and alphabet-based signs such as fingerspelling. In South Africa, South African Sign Language (SASL) is used. SASL is a fully-fledged language with its own expressive ability and grammar rules and syntax, similar to American Sign language (ASL) and British Sign language (BSL) (Bornman & Tönsing, 2017). Globally, other sign systems include

Manually Coded English (MCE) and key-word-signing (KWS) (e.g., SignAlong; Rombouts et al. (2017a). Makaton is another popular system for learners with intellectual disabilities which was developed in the United Kingdom (Murray & Goldbart, 2009) that has also been implemented in over 40 countries, including South Africa (Sheehy & Budiyanto, 2014).

International treaties such as the United Nations Convention on the Rights of the Child (UN, 1989) and the Convention for the Rights of Persons with Disabilities (UN, 2006) have progressively directed South African education policies and practices, resulting in the adoption of the White Paper 6 on Inclusive Education (Department of Education, 2001). Prior to 2001, general (mainstream) and special education schools focused on learners supposed intellectual and physical inadequacies, thereby perpetuating a focus on difference and the medical model of disability. Not surprisingly, this was counterproductive and contributed to a shortage of teachers with the necessary skills to teach learners with disabilities (Bornman & Donohue, 2013); this, in turn, resulted in less than optimum outcomes for learners (Engelbrecht, 2006).

South Africa's national school system recognizes both public schools (i.e., government-subsidized and state controlled) and independent schools (i.e., privately governed and subsidized mainly through school fees and donations) (South Africa, 1996). Both categories are further subdivided into mainstream schools (also known as full-service schools) and special education schools. Currently, learners with complex communication needs are mainly accommodated in special education schools (both public and independent), which provide specialized support in terms of physical and environmental adaptations, learning materials, teaching methodology, and therapeutic services (Nel et al., 2007). Public special education schools are divided by disability types (e.g., motor or visual disability; Nel et al., 2007), compared to independent schools, which are attended by learners with a broad spectrum of disabilities, including multiple disabilities.

Public schools tend to have more students than independent schools and therefore employ a larger number of teachers.

Because learners with complex communication needs almost exclusively attend special education schools (i.e., schools for learners with autism spectrum disorder (ASD), motor disabilities, intellectual disabilities or sensory disabilities) there is a risk that they will not be fully included, or worse, excluded altogether from classroom activities. Learners with complex communication needs are heterogeneous and therefore require different forms and degrees of educational support (Blackstone et al., 2007). Teachers at special education schools play an important role in supporting the implementation of AAC in the classroom because they are responsible for providing learners with complex communication needs with access to communication strategies that will support their educational needs optimally at the earliest age possible (Light & McNaughton, 2012). This interactive role that teachers play makes them frequent communication partners of learners with complex communication needs, which may contribute to environments that are supportive of AAC (Rombouts et al., 2017a, 2018).

Key-word signing is the most common form of unaided AAC employed within a special-needs classroom to facilitate communication and learning for students with complex communication needs. This differs from schools for learners who are Deaf, where the focus is on using sign language to teach the curriculum. When using KWS, some key signs from a sign language (e.g., SASL) are used while the teacher continues to use the spoken language (e.g., English) to highlight key educational concepts (Bornman & Tönsing, 2017); thus, only the most important words in the sentence are supported by signs (e.g., nouns, adjectives, verbs, pronouns, adverbs). KWS plays an important role in education in classrooms and on the playground, and there is extensive evidence that it may improve communication skills and support language

learning in children with complex communication needs (Budiyanto et al., 2018; Norburn et al., 2016; Rombouts et al., 2017a; 2018; Sheehy & Budiyanto, 2014). KWS may support receptive language, as the simultaneous production of signs adds a visual component to the spoken language, thereby allowing learners with complex communication needs to utilize both auditory and visual input to decode a specific message (Rombouts et al., 2017a; Tan et al., 2014). In addition, because the use of KWS inevitably slows down the teacher's rate of speech and emphasizes key concepts of the message, learners with slower processing skills have more time for encoding and decoding the message (Rombouts et al., 2017a). The visual nature of KWS may increase attention and assist learners to attend more closely to the teacher (Clibbens, 2001); this, in turn, may help reduce learner frustration and challenging behavior (Bornman & Tönsing, 2017) and improve interaction, speech development, and intelligibility (Clibbens, 2001; Cravotta et al., 2019; Light & McNaughton, 2012; Millar et al., 2006; Schlosser & Wendt, 2008).

Teachers' perceptions and beliefs about students' ability to learn have a direct impact on their teaching and interaction with learners with complex communication needs in the classroom and on the playground (Rombouts et al., 2017a), as do their inherent expectations that they can bring about change in a student's learning. A positive perception of a learner's ability to perform will reflect as confidence in teachers' skills (Soto, 1997) and as teacher self-efficacy (Bornman & Donohue, 2013). Teachers with high levels of self-efficacy are more likely to attempt new instructional approaches and persist with complex teaching strategies while remaining positive about their effectiveness, even in challenging situations (Bornman & Donohue, 2013). It follows, then, that when teachers are convinced that KWS can enhance communication, they are more likely to have a positive attitude towards implementation of the strategy. Rombouts et al. (2017b)

also suggested that, when teachers feel that their colleagues value KWS, they may be more positively inclined towards its use.

In contrast, teachers with negative attitudes and beliefs about KWS (e.g., that signing can stigmatize learners for whom signing is suitable) are less likely to succeed with implementing the strategy in the classroom. Such beliefs are strongly influenced by perceptions of social stigma, even in schools committed to the use of KWS (Sheehy & Budiyanto, 2014). Teachers may also believe that they do not have sufficient time or the AAC-related skills needed to implement KWS (Rombouts et al., 2016a) or that their colleagues do not support the strategy. Furthermore, the relationship between attitudes and beliefs about AAC and its use may be shaped by a complex interrelation of personal (intrinsic) and environmental (extrinsic) factors such as (a) teacher skill, knowledge, expectations, and self-efficacy; (b) demands on the classroom context; (c) collaboration between team members; and (d) learner ability (Tönsing & Dada, 2016).

Given that teachers' perceptions towards AAC may impede or facilitate AAC implementation (Rombouts et al., 2016a), understanding why KWS is essential for learning and how it may facilitate interaction with learners with complex communication needs is crucial. When teachers experience the benefits of and become more knowledgeable and confident about KWS, they are less likely to abandon the strategy and more likely to expand its use in the classroom and on the playground. Accordingly, it is important for teachers to understand the key principles of a successful KWS environment to ensure consistency across a learner's different environments (Dark et al., 2019). These key principles include how to use KWS alongside other communication modes such as speech and aided AAC; and within and across functional communication contexts at home, in school, or in the community (Dark et al., 2019). Teacher training, then, is central to addressing attitudes and beliefs about KWS and improving skills, in

order to bring about change in the classroom and, ultimately, improve learning outcomes (Chadwick & Joliffe, 2009; Dalton et al., 2012).

Previous studies have found positive attitudes towards AAC (Soto,1997), including within the South African context (Bornman & Donohue, 2013; Dada & Alant, 2001; Donohue & Bornman, 2015; Tönsing & Dada, 2016). In addition, studies have been undertaken internationally with regard to teachers and support-staff perceptions about and use of KWS in schools and residential homes (Budiyanto et al., 2018; Rombouts et al., 2017a, 2018; Sheehy & Budiyanto, 2014). Although both international (Beukelman & Mirenda, 2013; Rombouts et al., 2019; Sheehy & Budiyanto 2014) and South African literature (Bornman & Tönsing, 2017) have reported that teachers use KWS to support educational needs in the classroom, there is a lack of empirical evidence to this effect in South African special education schools. Neither is it evident whether teacher perceptions and use of KWS in the classroom differ in public and independent school environments.

Therefore, the primary aim of this study was to determine the perceptions of special education teachers in South African regarding the use of KWS The sub-aims were: How do teachers regard the usefulness of KWS? Which forms of unaided AAC strategies do they currently use? How do teachers view team support and collaboration regarding KWS? What are the underlying intrinsic and extrinsic challenges that may influence teachers' use of KWS? What are teachers' training needs with regard to KWS?



## Method

### Participants

A total of 101 special education teachers from 10 schools in the Gauteng province of South Africa participated in this study. Special education teachers were the focus because they are frequent communication partners of learners with complex communication needs and play an important role in the implementation of signing. The participants met the following inclusion criteria: (a) were employed as a full-time teacher at a special education school, and (b) had at least one year of experience teaching learners with complex communication needs. Of the participants, 96% were female, ranged in age from 24 to 65 years ( $M = 45$ ;  $SD = 12$ ), had 7 to 29 years of special education experience ( $M=18$ ;  $SD = 11$ ), and 2 to 20 years of experience teaching learners with complex communication needs ( $M = 11$ ;  $SD = 9$ ). See Table 1 for detailed participant demographics.

Permission letters for the Provincial Department of Education were obtained to allow data collection at public schools, and for school governing bodies at private schools. Permission letters for principals outlined the purpose of the study as well as potential risks and benefits. Informed consent letters for teachers also explained the study's purpose, what is expected of participants, as well as their rights, risks, and benefits. Written consent was obtained before they proceeded with the completion of the questionnaire which was provided as a hardcopy. The first author was present to provide clarification if and when required. She also reminded the participants that they were free to withdraw at any point should they feel uncomfortable, without any negative consequence. The completed questionnaires were collected, and all participants were thanked for their contribution.

**Table 1.** *Participant Characteristics (N=101)*

| Demographic variables                              | Public schools |       | Independent schools |        |
|--|----------------|-------|---------------------|--------|
|  | (n= 85)        | %     | ( n =16)            | %      |
| <b>Age</b>   |                |       |                     |        |
| 21 – 30 years                                      | 7              | 8.86  | 3                   | 18.75  |
| 31 – 40 years                                      | 18             | 22.78 | 6                   | 37.50  |
| 41 – 50 years                                      | 12             | 15.19 | 4                   | 25.00  |
| 51 – 60 years                                      | 33             | 41.77 | 3                   | 18.75  |
| >60 years  | 9              | 11.39 | 0                   | 0.00   |
| <b>Sex</b>   |                |       |                     |        |
| Female   | 81             | 95.29 | 16                  | 100.00 |
| Male   | 4              | 4.71  | 0                   | 0.00   |
| <b>Total teaching experience</b>                   |                |       |                     |        |
| 1 – 5 years  | 13             | 15.29 | 4                   | 25.00  |
| 6 – 10 years                                       | 11             | 12.94 | 8                   | 50.00  |
| 11 – 20 years                                      | 27             | 31.76 | 3                   | 18.75  |
| 21 – 30 years                                      | 23             | 27.06 | 0                   | 0.00   |
| >30 years  | 11             | 12.94 | 1                   | 6.25   |
| <b>Teaching experience at special needs school</b> |                |       |                     |        |
| 1 – 5 years  | 33             | 38.82 | 6                   | 37.50  |
| 6 – 10 years                                       | 15             | 17.65 | 7                   | 43.75  |
| 11 – 20 years                                      | 18             | 21.18 | 3                   | 18.75  |
| 21 – 30 years                                      | 15             | 17.65 | 0                   | 0.00   |
| >30 years  | 4              | 4.71  | 0                   | 0.00   |
| <b>Formal qualifications</b>                       |                |       |                     |        |
| Grade 12   | 2              | 2.35  | 2                   | 12.50  |
| Teaching diploma/degree                            | 60             | 70.59 | 11                  | 68.75  |
| Honours/master degree                              | 23             | 27.06 | 3                   | 18.75  |

### ***Recruitment***

A two-pronged, nonprobability purposive sampling technique (Leedy & Ormrod, 2014) was used to recruit the teachers from the 10 participating schools. First, public and private special education schools that had been exposed to or had prior knowledge of KWS were identified. Excluded were schools that did not use KWS (e.g., for students with hearing impairments, where SASL was the language of teaching and learning; schools for students with epilepsy and mild learning disabilities). Telephone contact was made with the principals of 18

schools (10 public and eight private) that met the criteria, five of whom indicated that signing was not currently being used to support learning, and three of whom declined due to other research commitments. Written permission was received from principals of 10 schools: six public schools (two for learners with severe intellectual impairments, two for students with cerebral palsy, and two for students with ASD); and four independent schools (all of which served students with multiple disabilities). Teachers from the schools who met the inclusion criteria were then invited to participate.

Demographically, the South African teacher workforce is relatively young or older than 50 years (Donohue & Bornman, 2014). According to the South African Council for Educators Act (Department of Education, 2011), all teachers should have a teaching diploma/degree and be registered at the Department of Education. Teachers do not require a special education qualification to teach at a special needs school and hence their formal qualifications include a combination of general and special education diploma or degrees.

### **Research Design**

A descriptive paper-based survey was used, employing both closed and open-ended questions. This form of data collection is preferred by South African teachers because of limited or poor internet connectivity, which can compromise the on-line survey process (Bornman & Tönsing, 2016). Moreover, surveys are effective for gathering data about abstract ideas such as perceptions, attitudes or beliefs while ensuring confidentiality (Rickards et al., 2012).

All required approvals were received from the University of Pretoria.

## **Materials**

### *Questionnaire*

The preliminary questionnaire consisted of 23 questions. Section A focused on participant demographics, including teaching load and the curriculum. The questions in Section B were conceptualized from previous research on teachers' perceptions and experience of AAC implementation (Tönsing & Dada, 2016) and their use of KWS in the educational context (Rombouts et al., 2017a, b; Sheehy & Budiyo, 2014). These questions focused on perceptions regarding the usefulness of KWS in the classroom, teaching strategies, motivation to use KWS, team support for KWS, further training needs, and intrinsic and extrinsic factors that hinder KWS implementation.

The preliminary questionnaire was evaluated by a panel of six speech-language pathologists (SLPs) with 2-19 years of clinical experience working with children with complex communication needs. They were asked to comment on the questionnaire's clarity and simplicity, its overall design, and the relevance of questions in relation to the sub-aims of the study. Their main suggestion was that "unaided AAC and key-word-signing" be changed to "manual signing" for the sake of brevity and to reflect more familiar terminology in the South African school-context.

The questionnaire was revised and then piloted with 10 teachers with profiles similar to those of the study's main participants. The teachers were employed at a school for special needs that met the same requirements as participating schools in the main study. Interviews were used to determine the clarity of the questions, whether the response anchors were clear and understandable, and if the format (including font size and layout), was clear and legible. The teachers were also asked to evaluate the feasibility of the recruitment strategy used for

participating schools and the teacher inclusion criteria as well as the effectiveness of the data capturing process, coding, and data analysis. Minor linguistic and layout changes were suggested and made. In addition, the researchers agreed with a suggestion that the questionnaires not be printed on two sides, to ensure that none of the questions would be overlooked and possibly result in missing data (McDowell, 2019). The final questionnaire with the theoretical justification for the specific questions is shown in Appendix A.

### **Procedures**

The survey was conducted in person with the first author present to provide clarifications of questions as required. Following the necessary permissions teachers were recruited by explaining the study to them in the staff tearoom.

### ***Data Collection and Analysis***

Descriptive statistics, including frequency distribution, average, standard deviation, and range, were used to interpret quantitative data. Items of a particular construct identified under sub-aims were assessed using a 5-point Likert scale, 1 (*never*), 2 (*seldom*), 3 (*sometimes*), 4 (*frequently*), 5 (*always*) (Sullivan & Artino, 2013). Written responses to the open-ended questions (qualitative narrative data) were re-typed and entered into an Excel spreadsheet. The open-ended questions were treated in a manner that mimicked thematic analysis (Popping, 2015): First, both the first and second authors independently familiarized themselves with the answers. Next, they organized the responses into key ideas that were together under the same broad main themes. In cases where the narrative data did not align with a main theme, the answer was recorded as a separate new theme.

## Results

Quantitative and narrative results are presented according to the sub-aims of the study. Throughout the results section public and independent schools are contrasted because previous studies have reported that teaching environments impact perceptions (Rombouts et al., 2017a). Highlighting possible differences (and similarities) between these contexts (i.e., public vs. independent schools) might increase understanding of KWS regarding the different school populations and signing environments.

### Teachers' Perceptions Regarding the Usefulness of KWS

The 101 participants reported that 500 of the 1015 learners they taught (49%) had complex communication needs. The 49:51 (complex communication needs:verbal) ratio was expected and is in line with earlier South African data that reported a 45:55 ratio (Tönsing & Dada, 2016). Figure 1 shows the frequency data for the use of KWS inside and outside the classroom.

Within the classroom frequency scores, KWS use varied from seldom (9%) to always (50%). As only schools where KWS was used were included, this result was expected as all teachers used at least some KWS. Outside the classroom (e.g., school corridors and playground), signing was used less frequently, varying from never (1%) to always (31%). When using the 5-point scale to calculate mean scores, independent school teachers used KWS more often in the classroom ( $M = 4.3$ ) than outside the classroom ( $M = 3.8$ ). Similarly, teachers at public schools used signing more frequently in the classroom ( $M = 3.7$ ) than outside the classroom ( $M = 3.3$ ), although to a lesser degree in both settings than teachers in independent schools.

**Figure 1.** *The Use of KWS Inside and Outside the Classroom*

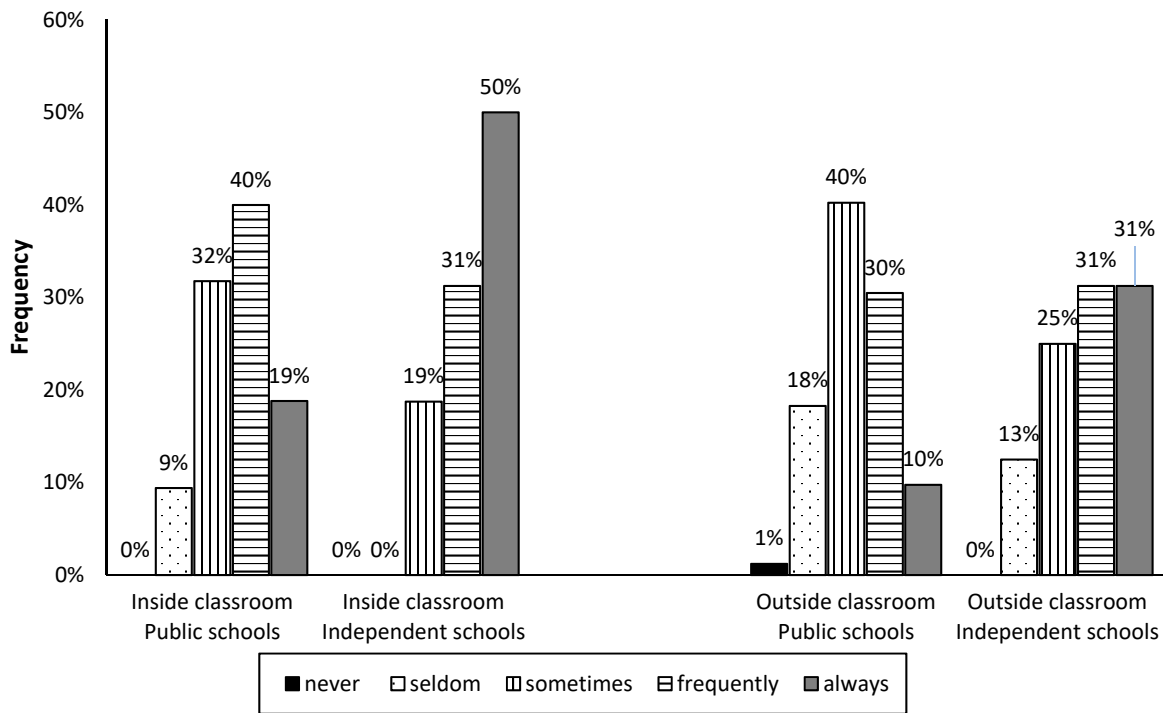
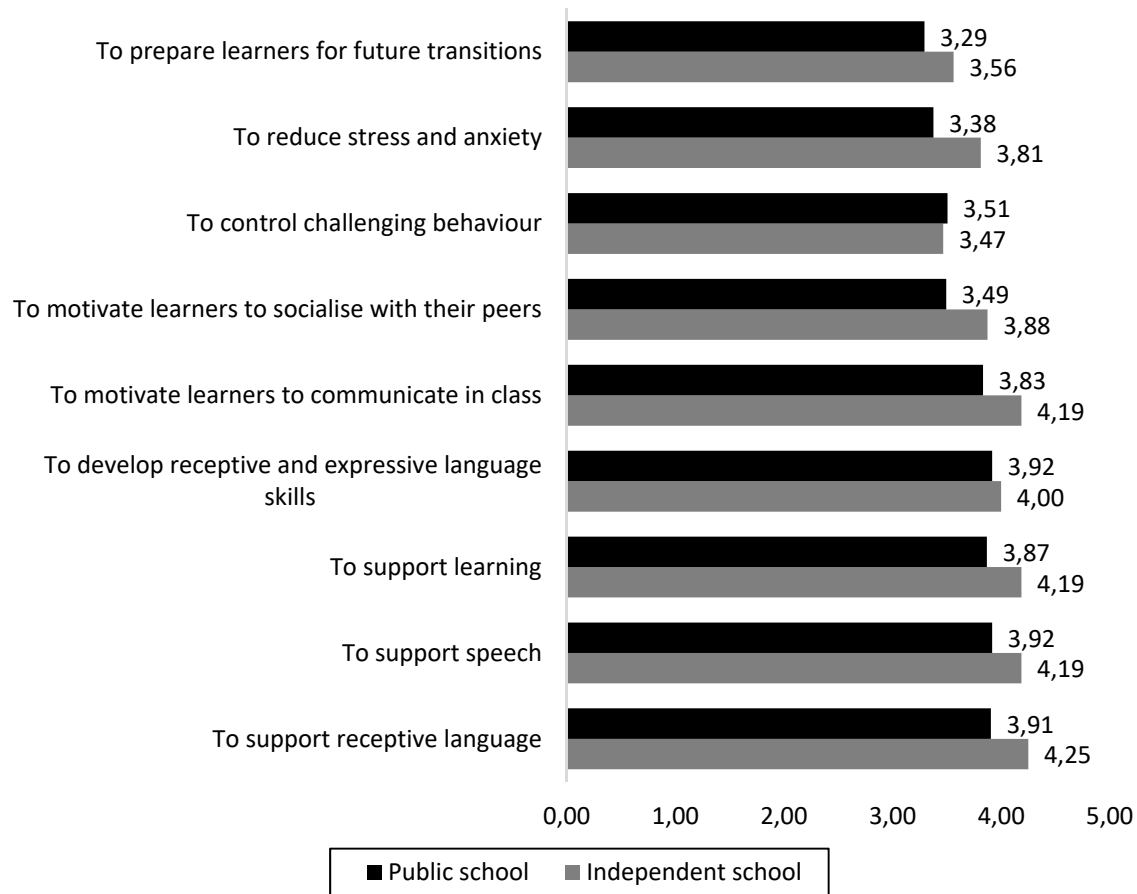


Figure 2 shows teachers’ perceptions regarding the usefulness of KWS within the educational context on a 5-point rating scale. Teachers at public and independent schools, on average, rated KWS in the classroom as the most useful for supporting receptive language ( $M = 4.08$ ) and the least useful for preparing learners for upcoming transitions ( $M = 3.43$ ). Teachers at public schools rated KWS as the most useful for supporting speech ( $M = 3.92$ ), followed by developing receptive and expressive language skills ( $M = 3.92$ ), supporting receptive language ( $M = 3.91$ ), and supporting learning ( $M = 3.87$ ). KWS was rated least useful for preparing learners for future transitions ( $M = 3.29$ ). Teachers at independent schools, on average, rated KWS as the most useful for supporting receptive language ( $M = 4.25$ ), followed by motivating learners to communicate in class ( $M = 4.19$ ), and supporting learning and speech at ( $M = 4.19$ ). They rated KWS as least useful for controlling challenging behavior ( $M = 3.47$ ).

**Figure 2.** Teachers' Perception of the Usefulness of Employing KWS Within the Educational Context



Note. Average Likert scale ratings 1 = (never), 2 = (seldom), 3 = (sometimes), 4 = (frequently), 5 = (always).

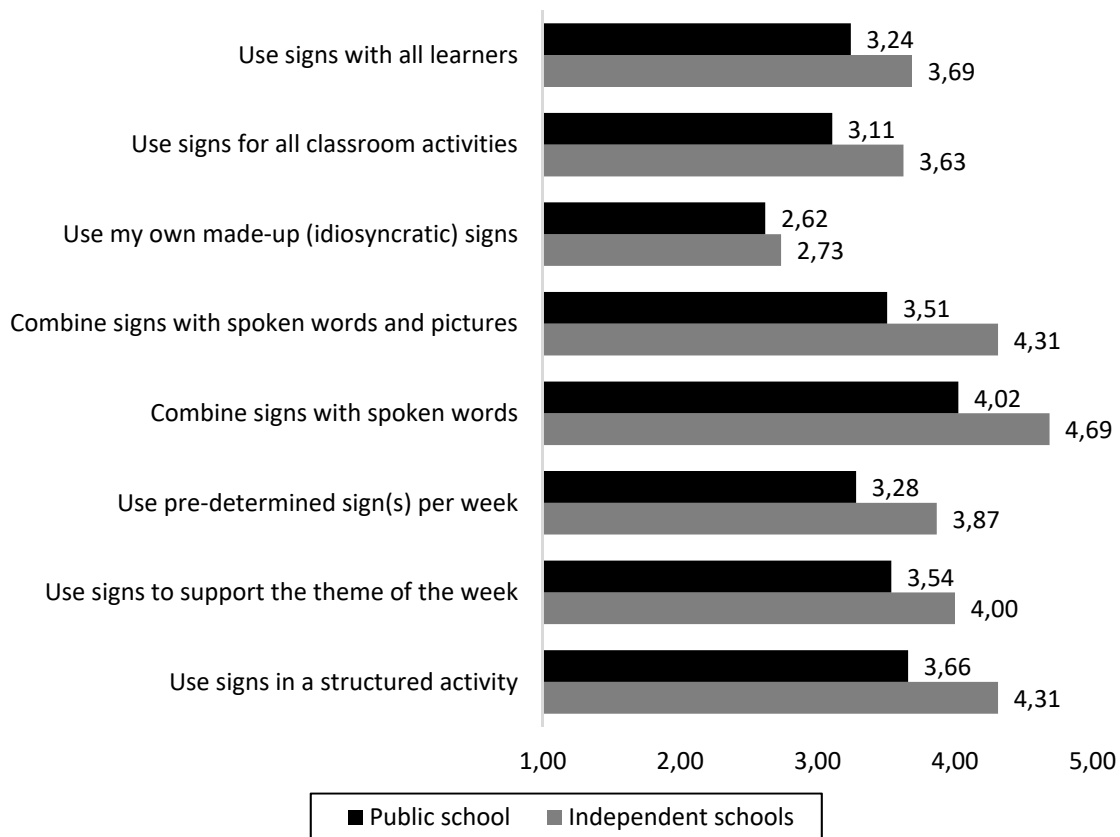
The narrative data showed that teachers perceived KWS as beneficial in assisting with language barriers within the classroom (South Africa is a multilingual country where 11 languages are spoken). Said one participant: “Language barriers are a big concern, and the use of sign language often helps the way of communication.” The data further showed teacher-related benefits such as self-efficacy, enjoyment, and satisfaction in using KWS. One teacher explained: “First it was challenging and looked impossible, but with frequent practice it gets enjoyable and easy to use.”



### Teachers' Perceptions Regarding Currently Employed KWS Strategies

Teachers must be creative and innovative and therefore it is crucial to understand what classroom strategies they employ when using KWS to support learning. Figure 3 shows that survey participants from public and independent schools had similar responses for the most and least employed KWS strategies, albeit with slightly different frequencies. The four most popular KWS strategies were (a) combining signs with spoken words, (b) using signs with spoken words and pictures, (c) using signs in a structured activity, and (d) using signs with the “theme of the week.” Teachers rated using their own idiosyncratic signs as the least-used strategy.

**Figure 3.** Teachers' Perception of Currently Employed KWS Strategies



Note. Average Likert scale ratings 1 = (never), 2 = (seldom), 3 = (sometimes), 4 = (frequently), 5 = (always).

In terms of additional strategies used by teachers, the data revealed two main themes: unaided AAC strategies (structured activities, teaching methods, reinforcement strategies, and adapted strategies), and aided AAC strategies (teaching methods, the characteristics of visual aids, and teaching purpose).

### **Teachers' Perceptions of Team Support (Collaboration) Regarding KWS**

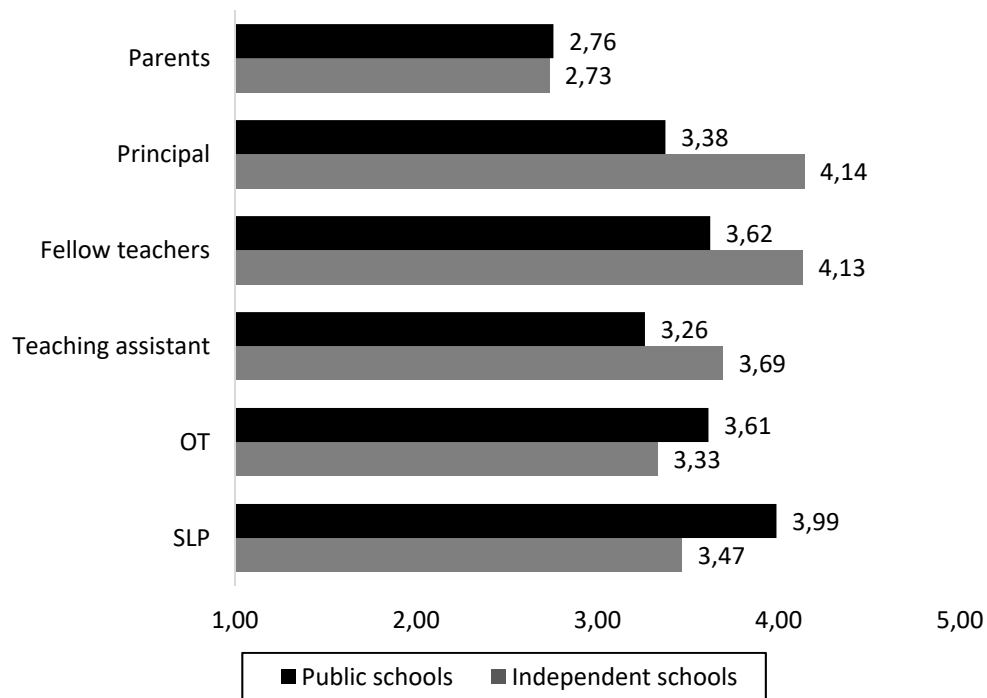
All six public special education schools had occupational therapists (OTs) and SLPs employed by the Education Department to provide teacher support. Most teachers, especially in classrooms for younger learners (i.e., Early Child Development Phase, Foundation Phase and Junior Phase) had full-time or part-time teaching assistants helping in class. These assistants typically had minimal training and were employed to help with the personal care of learners. SLPs and OTs are not employed by independent special education schools; however, three of the four schools did employ teaching assistants, some of whom some were trained in using KWS at school.

As illustrated in Figure 4, teachers in the public schools perceived SLPs to provide the most support regarding the use of KWS, with an average rating of 3.99, followed by OTs ( $M = 3.61$ ), and fellow teachers ( $M = 3.62$ ). Independent school teachers perceived the principal ( $M = 4.14$ ) and fellow teachers ( $M = 4.13$ ) as providing the most support regarding KWS. As with teachers in public schools, teachers in independent schools also perceived parents as providing the least support, with an average rating of ( $M = 2.73$ ). They indicated that factors such as lack of parent involvement, poor parent education, and lack of home reinforcement for KWS were barriers to team support; however, many also commented that they actively attempted to facilitate the use of KWS by educating and empowering parents. As one teacher explained:

I encourage parents to learn to sign at a signing parents evening; weekly, signs are given in print with a photo of each sign to parents to help them learn signs with their children; WhatsApp – video clips are sent to parents to help them learn to sign easier” ;“I send the information about signs home for the parents” and “I struggle to motivate parents to attend training or come to education sessions where training is provided in SASL.

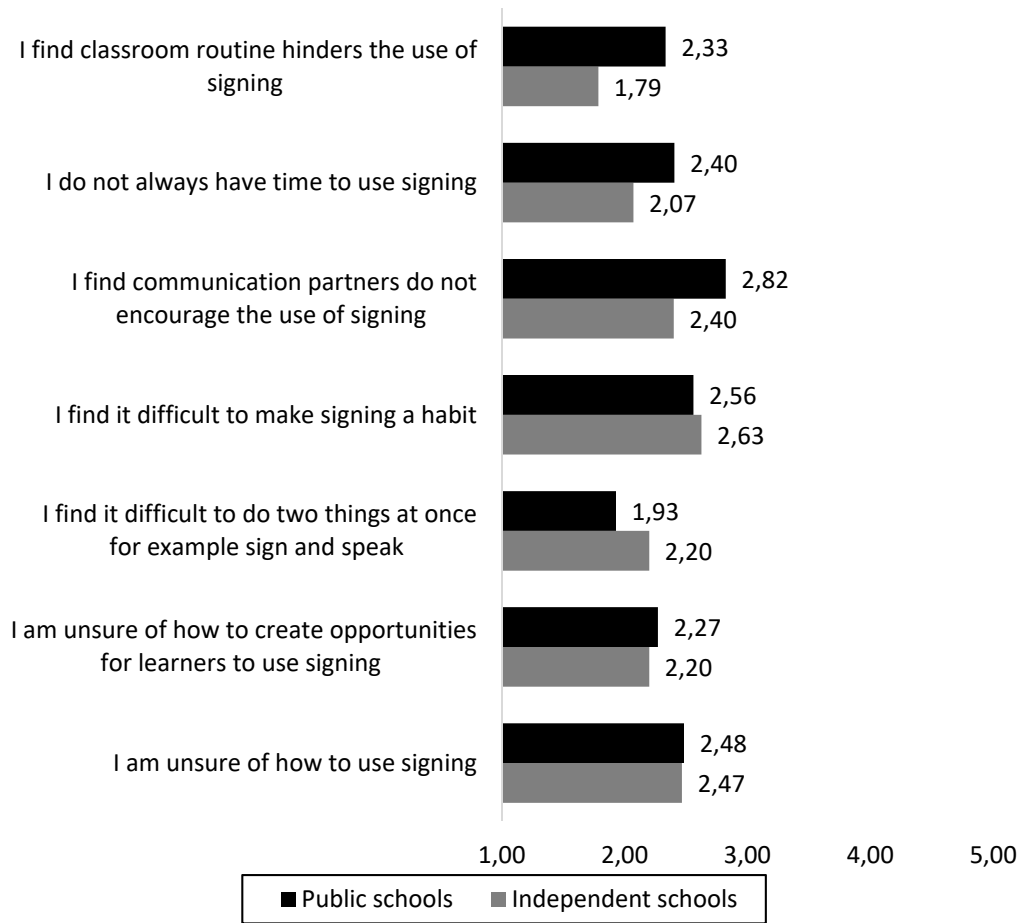
Teachers noted the lack of signing awareness in the community-at-large. Said one participant: “I’ve never heard anyone talking about Makaton” and “We are working in isolation with the community.”

**Figure 4.** *Teachers’ Perception with Regard to Team Support*



*Note.* Average Likert scale ratings 1 = (never), 2 = (seldom), 3 = (sometimes), 4 = (frequently), 5 = (always).

**Figure 5.** *Teachers' Perception of Intrinsic Challenges*



Note. Average Likert scale ratings 1 = (*never*), 2 = (*seldom*), 3 = (*sometimes*), 4 = (*frequently*), 5 = (*always*).

### **Intrinsic and Extrinsic Challenges Regarding KWS**

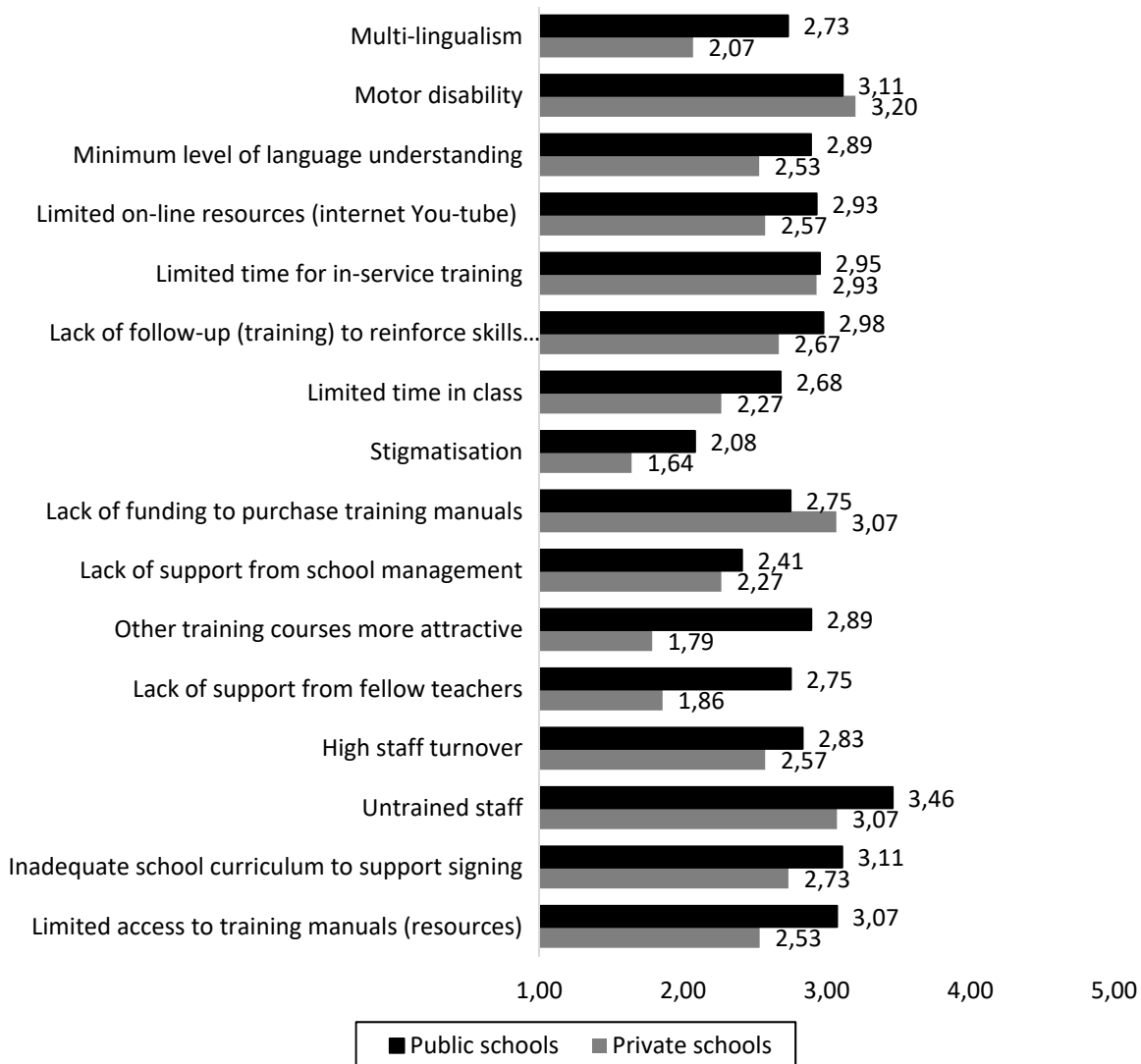
As illustrated in Figure 5, teachers at both public and independent special education schools identified a number of intrinsic (teacher-related) challenges related to (a) classroom context (e.g., limited class time, limited time for in-service training), and (b) teacher knowledge and skills (e.g., being unsure about how to create opportunities for and use of KWS in the classroom; finding it difficult to simultaneously sign and speak) as the least challenging overall,

with average ratings ranging from 2.47 to 1.93. These findings indicate that some teachers perceived themselves as knowledgeable about using KWS even though the data show that some teachers found it difficult to make KWS a habit and had difficulty finding time to include the strategy as part of their daily class routine. As one teacher stated: “Incorporating signs in the classroom require more weekly planning.” Some teachers felt that the school culture may have played a role in encouraging the use of KWS. Said one respondent: “Sadly, signing is not emphasized in our school anymore, previously it was.”

As illustrated in Figure 6, teachers also experienced a variety of external challenges that hindered the use of KWS. Public school teachers rated untrained staff as the most significant challenge (average rating of 3.46). Factors relating to motor disability and inadequacy of the school curriculum to support KWS were jointly rated as the second most significant challenge ( $M = 3.11$ ). Factors related to resources (e.g., limited access to training manuals); and training (e.g., lack of follow-up training to reinforce newly learned skills; limited time for in-service training) were perceived as significant challenges. On average, stigmatization for using sign was rated as the least significant external challenge ( $M = 2.08$ ).

Independent special education school teachers rated factors relating to motor disability as the most significant challenge ( $M = 3.20$ ). Factors related to untrained staff and the lack of funding to purchase training manuals were rated as the second most significant challenge ( $M = 3.07$ ). As with public school teachers, stigmatization was rated the least significant external challenge ( $M = 1.64$ ).

**Figure 6.** *Teachers' Perceptions of Extrinsic Challenges*

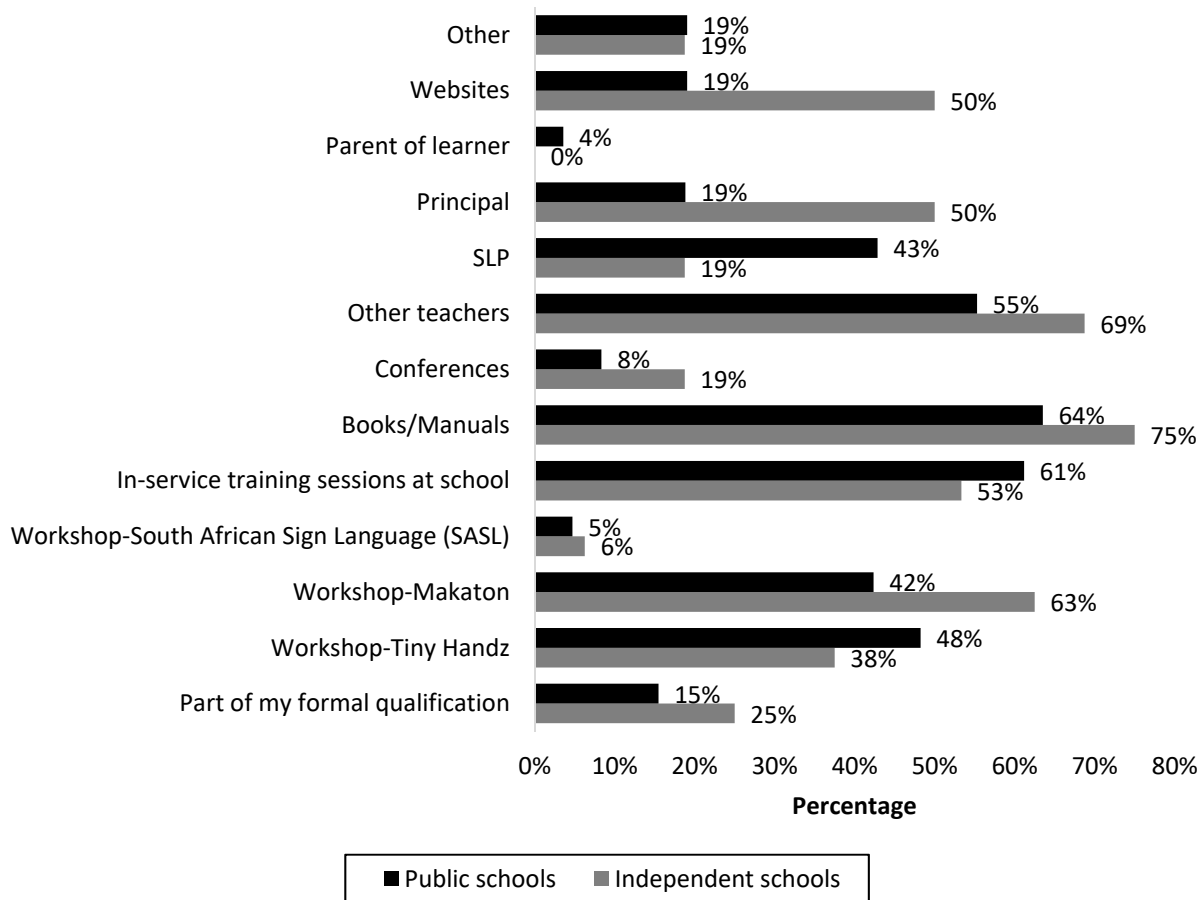


*Note.* Average Likert scale 1 = (*never*), 2 = (*seldom*), 3 = (*sometimes*), 4 = (*frequently*), 5 = (*always*).

Specific diagnoses (e.g., cerebral palsy) were perceived as learner-related challenges to implementing KWS. Some teachers, however, continued to utilize and remain positive about KWS, believing that it could be used with their students to support receptive language and learning. Said one teacher, commenting on students with motor disability: “They still understand, even if they can’t sign back.” Furthermore, teachers also expanded on training-

related factors such as the high cost of training courses and the lack of availability of South African resources on the internet: As one respondent said, “Most of the signing resources online is not South African.”

**Figure 7.** *Teachers’ Perceptions with Regard to Knowledge, Skills and Training Needs*



### **Teacher’s Knowledge, Skills, and Needs Regarding KWS**

Teacher training is critical for the successful use of KWS at school; thus, it is important to understand teachers’ knowledge, skills, and needs regarding KWS (all schools in this study used some form of unaided AAC, per the inclusion criteria). As illustrated in Figure 7, teachers from both public and independent schools gained most of their signing knowledge from books

and manuals, followed by in-service training, training by other teachers, training by SLPS, and Makaton and Tiny Handz training courses. Less than 25 % of signing knowledge was obtained from a school principal, websites, formal training in sign, conferences, SASL workshops, parents, and other sources. Most teachers from both public and independent schools (88%) indicated interest in receiving additional training in the use of KWS to support learning at special education schools, while 12% were not interested in additional training.

### **Discussion**

Learners with disabilities in South Africa, specifically those with ASD, cerebral palsy, intellectual disability, and sensory disabilities, almost exclusively attend special education schools (Tönsing & Dada 2016). Teachers at these schools provide these learners with access to communication strategies such as KWS as part of providing support to meet their educational needs.

Although the study's main aim was to explore teacher's perceptions regarding how to support education by using KWS, an element of bias was introduced, as only those schools that were familiar with signing were included. Public schools have larger school populations than independent schools, therefore they naturally employ a larger number of teachers, resulting in the participation of more teachers from public schools than from independent ones. Despite the disproportionate split, the decision was made to maintain the distinction between these two school contexts for descriptive purposes. Independent schools focus mostly on learners with severe to profound multiple disabilities as compared to public schools that cater to learners with a specific type of disability in the mild to moderate severity range.



### **Teacher Perceptions Regarding the Usefulness of KWS**

Most teachers at both public and independent schools use KWS to some extent inside and outside the classroom environment. This concurs with the fact that signing is accepted as common in some special schools and regarded as an example of good classroom practice all over the world (Rombouts et al., 2019). In the current study, use of KWS is thus regarded as a positive finding, because learners with complex communication needs are a heterogeneous group who clearly require different forms and degrees of educational support (Blackstone et al., 2007) and could benefit from this unaided AAC strategy (Norburn et al., 2016).

Even so, the mere use of signing in special education schools does not necessarily imply that teachers use it intensively, as indicated by the wide variation of the frequency data regarding sign usage. Rombouts et al. (2019) introduced the concept of low- and high-signing environments. This concept can also be applied to the current study to explain the range of KWS usage at schools. Schools for learners with ASD and with multiple disabilities, would be classified as high-signing environments, which implies that teachers are more inclined to use KWS to support communication and learning. The Makaton program has proven to be successful for learners with ASD in the UK (Rombouts et al., 2019) and has similarly influenced South African school practices. Also, the multi-modality features of Makaton (Launonen & Grove, 2019) have proven to be successful for learners with multiple disabilities. Schools that accommodate learners with physical disabilities and severe intellectual disabilities would be classified as a mixture of low- and high-signing environments, as signing is mostly used in classrooms that cater to younger learners. Based on our descriptive findings, nearly half of the population of learners at special education schools included in the current study had some form

of speech; thus, a difference between school environments exists regarding signing because of the specific population of learners attending these schools.

The current study also found that the teachers who use KWS have a good understanding of the usefulness of this strategy. Rombouts et al. (2016a) point to the fact that teachers' perceptions towards AAC may impede or facilitate its use. Clearly, for teachers to use KWS, they need to understand why it is essential to positive educational outcomes for learners with complex communication needs and how it may facilitate interaction with these students. This was confirmed by the quantitative data, which indicated that both public and independent school teachers had similar perceptions about the usefulness of signing, reporting it to be most useful for supporting speech and receptive language, developing receptive and expressive language skills, and supporting learning.

Another finding concerned the linguistic and cultural diversity of South African special education schools (Tönsing & Dada, 2016). Four teachers identified signing to be useful in assisting with language barriers within the classrooms. A similar benefit was identified in studies where Makaton was used for teaching foreign languages to English speakers (Mistry & Barnes, 2013; Walker et al., 2019).

Teachers in the current study who used signing also seemed motivated and reported high self-efficacy. Previous studies have shown that teachers with this profile are likely to commit to an innovative approach such as KWS, attempt new instructional methods, and persist with complex teaching strategies while remaining positive about their effectiveness even in negative situations (Bornman & Donohue, 2011, 2013; Soto, 1997). Because these teachers perceived the use of KWS as beneficial and even enjoyable, it is not surprising that they expressed positive attitudes towards the use of signing within different school environments. Previous studies have

identified positive attitudes among special education teachers towards the use of AAC strategies (Soto, 1997; Tönsing & Dada, 2016). Likewise, Rombouts et al. (2017b) stated that, when special education teachers are convinced that signing can improve communication skills, they may be more likely to be positive about the strategy. Moreover, the results confirmed that signing has a definite role to play in education (Sheehy & Budiyanto, 2014) because it enhances both classroom participation and interaction on the playground (Bornman & Tönsing, 2017).

### **Current Strategies Employed to Support the Use of KWS**

To realize the benefits of KWS in the classroom, it is critical that teachers employ appropriate KWS-based strategies to communicate effectively and efficiently with all learners, including those with complex communication needs. Both public and independent school teachers used similar methods to enhance learner knowledge and skills, the most frequent of which were combining signs with spoken words and/or with pictures and using signs in structured activities to support the “theme of the week.” Given that a key principle of signing is to use it with other communication modes (e.g., speech, other forms of aided AAC) as part of a multi-modal approach (Dark et al., 2019), the participants’ use of such strategies is extremely encouraging.

In addition, the narrative data that expanded on different educational strategies to support learning showed that teachers preferred to use signing in structured activities such as storytelling, singing, rhymes, role play, and group activities. Similarly, Rombouts et al. (2018) reported that teachers used signing more easily during structured activities such as direct teaching for communication or language development. In a follow-up study, Rombouts et al. (2019) suggested that learners find it easier to focus on signing during structured activities because signing is given higher priority during these activities.

### **Teachers' Perceptions Regarding Team Support for KWS**

The results revealed that teachers in public and independent school environments experienced different team dynamics associated with KWS support. Teachers from public schools felt that SLPs provided the most support for the use of KWS, followed by OTs, and fellow teachers; this is supported by the fact that some public schools receive support in the form of therapeutic services (Nel, 2007). Independent school teachers felt that the principal and fellow teachers provided the most support for the use of KWS. Although speech language and occupational therapy is scheduled weekly at independent schools, SLPs and OTs are not based at these schools and so are not necessarily closely involved with classroom practices. In some situations, SLPs and OTs are employed by parents to provide intervention services to their children while they are in school.

Both public and independent school teachers perceived parent involvement with KWS to be limited. Although current best practices in AAC and special education have moved towards incorporating a more family-centred approach (Coburn et al., 2021), which emphasizes diversity and cultural sensitivity (Tönsing & Dada, 2016), a lack of parent involvement and collaboration has been reported in various studies as a concern for both teachers and SLPs (De Bortoli et al., 2011). Engelbrecht et al. (2003) further grounded this concern within the educational context as mainly due to socio-economic disadvantage in South Africa. This is further supported by narrative data from teacher's perceived external challenges that explained parent's lack of involvement as a concern regarding KWS training.

Geldenhuys and Wevers (2013) found that parents seldom provide effective stimulation to their children at home and perceive the provision of educational support and development to be the role of the school; however, Dark et al. (2019) referred to the knowledge, skills, and

attitudes of communication partners (e.g., parents) and the facilitation of communication opportunities as most influential in the home environment; thus, if parents are reluctant to use KWS regularly or they believe that it may hinder speech development (Millar et al., 2006; Schlosser & Wendt, 2008), the child will have limited opportunities to sign. In addition, in some countries, signing is still believed to be of lower status than speech despite successful implementation of strategies such as Makaton (von Tetzchner & Martinsen, 1992). Parent training in AAC has been shown to facilitate (a) the provision of communication opportunities by parents, (b) child communication, and (c) parent responses to a child's communication attempts (Senner et al., 2019). Engelbrecht et al. (2003) suggested that, in poorer communities, teachers would need to take the initiative to reach out to parents and make them part of the school community (e.g., by initiating KWS training at school). In the current study, four teachers persisted with parent training to empower parents to use KWS, and experienced positive results from their efforts.

### **Teachers' Perceptions of Barriers Hindering the Implementation of Signing**

Teachers from both public and independent special education schools experienced and identified a variety of external barriers to the use of signing in classrooms, including motor disability.

Previous studies have identified that the relationship between believing in the value of AAC and using it is shaped by a complex set of interrelation of personal and environmental factors (Norburn et al., 2016; Rombouts et al., 2016a; Tönsing & Dada., 2016).

Although KWS has proven to be successful for some learners with disabilities (Meuris et al., 2014; Tan et al., 2014), both public and independent school teachers in the current study perceived motor disability as one of the most common challenges to teaching signing. Grove et

al. (2019) also named this as the most common challenge because many learners with complex communication needs have concomitant diagnoses that involve motor skills. Specific handshapes, locations, movements, and orientation are the building blocks of sign parameters and require a complex integration of fine motor skills (Doherty, 1985; Grove et al., 2019; Meuris et al., 2014). Yet, some teachers continued to use KWS as an input strategy with these learners, in keeping with the suggestion that emphasis should be placed on the function not the articulation of the sign (von Tetzchner & Martinsen, 1992). Although students with motor and other physical disabilities may not be able to use formal sign, they may be able to approximate signs (Walker et al., 2019), which is sometimes overlooked.

Overall, teachers felt that untrained staff, an inadequate curriculum, and factors related to resources (e.g., limited access to training manuals, lack of funding) and training (e.g., lack of follow-up training; limited time for in-service training) are hindering the use of signing in the educational context. The influx of new teachers and the fact that just over a third of the participating teachers had only between 1 and 5 years of teaching experience could have contributed to this finding. Teachers also indicated that training courses were typically “one-off” sessions of 1 to 4 days, without regular training to reinforce their newly acquired signing skills. Most teachers in the study felt that they would benefit from additional training and that they would be more likely to employ AAC strategies if they were more knowledgeable and confident about signing. Rombouts et al. (2017a) concurred, stating that teachers’ skills and beliefs may affect their use of AAC in classrooms. Teacher training is therefore central to improving skills in the practice of teachers and bringing about change in the classroom, and teachers’ beliefs and attitudes, all of which would lead to improved learning outcomes (Bornman & Donohue, 2013; Dalton et al., 2012).

Teachers from both public and independent special education schools noted the lack of KWS-related resources as a barrier. Public school teachers needed to experience a sense of control over their KWS needs through increased accessibility to existing classroom resources, such as KWS training manuals, while independent special education teachers felt that funding prevented them from purchasing such resources

### **Teachers' Knowledge, Skills, and Training Needs Regarding KWS**

Teachers with a high level of self-efficacy require ongoing support to create supportive KWS environments (Rombouts et al., 2017a). Because both public and independent school teachers were supported to some extent in their use of KWS, continued support for teachers future professional development is important and can be further supported by school administrators and policies to play a more active role in KWS (Rombouts et al., 2019). Such support might include regular training to reinforce teachers' newly acquired signing skills, training opportunities for parents, and increased accessibility to resources to help teachers feel more in control over their sign use by, for example, appointing a KWS coordinator within the school to drive the initiative or using mobile apps with signing videos). Ongoing support of existing teacher practices at school, and identifying teacher training and support needs, may lead to successful use of KWS in both classrooms (structured environments) and less structure environments (e.g., playground).

It is important to acknowledge the dynamic and complex relationship between the sign environment and the use of signing by teachers and learners with complex communication needs; otherwise, the quality of the environment will not be realized and will depend solely on teacher preferences. As with any innovation, perceptions may change with time as a function of both experience and the expertise that develops through the process of implementation (Bornman &

Donohue, 2013). Deciding to introduce signing should be viewed as an organizational initiative rather than an individualized compensatory strategy (Budiyanto et al., 2018; Rombouts et al., 2019).

### **Limitations and Directions for Further Research**

Although a substantial number of teachers (101) from a wide variety of schools participated in the study, only urban schools within the Gauteng province were included because these schools tend to be better-resourced (Tonsing & Dada, 2016). As such, the results may not necessarily be fully representative of the greater South African region. In addition, sampling bias may be evident because only schools with knowledge of or exposure to unaided AAC participated in the study. Special needs schools that did not use KWS were excluded because the aim of the study was to report on the perceptions of teachers who had used signing; thus, it is not possible to generalize the results across all school environments within South Africa. In addition, the presence of the first author during completion of the survey might have compromised teacher anonymity and may have resulted in some questions being answered in a socially desirable way, thereby resulting in the so called “Hawthorne effect” (Leedy & Ormrod, 2014).

The present findings suggest that more research is needed to better understand the views of school officials, SLPs, and teachers about the implementation of KWS as an unaided AAC strategy at schools that do not currently employ KWS. This is important because the use of signing is influenced by the culture, beliefs, and existing practices within a particular school environment and community (Sheehy & Budiyanto, 2014). In addition, alternative forms of support for the use of KWS, such as the development of a KWS mobile application specifically for teachers, should be investigated. Such an app could be beneficial to those who are new to KWS or who need refreshers now and then and might also help increase access to limited-



signing resources at special schools. Research is also needed to better understand the concept of co-collaboration that exists between the school and home contexts, with a view to strengthening relationships between teachers and parents, and sharing resources, knowledge, and experiences regarding teaching practices.

### **Conclusion**

This study provides preliminary evidence about teachers' perceptions regarding the use of KWS to support learners with special educational needs. Results suggest that most of the participants used signing to some extent within and outside the classroom environment and that they not only had a positive attitude towards the use of signing but also understood its educational benefits. Teachers identified KWS to be most useful for supporting speech, understanding, and learning, and for developing language skills. They typically combine signs with spoken words and also with pictures in a variety of innovative structured activities such as storytelling, singing, rhymes, role play and in group activities, which in return provide enjoyment and satisfaction. Teachers also identified a variety of factors that influence the use of KWS within the educational system. These factors are related to the teachers' school context (e.g., school culture), the team members involved, community awareness, learner-related factors (e.g., specific diagnoses), and training needs. The sustainability of an innovation such as KWS is important and depends on the quality of training, as well as the reinforcement of signing skills acquired to maintain a high signing environment in education.

## References

- Beukelman, D. R., & Mirenda, P. (2013). *Augmentative and alternative communication: Supporting children and adults with complex communication needs*. Paul H. Brookes Publishing.
- Blackstone, S. W., Williams, M. B., & Wilkins, D. P. (2007). Key principles underlying research and practice in AAC. *Augmentative and Alternative Communication, 23*(3), 191–203.
- Bornman, J., & Donohue, D. K. (2013). South African teachers' attitudes towards learners with barriers to learning: Attention-deficit and hyperactivity disorder and little or no functional speech. *International Journal of Disability, Development and Education, 60*(2), 85–104. <https://doi.org/10.1080/1034912x.2013.786554>
- Bornman, J., & Tönsing, K. (2017). Augmentative and alternative communication. In E. Landsberg, D. Kruger, & E. Swart (Eds.), *Addressing barriers to learning: A South African perspective* (3rd ed., pp. 188–200). Van Schaik.
- Budiyanto, Sheehy, K., Kaye, H., & Rofiah, K. (2018). Developing Signalong Indonesia: issues of happiness and pedagogy, training and stigmatisation. *International Journal of Inclusive Education, 22*(5), 543–559 <https://doi.org/10.1080/13603116.2017.1390000>
- Chadwick, D. D., & Joliffe, J. (2009). A pilot investigation into the efficacy of a signing training strategy for staff working with adults with intellectual disabilities. *British Journal of Learning Disabilities, 37*, 34–42. <https://doi.org/10.1111/j.1468-3156.2008.00503.x>
- Clibbens, J. (2001). Signing and lexical development in children with Down Syndrome. *Down Syndrome Research and Practice, 7*(3), 101–105. <https://doi.org/10.3104/reviews.119>
- Coburn, K. L., Jung, S., Ousley, C. L., Dawn J. Sowers, D. L., Wendelken, M., & Wilkinson, K. M. (2021) Centering the family in their system: a framework to promote family-centered

AAC services, *Augmentative and Alternative Communication*, 37(4), 229-240.

<https://doi.org.10.1080/07434618.2021.1991471>

Cravotta, A., Busă, M. G., & Prieto, P. (2019). Effects of encouraging the use of gestures on Speech. *Journal of Speech, Language, and Hearing Research*, 62, 3204 – 3219.

Dada, S., & Alant, E. (2001). Teacher's attitudes towards learners with little or no functional speech using alternative/augmentative communication devices. *South African Journal of Education*, 21(2), 99-103.

Dalton, E. M., McKenzie, J. A., & Kahonde, C. (2012). The implementation of inclusive education in South Africa: Reflections arising from a workshop for teachers and therapists to introduce universal design for learning. *African Journal of Disability*, 1(1), 1–7. <https://doi.org/10.4102/ajod.v1i1.13>

Dark, L., Brownlie, E., & Bloomberg, K. (2019). Selecting, developing and supporting key-word sign vocabularies for children with developmental disabilities. In N. Grove & K. Launonen (Eds.), *Manual sign acquisition in children with developmental disabilities* (pp. 213–245). Nova Science.

De Bortoli, T., Arthur-Kelly, M., Foreman, P., Balandin, S., & Mathisen, B. (2011). Complex contextual influences on the communicative interactions of students with multiple and severe disabilities. *International Journal of Speech-Language Pathology*, 13, 422–435. <https://doi.org/10.3109/17549507.2011.550691>

Department of Education. (2001). *Special needs education: Building an inclusive education and training system* [Education White Paper 6].

Department of Education. (2011). South African Council for Educators Act (SACE), Number 31 of 2000.

Department of Education. (2018). *South African sign language, home language. Curriculum and Assessment Policy Statement: Foundation Phase Grades R-3.*

Doherty, J. (1985) The effects of sign characteristics on sign acquisition and retention: an integrative review of the literature. *Augmentative and Alternative Communication, 1*(3), 108-121. <https://doi.org.10.1080/07434618512331273601>

Donohue, D. K., & Bornman, J. (2014). The challenges of realising inclusive education in South Africa. *South African Journal of Education, 34*(2), 1–14. <http://doi.org/10.15700/201412071114>

Donohue, D.K. & Bornman, J. (2015). South African teachers' attitudes toward the inclusion of learners with different abilities in mainstream classrooms. *International Journal of Disability, Development and Education, 62*(1), 42-59.

Engelbrecht, P. (2006). The implementation of inclusive education in South Africa after ten years of democracy. *European Journal of Psychology of Education, XXI* (3), 253–264.

Geldenhuys, J. L., & Wevers, N. E. J. (2013). Ecological aspects in mainstream primary schools in the Eastern Cape, SA. *South African Journal of Education, 33*(3), 1–18.

Grove, N., Dark, L., & Brownlie, E. (2019). Assessment and intervention for problems in sign production. In N. Grove & K. Launonen (Eds.), *Manual sign acquisition in children with developmental disabilities* (pp. 247–270). Nova Science.

Launonen, K., & Grove, N. (2019). Looking back, looking forward: Conclusion. In N. Grove & K. Launonen (Eds.), *Manual sign acquisition in children with developmental disabilities* (pp. 427–437). Nova Science.

Leedy, P. D., & Ormrod, J. E. (2014). *Practical research: Planning and design*. Pearson.

- Light, J., & McNaughton, D. (2012). Supporting the communication, language and literacy development of children with complex communication needs: State of the science and future research priorities. *Assistive Technologies, 24*, 34-44.  
<https://10.1080/10400435.2011.648717>.
- Lloyd, L. L., Fuller, D. R., & Arvidson, H. (1997). *Augmentative and alternative communication: A handbook of principles and practices*. Allyn & Bacon.
- McDowell, A. C. M. (2019). *The use of unaided augmentative and alternative communication strategies to support learners in South African special schools: A study of teachers' perceptions*. Master's mini-dissertation, University of Pretoria, Pretoria, South Africa.
- Meuris, K., Maes, B., de Meyer, A., & Zink, I. (2014). Manual signing in adults with intellectual disability: Influence of sign characteristics on functional sign vocabulary. *Journal of Speech, Language, and Hearing Research, 57*, 990–1010.  
[https://doi.org/10.1044/2014\\_JSLHR-L-12-0402](https://doi.org/10.1044/2014_JSLHR-L-12-0402).
- Millar, D., Light, J. C., & Schlosser, R. W. (2006). The impact of augmentative and alternative communication intervention on the speech production of individuals with developmental disabilities: A research review. *Journal of Speech, Language, and Hearing Research, 49*, 248-264. [https://doi.org/10.1044/1092-4388\(2006/021\)](https://doi.org/10.1044/1092-4388(2006/021))
- Mistry, M., & Barnes, D. (2013). The use of Makaton through talk, through play, for pupils who have English as an Additional Language (EAL) in the Foundation Stage. *International Journal of Primary, Elementary and Early Years Education, 41*, 603–616.
- Murray, J., & Goldbart, J. (2009). Augmentative and alternative communication: A review of current issues. *Pediatrics and Child Health, 19*(10), 464–468.

- Norburn, K., Levin, A., Morgan, S., & Harding, C. (2016). A survey of augmentative and alternative communication used in an inner-city special school. *British Journal of Special Education*, 43(3), 289–306. <https://doi.org/10.1111/1467-8578.12142>
- Popping, R. (2015). Analyzing open-ended questions by means of text analysis procedures. *Bulletin de Méthodologie Sociologique*, 128, 23-39. [https://doi: 10.1177/0759106315597389](https://doi.org/10.1177/0759106315597389)
- Rickards, G., Magee, C., & Artino, A. R. (2012). You can't fix by analysis what you've spoiled by design: Developing survey instruments and collecting validity evidence. *Journal of Graduate Medical Education*, 4(4), 407–410. <https://doi.org/10.4300/JGME-D-12-00239.1>
- Rombouts, E., Maes, B., & Zink, I. (2016a). Attitude and key word signing usage in support staff. *Research in Developmental Disability*, 55, 77–87. <https://doi.org/10.1016/j.ridd.2016.03.016>
- Rombouts, E., Maes, B., & Zink, I. (2017a). Beliefs and habits: Staff experiences with key word signing in special schools and group residential homes. *Augmentative and Alternative Communication*, 33(2), 87–96. <https://doi.org/10.1080/07434618.2017.1301550>
- Rombouts, E., Maes, B., & Zink, I. (2017b). The behavioural process underlying augmentative and alternative communication usage in direct support staff. *Journal of Intellectual and Developmental Disability*, 42(2), 101–113. <https://doi.org/10.3109/13668250.2016.1219023>
- Rombouts, E., Maes, B., & Zink, I. (2018). Use of key word signing by staff in special schools and in day centres for adults with intellectual disabilities. *Journal of Intellectual Disability Research*, 3(1), 21–29. <https://doi.org/10.1111/jir.12444>

Rombouts, E., Sheehy, K., Buchanan-Mellon, J., & Grove, N. (2019). Signing in school. In N.

Grove & K. Launonen (Eds.), *Manual sign acquisition in children with developmental disabilities* (pp. 359–377). Nova Science.

Schlosser, R. W., & Wendt, O. (2008). Effects of augmentative and alternative communication intervention on speech production in children with autism: A systematic review.

*American Journal of Speech-Language Pathology*, *17*, 212-230.

[https://doi.org/10.1044/1058-0360\(2008/021\)](https://doi.org/10.1044/1058-0360(2008/021))

Sheehy, K., & Budiyanto (2014). Teachers' attitudes to signing for children with severe learning disability in Indonesia. *International Journal of Special Education*, *18*(11), 1143–1161.

<https://doi.org/10.1080/13603116.2013.879216>

Soto, G. (1997). Special education teacher attitude toward AAC: Preliminary survey. *AAC*,

*13*(3), 186–197. <https://doi.org/10.1080/07434619712331278008>

Sullivan, G. M., & Artino Jr., H. R. (2013). Analyzing and interpreting data from Likert-type scales. *The Journal of Graduate Medical Education*, *5*, 541-542.

<https://doi.org/10.4300/JGME-5-4-18>

Tan, X. Y., Trembath, D., Bloomberg, K., Iacono, T., & Caithness, T. (2014). Acquisition and generalization of key word signing by three children with autism. *Developmental*

*Neurorehabilitation*, *17*(2), 125–136. <https://doi.org/10.3109/17518423.2013.863236>

Tönsing, K. M., & Dada, S. (2016). Teachers' perceptions of implementation of aided AAC to support expressive communication in South African special schools: A pilot

investigation. *AAC*, *32*(4), 282–304. <https://doi.org/10.1080/07434618.2016.1246609>

UN (1989). Convention on the Rights of the Child.

<https://www.refworld.org/docid/3ae6b38f0.html>

UN (2006). Convention on the Rights of Persons with Disabilities.

<http://www.un.org/disabilities/documents/convention/convoptprot-e.pdf>

von Tetzchner, S., & Martinsen, H. (1992). *Introduction to symbolic and augmentative communication*. Singular.

Walker, M., Mitha, S., & Riddington, C. (2019). Cultural issues in developing and using signs within the Makaton Language Programme in different countries. In N. Grove & K. Launonen (Eds.), *Manual sign acquisition in children with developmental disabilities* (pp. 391–408). Nova Science.