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Augmentative and alternative communication training: The effect on perceptions of special school teachers

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Augmentative and alternative communication (AAC) strategies benefit learners with complex communication needs (CCN) by allowing them to participate, interact and learn. AAC is realised in the South African Education policy; however, research indicates that many teachers still have limited AAC knowledge. With this study we aimed to describe the effect of a newly developed evidence-based AAC training programme on special school teachers' perceptions of their own abilities related to teaching learners with CCN as well as their perceptions of the general academic, communication, and classroom interaction skills of learners with CCN and finally the teachers' perceptions of the inclusion of learners with CCN. A quasi-experimental pre-test-post-test group design with a non-randomised control group was used, employing a standardised measuring instrument, with 5 subscales, namely the modified teachers attitude scale (MTAS). The sample size included 58 teachers who participated: 6 in the pilot, 34 in the experimental and 18 in the control group. The brief AAC training session of 4 hours had a positive, statistically significant effect on several items on the subscales measuring teachers' perceptions of their abilities related to teaching learners with CCN, as well as their perceptions of the communication of learners with CCN, classroom interaction skills, and teachers' perceptions on the inclusion of learners with CCN. AAC training is recommended for special school teachers to enhance their own knowledge and to enhance the academic and social skills of learners with CCN. Furthermore, future studies are recommended to determine the prevalence of learners with CCN to influence the planning of services for this population in this context.

Keywords: augmentative and alternative communication (AAC); knowledge; perceptions; special needs education; special school teachers; training

Introduction

In all classrooms where learners have diverse abilities and support needs, teaching and learning occurs through communication (Forlin & Chambers, 2017). Teachers are thus expected to communicate in such a way that all learners can benefit from their teaching – including those learners with complex communication needs (CCN) (Bornman, 2021). Learners with CCN are typically considered to have a vocabulary of less than 30 intelligible spoken words, attributable to a wide range of aetiologies (e.g., autism spectrum disorder (ASD), cerebral palsy (CP), and Down syndrome) (Beukelman & Light, 2020). As such, these learners represent a heterogenous group in terms of abilities and needs, yet they share an inability to rely on spoken language to make their needs and wants known, which hinders their ability to participate and learn in the classroom (Beukelman & Light, 2020). In addition, their limited verbal skills also negatively impact their ability to interact with peers and opens a potential gateway for being avoided and/or ignored by teachers and other learners (Bornman, 2021).

Augmentative and alternative communication (AAC) strategies allow learners with CCN to participate and interact with their peers inside and outside the classroom (Light & McNaughton, 2013) while providing access to a curriculum that enhances their academic skills (Stanford & Harris, 2019). The implementation of AAC strategies for learners with CCN has a solid global (Beukelman & Light, 2020; Iacono, Trembath & Erickson, 2016) and local (Bornman, 2021; Tönsing & Dada, 2016) evidence base to enhance communication and facilitate learning. Moreover, AAC increases learners' levels of spoken language and supports their ability to communicate, thereby enhancing their social skills (Radici, Heboyan, Mantovani & De Leo, 2019). While also providing access to the curriculum (Stanford & Harris, 2019), AAC augmented input can enhance learners' comprehension of verbal language (Drager, Light & McNaughton, 2010). AAC supports literacy learning (Light et al., 2019) and develops literacy for learners with CCN (Light & McNaughton, 2013), thereby enhancing academic gains. Literature thus confirms that the implementation of AAC in the classroom is beneficial for both academic and social gains for learners with CCN (Drager et al., 2010; Radici et al., 2019; Stanford & Harris, 2019; Tönsing & Dada, 2016).

International literature indicates that although teachers are expected to teach learners with CCN, they often lack sufficient knowledge and skills to successfully implement AAC intervention in their classrooms (Da Fonte & Boesch, 2016; Lee & Park, 2018; Stanford & Harris, 2019). It is not unusual for these teachers to have never received any form of AAC training (Radici et al., 2019). Likewise, teachers in South Africa have limited knowledge on AAC, which unintentionally hinders the learners' academic and social development (Bornman & Donohue, 2013; Tönsing & Dada, 2016). Providing teachers with AAC training can result in positive outcomes for teachers and learners with CCN, such as increasing communication interactions (Douglas, West & Kammers, 2020). Various AAC training programmes specifically targeted at teachers have been recorded in the literature (Muttiah, Drager, McNaughton & Perera, 2018; Patel & Khamis-Dakwar, 2005; Subihi, 2013).

Literature Review

Inclusive education

During a press release, the United Nations Children's Fund reported an estimate of almost 240 million children with disabilities worldwide (UNICEF, 2021). These children need appropriate education, which is globally recognised as a basic human right, as captured in Article 24 of the United Nations Convention on the Rights of Persons with Disabilities (CRPD) (United Nations, 2006). The CRPD is also aligned with Goal 4 of the Sustainable Development Goals (SDGs), which acknowledges and advocates for inclusive, quality education with education opportunities tailored to provide different levels of support across the lifespan (United Nations, n.d.).

Internationally, inclusive education gained traction with the adoption of the Salamanca Agreement with its outcome known as "Education For All", advocating for quality basic education for all disabled children and for inclusion. Thus, it comes as no surprise that the Salamanca Statement is considered to be the most significant international document in the field of special education as it informs policies, guides the actions of governments, and endorses inclusive education (United Nations Educational, Scientific and Cultural Organization [UNESCO], 1994). Inclusive educational policies have since been widely adopted in most countries (Hardy & Woodcock, 2023).

Locally, the Department of Education advocates that children between 7 and 15 years old – including those with disabilities – have the right to basic education. In South Africa, Education White Paper 6 (EWP6) became the basis for inclusive education in order to create a wider spread of educational support services in line with what learners with disabilities require (DoE, 2001). This was done by stratifying schools into mainstream schools (for learners requiring low levels of support), full-service schools (for learners requiring moderate levels of support), as well as special schools known as resource centres or as schools for learners with special educational needs (LSEN) (for learners requiring high levels of support). To date, most LSEN are placed in LSEN schools that implement an appropriate curriculum for learners with severe intellectual disability (known as DCAPS) that caters specifically for the needs of these learners by accommodating individual learner differences in the learning environment (Department of Basic Education [DBE], Republic of South Africa [RSA], 2018).

South African LSEN schools are supported by district-based support teams (DBST), who are tasked with placing learners in appropriate schools and supporting the school-based support team (SBST) known as an institution-level support team (ILST). The ILST forms an initial support structure

for both teachers and learners by identifying and addressing teacher, learner, and school needs by developing appropriate learner programmes, facilitating staff development and training, encouraging collaborative teamwork, and engaging with the DBST (Nel, Tlale, Engelbrecht & Nel, 2016). In line with EWP6, identified teachers from LSEN schools should also serve on the DBST, therefore, there is a reciprocal relationship between DBST members and LSEN schools (DoE, 2001). The successful implementation of education policies depends on teachers as they are the gatekeepers of activities inside and outside the classroom. In inclusive classrooms, teachers are responsible for adopting effective teaching practices by highlighting learners' strengths rather than weaknesses (Bornman, 2021; DoE, 2001). South African teachers are currently trained to accommodate learners with diverse support needs within a single classroom using a curriculum and assessment policy statement (CAPS) and DCAPS curricula (DBE, RSA, 2018).

Globally, teacher perceptions of inclusion and disability are reported as influencing the implementation of inclusion (Bornman, 2021). A Spanish study reports that teachers in special education had positive perceptions towards including learners with severe permanent disabilities (Colmenero, Pegalajar & Pantoja, 2019), while a French study highlights that teacher attitudes were more positive towards learners with motor (physical) disabilities than towards learners with intellectual disability and learners with ASD (Jury, Perrin, Rohmer & Desombre, 2021). The French teachers held the least favourable attitudes towards including learners with ASD than any other disability.

Results from a South African study in which vignettes of learners with congenital blindness, ASD, spastic quadriplegia, and Down syndrome were used, show that teachers thought that the inclusion of these learners into mainstream classrooms would improve their social development more than their intellectual (academic) development (Donohue & Bornman, 2015). In an earlier study, these authors reported that teachers' attitudes were less favourable towards a learner with CCN than a learner with attention deficit hyperactivity disorder (ADHD) (Bornman & Donohue, 2013). The Pygmalion/Rosenthal effect, which has often been described in education research, posits that if teachers hold high expectations for a learner, then it is likely that the learner will reflect that enhanced performance (Bornman, 2021). Drawing from the Pygmalion/Rosenthal effect, applied research indicates that teachers who hold positive attitudes towards inclusion result in a more favourable work ethic towards learners with high support needs (Bornman & Donohue, 2013; Forlin & Chambers,

2017). However, the opposite is also true – teachers' or parents' negative attitudes hamper the successful implementation of inclusion. Teachers' perceptions towards learners with CCN will, therefore, impact their expectations for these learners, affecting the learning opportunities provided to them and, ultimately, the academic outcomes they achieve as a result of the AAC training.

Learners with CCN and AAC

Learners with CCN are a neglected group, despite high prevalence rates in LSEN schools. A landmark prevalence study shows that 39% of learners in schools for learners with intellectual disabilities in the greater Pretoria metropolis had CCN (Alant, 1999; Bornman & Alant, 1997). As alluded to earlier, learners with CCN are a heterogeneous group who differ with regards to motor, linguistic, cognitive, and perceptual skills with diagnoses including, but not limited to, ASD, CP, Down syndrome, developmental disabilities, and multiple disabilities (Stanford & Harris, 2019), representing different cultural, language, socio-economic, and environmental backgrounds (Drager et al., 2010). Due to the limited speech of learners with CCN and the resulting negative impact on classroom participation (Beukelman & Light, 2020) as well as barriers to learning (both academically and socially), the DoE, RSA (2005) states that these learning barriers occur because of the unavailability of AAC strategies. AAC is the strategy which will enable these learners to learn, engage, and develop. AAC either supplements (in an augmentative manner) or replaces speech (in an alternative manner) for a temporary or a permanent period, depending on the learner's specific needs (Beukelman & Light, 2020). AAC systems include both unaided forms of communication, such as communicating by using gestures, manual signs, vocalisations, eye-pointing, and fingerspelling and aided forms, such as using objects, pictures, photographs, or written words. These aided symbols can be displayed on low-technology communication boards or on high-technology devices using smartphone applications or speech-generating devices (Beukelman & Light, 2020).

For learners with CCN to bridge the identified barriers to learning and benefit from AAC, teachers should receive relevant training in line with continuous professional teacher development (Douglas et al., 2020). AAC training and support to teachers when implementing AAC in their respective classrooms is also in line with evidence-based education outcomes, which agrees that learners with CCN benefit from AAC strategies, as it allows for social participation and inclusion (Aldabas, 2021); strengthens the development of speech and language skills (Drager et al., 2010); enhances the development of effective

communication and functional academic skills which are a prerequisite for learning (Beukelman & Light, 2020); provides access to the curriculum (Aldabas, 2021); promotes literacy development (Light & McNaughton, 2013), and improves the learner's quality of life (Andzik, Chung & Kranak, 2016). Literature has shown that AAC training programmes can improve teachers' AAC knowledge (Patel & Khamis-Dakwar, 2005), skills and competency (Costigan & Light, 2010; Light & McNaughton, 2013) and can positively influence teachers' attitudes towards learners with CCN (Patel & Khamis-Dakwar, 2005). If appropriate andragogy (i.e., adult learning principles) with the appropriate content is used – through in-service training – teachers can implement the AAC strategies they learnt in their respective classrooms (Akintolu & Letseka, 2021; Douglas et al., 2020; Van der Merwe-Muller & Dasoo, 2021). Providing teachers with AAC knowledge through training can positively change attitudes, behaviours, knowledge, skills, and competency.

Therefore, the main aim with this study was to describe the effect of a newly developed evidence-based AAC training programme (based on a rapid review [Ngcobo, 2022]) on special school teachers' perceptions of: i) their abilities related to teaching learners with CCN, ii) the general academic, communication, and classroom interaction skills of learners with CCN, and iii) the inclusion of learners with CCN.

Theoretical/Conceptual Framework

In order to address the main aim of the study, with focus on the participants, their age and their knowledge, the successful implementation of this research draws heavily on the ideas of andragogy (Akintolu & Letseka, 2021) and how a continuous education programme that uses adult learning principles, which rely on the participants' own experiences, beliefs, and attitudes, can result in transformative learning (Merriam, 2017).

Methodology

A quasi-experimental design with a non-randomised control group pre-test-post-test design was employed (McMillan, 2022). This design allowed for a comparison between the pre-test and post-test, which would indicate the effect of the independent variable (i.e., the AAC training programme) on the dependent variable (i.e., the teachers' perceptions), as well as comparisons between the control and experimental groups. Using a control group helped to account for a threat to internal validity.

Population and Sample

Non-probability purposeful sampling was used to select and recruit teachers from three LSEN schools in KwaZulu-Natal (KZN) (covering the

districts of Umlazi [$N = 1$] and uGu [$N = 2$]). Strict ethical procedures were upheld, and permission was obtained from the Department of Education in KZN, and consent from the three relevant school principals and all the teachers. The inclusion criteria were that the participants were registered with the South African Council for Educators (SACE) as teachers, participants were employed at

the participating LSEN schools, and the participants had to be able to read, write and speak in English. Teachers who did not meet these criteria were excluded. Fifty-eight teachers participated – six in the pilot study, 18 in the control group and 34 in the experimental group. The participants' demographics are presented in Table 1.

Table 1 Participant description ($N = 58$)

Attribute	Category	Pilot study ($n = 6$)	Experimental group ($n = 34$)	Control group ($n = 18$)
Sex	Male	0%	14.7%	11.1%
	Female	100%	85.3%	88.9%
Age	20–30 years	0%	17.7%	11.1%
	31–40 years	17%	23.5%	16.7%
	41–50 years	17%	26.5%	55.5%
	51–60 years	67%	29.4%	16.7%
	> 60 years	0%	2.9%	0%
Languages	isiZulu	100%	64.7%	33.3%
	English	0%	35.3%	38.9%
	*Other	0%	0%	27.8%
Qualifications	Teaching diploma	0%	29.4%	44.4%
	Bachelor's degree	33%	50%	38.9%
	Honours degree	67%	20.6%	16.7%
Specialised training	Yes	100%	67.6%	55.6%
	No	0%	32.4%	44.4%
Teaching experience overall	< 1 year	0%	3%	0%
	1–5 years	0%	44%	11%
	6–10 years	17%	3%	11%
	11–15 years	33%	3%	17%
	16–20 years	33%	23.5%	22%
	> 20 years	17%	23.5%	39%
Teaching experience: LSEN school(s)	< 1 year	0%	11.7%	0%
	1–5 years	0%	44%	17%
	6–10 years	50%	8.8%	17%
	11–15 years	17%	6%	22%
	16–20 years	33%	23.5%	33%
	> 20 years	0%	6%	11%
Previous AAC training	Yes	17%	26.5%	73.5%
	No	83%	22.2%	77.8%

Note. *Other languages: Afrikaans and isiXhosa.

Table 1 shows that although the LSEN schools were comparable, the teacher attributes showed some variations, although none were statistically significant.

Measuring Instrument

The modified teachers attitude scale (MTAS) (Van Heerden, 2009) was used because of its relevance to the study aims and context. The MTAS starts with a vignette followed by 32 questions set out in five subscales, each with seven or fewer questions. Subscale 1 (questions 1–6) focuses on teacher's perceptions of their own abilities related to teaching learners with CCN; subscale 2 (questions 7–12) on perceptions regarding learners with general academic abilities; subscale 3 (questions 13–19) on these learner's classroom interaction; subscale 4 (questions 20–26) on general communication; and subscale 5 (questions 27–32)

on teacher's perceptions of inclusion of learners with CCN.

For the post-test (i.e., directly after training), the vignette was slightly altered by changing non-critical factors (e.g., the name of the learner described in the case study) to create a feeling of novelty for the participants. Before training started, participants were requested to also complete a short biographic questionnaire.

Procedure

The proposed instrument and method were tested in a pilot study prior to the main data collection. Six teachers with similar attributes to the main study participants individually completed the proposed MTAS using the think-aloud method (Güss, 2018). From the results of the pilot study we realised that the Likert scale should be visible on every page and that the participants should complete the MTAS in

a group, with the researchers reading the vignette and questions aloud. Furthermore, prior arrangements were made with the school principals to ensure sufficient staffing to avoid disrupting teaching and learning.

In order to inform the content of the proposed AAC training programme, a rapid review was conducted (Ngcobo, 2022). With this review we aimed to identify and analyse existing AAC training programmes for teachers. The newly developed training programme, based on the outcome of the review, consists of three sessions spread across 4 hours. The first session (1.5 hours) was lecture-based and focused on the importance of communication, introduced AAC, highlighted unaided systems and described which learners could benefit from AAC. A 30-minute break with refreshments was provided, followed by the second 1.5-hour session. This session was practical-based, using a workshop format, and focused on aided AAC and implementing these strategies in the classroom. The third session (30 minutes) included a discussion on promoting language learning via storytelling. Hereafter the participants completed

the post-test MTAS.

Data Analysis

All raw data were recorded on the MTAS questionnaire and later transferred to Version 28 of the Statistical Package for Social Sciences ([SPSS] McMillan, 2022). Descriptive statistics (frequency and percentage) described biographic variables (e.g., age, sex, first language, qualifications, and experience) and investigated potential relationships, while inferential statistics (a two-sample *t*-test) was used to determine a statistically significant difference between the pre-test and post-test means in terms of specific features.

Results

The results are shown in Table 2 and are discussed according to the three sub-aims of the study, namely teacher's perceptions of i) their own abilities related to teaching learners with CCN (subscale 1), ii) the general academic, communication, and classroom interaction skills of learners with CCN (subscales 2–4), and iii) the inclusion of learners with CCN (subscale 5).

Table 2 Pre- and post-training results on all five MTAS subscales for the control and experimental group

Question	Group	Pre-train	Post-train	Pre-train	Post-train	Pre-train	Post-train	<i>p</i>
		Disagree	Disagree	Uncertain	Uncertain	Agree	Agree	
Subscale 1: Teachers' perceptions of their own teaching abilities related to learners with CCN								
1) I will be able to teach this learner	Exp	6%	0%	3%	0%	91%	100%	0.06
	Control	0%	0%	6%	12%	94%	88%	1
2) I am trained to teach this learner	Exp	18%	0%	12%	3%	70%	97%	0.01*
	Control	29%	24%	24%	12%	47%	65%	0.22
3) I will be able to cope with this learner in my class without help	Exp	30%	12%	21%	18%	48%	70%	0.03*
	Control	12%	6%	18%	24%	71%	71%	0.75
4) I need extra training to teach this learner	Exp	12%	24%	3%	15%	85%	61%	0.01*
	Control	0%	18%	18%	6%	82%	76%	0.21
5) I will need an assistant if this learner were in my class	Exp	15%	18%	6%	6%	79%	76%	0.10
	Control	35%	35%	12%	29%	53%	35%	0.14
6) I will feel confident to teach this learner	Exp	6%	0%	27%	3%	67%	97%	0.01*
	Control	0%	0%	6%	18%	94%	82%	0.27
Subscale 2: Teachers' perceptions of the general academic abilities of learners with CCN								
7) This learner wants to learn	Exp	0%	0%	6%	3%	94%	97%	0.20
	Control	0%	0%	0%	6%	100%	94%	0.77
8) This learner will learn quickly	Exp	48%	42%	36%	45%	15%	12%	0.89
	Control	29%	18%	47%	47%	24%	35%	0.56
9) This learner will need extra help to learn	Exp	9%	0%	6%	3%	85%	97%	0.72
	Control	6%	0%	6%	12%	88%	88%	0.70
10) This learner will eventually need a disability grant	Exp	3%	0%	12%	18%	85%	82%	0.72
	Control	24%	12%	12%	24%	65%	65%	0.70
11) This learner will be able attend a normal school	Exp	67%	61%	24%	30%	9%	9%	0.41
	Control	71%	65%	12%	12%	18%	24%	0.44
12) This learner will find a job one day	Exp	12%	6%	48%	52%	39%	42%	0.46
	Control	18%	18%	47%	59%	35%	24%	0.23
Subscale 3: Teachers' perceptions of the classroom interaction of learners with CCN								
13) This learner will disrupt others in class	Exp	61%	76%	12%	15%	27%	9%	0.21
	Control	59%	65%	29%	29%	12%	6%	0.54
14) This learner will answer questions appropriately in class	Exp	45%	27%	42%	33%	12%	39%	0.01*
	Control	47%	47%	18%	29%	35%	24%	0.75
15) This learner will be able to participate appropriately in class	Exp	36%	18%	33%	15%	30%	67%	0.00*
	Control	29%	29%	18%	24%	53%	47%	1.00
16) This learner will be able to ask questions in class	Exp	58%	27%	24%	39%	18%	33%	0.00*
	Control	41%	29%	18%	29%	41%	41%	0.48
17) This learner will be lonely in class	Exp	55%	58%	36%	27%	9%	15%	0.74
	Control	47%	53%	29%	24%	24%	24%	0.82
18) This learner will be isolated from participating in class	Exp	73%	79%	15%	9%	12%	12%	0.44
	Control	53%	71%	18%	12%	29%	18%	0.07
19) This learner will be able to tell a coherent story	Exp	52%	36%	27%	30%	21%	33%	0.06

Question	Group	Pre-train	Post-train	Pre-train	Post-train	Pre-train	Post-train	<i>p</i>	
		Disagree	Disagree	Uncertain	Uncertain	Agree	Agree		
	Control	41%	59%	35%	18%	24%	24%	0.43	
Subscale 4: Teachers' perceptions of how learners' with CCN communicate									
20)	This learner will be able to ask for things that he needs	Exp	27%	9%	12%	12%	61%	79%	0.03*
		Control	12%	18%	12%	24%	76%	59%	0.06
21)	This learner will be able to start a conversation	Exp	39%	24%	30%	21%	30%	55%	0.01*
		Control	41%	35%	29%	12%	29%	53%	0.03*
22)	This learner will have difficulties to develop personal relationships	Exp	30%	33%	24%	39%	45%	27%	0.14
		Control	24%	18%	35%	35%	41%	47%	0.33
23)	This learner is impolite	Exp	76%	73%	12%	15%	12%	12%	0.87
		Control	76%	71%	6%	18%	18%	12%	0.38
24)	This learner will have difficulty to share information with others	Exp	24%	42%	30%	21%	45%	36%	0.24
		Control	29%	24%	12%	29%	59%	47%	0.35
25)	This learner is well mannered	Exp	12%	21%	30%	12%	58%	67%	1.00
		Control	0%	0%	47%	29%	53%	71%	0.19
26)	I will often engage in conversation with this learner	Exp	15%	9%	9%	15%	76%	76%	0.32
		Control	0%	12%	0%	0%	100%	88%	0.22
Subscale 5: Teachers' perceptions of the inclusion of learners with CCN									
27)	I am willing to have this learner in my class	Exp	3%	3%	0%	3%	97%	94%	0.45
		Control	0%	0%	0%	0%	100%	100%	0.33
28)	This learner will benefit from inclusive education	Exp	6%	6%	3%	0%	91%	94%	0.57
		Control	6%	0%	0%	6%	94%	94%	0.27
29)	This learner will have a negative effect on the classroom environment	Exp	70%	82%	18%	12%	12%	6%	0.16
		Control	76%	76%	18%	18%	6%	6%	0.75
30)	I will have enough time to educate this learner	Exp	24%	9%	36%	21%	39%	70%	0.00*
		Control	24%	24%	24%	29%	53%	47%	1.00
31)	I am willing to modify my curriculum goals to ensure academic success of this learner	Exp	0%	3%	6%	3%	94%	94%	0.64
		Control	12%	6%	6%	6%	82%	88%	0.14
32)	I am willing to modify my instructional techniques to ensure academic success of this learner	Exp	0%	3%	0%	3%	100%	94%	0.04*
		Control	0%	6%	12%	0%	88%	94%	0.82

Note. *Significance at the 5% level ($p \leq 0.05$). Exp = Experimental.

Teacher Perceptions of their Own Abilities related to Teaching Learners with CCN

Subscale 1 shows that most participants in the experimental group, during pre- and post-training, agreed that they would be able to teach this learner (91% and 100%, respectively) and 94% and 88% in the control group. Similar results were noted regarding their perception of feeling trained to teach this learner (70% and 97%, respectively) in the experimental group and 47% and 65% in the control group. In both instances, an increase was noted during the post-training condition. This trend continued when teachers were asked whether they would be able to cope with having this learner in their class without help (48% to 70%), even though a high percentage (30%) disagreed with this statement prior to the training. As expected, the pre- and post-training scores for the control group remained unchanged. When asked how confident they felt about teaching these learners, teachers in the experimental group increased from pre- to post-training (67% to 97%), while the control group showed a decrease (94% to 82%). For Question 4, "I need extra training to teach this learner", scores decreased from 85% to 61% in the experimental group and 82% to 76% in the control group. A slight decrease was also noted for Question 5, "I will need an assistant if this learner is in my class" (79% to 76% in the experimental group) with a larger decrease in the control group (53% to 35%). Subscale 1 shows a statistically significant difference on the 5% level ($p \leq 0.05$) for four of the six questions for the experimental group but none for the control group.

Teacher's Perceptions of the General Academic -, Communication-, and Classroom Interaction Skills of Learners with CCN

Subscale 2 focused on general academic skills and showed that teachers' perceptions of whether the learner wanted to learn were already high pre-training (94% for the experimental group, increasing to 97%) and 100% pretraining for the control group, decreasing slightly to 94% post-training. Teachers' perceptions of whether the learner needed extra help to learn (Question 9) increased in the experimental group (85% to 97% post-training) but remained consistent (88%) for the control group. In the experimental group, there was a high agreement regarding teachers' perceptions of whether the learner would eventually need a disability grant (85% to 82% post-training). However, in the control group, teachers' perceptions remained unchanged (65% agreement). Most teachers disagreed with the statement, "The learners will be able to attend a normal school." For the experimental group, the pre-training score slightly decreased (67% to 61%), with a similar trend for the control group (71% to 65%). Teachers' perceptions of how quickly the learner would learn, showed significant variance. In

the experimental group, 48% disagreed pre-training, decreasing to 42% post-training, while the number of uncertain responses increased from 36% to 45%. For the control group, most teachers were uncertain (47%), without any change, although the number of agreements increased from 24% to 35%. Regarding the question of whether this learner would find a job one day, almost half of the participants in the control group (48% and 52%) were uncertain, while 39% in the experimental group agreed pre-training and 42% post-training. A similar trend was seen in the control group (47% and 59% were uncertain), while the percentage of agreement decreased from 35% to 24%.

No statistically significant changes were reported for any questions on subscale 2 for either the experimental or the control group. However, the increase in mean values from pre- to post-training for the experimental group for all questions (except Question 10) indicated a change in their perceptions, although not at a statistically significant level.

Subscale 3 focused on classroom interaction, and most of the participants' answers focused on the negative side of the scale. Regarding Question 13 ("This learner will disrupt others in class"), 61% disagreed pre-training, which increased to 76% for the experimental group, with a similar tendency noted in the control group (59% to 65%). For Question 18, "This learner will be isolated from participating in class", 73% of the experimental group disagreed pre-training and 79% post-training). This trend was also noticed in the control group (53% increasing to 71%). Question 17, "The learner will be lonely in class", also increased slightly in the disagree option for both the experimental (55% to 58%) and control groups (47% to 53%). Question 14 focused on whether the learner will answer questions appropriately in class. Pre-training, only 12% in the experimental group agreed, with 45% disagreeing, while 39% agreed post-training compared to 27% who disagreed. In the control group, 47% disagreed with both pre- and post-training while 35% agreed pre-training declining to 24%. Question 15 focused on whether the learner would be able to participate appropriately in class, with only 30% agreeing pre-training (increasing to 67%) in the experimental group. An opposite trend was noted in the control group (53% decreasing to 47%). In the experimental group, only 18% initially agreed with the statement that the learner would be able to ask questions in the class, increasing to 33% post-training, with no change in the control group (remaining at 41%). For Question 19, "The learner will tell a coherent story", 52% of the experimental group disagreed with this statement pre-training, reducing to 36% post-training, while 21% agreed pre-training increasing to 33% post-training. For the control group no change was noted (24%),

although the number of participants who disagreed increased from 41% to 59%.

Subscale 3 shows a statistically significant difference on the 5% level ($p \leq 0.05$) for three of the seven items for the experimental group. However, no significant differences existed between the pre- and post-training for the control group for any of the questions ($p > 0.05$).

Subscale 4 focused on general communication. Question 20 shows that for the experimental group, 61% agreed with this statement that the learner would be able to ask for things he/she needed pre-training, increasing to 79%. A reverse trend was noted in the control group (76% decreasing to 59%). The same trend was noted for the question on whether a learner would be able to start a conversation (Question 21) for both the experimental (30% agreeing, increasing to 55%) and the control groups (29% to 53%). Question 25 focused on whether the teachers perceived the learner as well mannered, with agreements increasing for the experimental (58% to 67%) and control groups (53% to 71%). Question 23, "The learner is impolite", showed no changes in agreement in the experimental group (12%), while a slight decrease (18% to 12%) was noted in the control group. Question 22, "The learner will have difficulties to develop personal relationships", showed 45% agreement pre-training, which decreased to 27%. Question 22 showed the highest increase (24% to 39%) in the uncertain category for the experimental group. In the control group, the percentage increased from 41% to 47%. In total, 24% of the experimental group disagreed pre-training with Question 24, "This learner will have difficulties to share information with others", increasing to 42% post-training. In the control group, 29% disagreed with the statement, decreasing to 24%. The final question for this subscale (Question 26), focused on whether the teacher would often engage in conversation with this learner. Slightly more than three quarters (76%) in the experimental group agreed with this statement pre- and post-training, while 100% of the control group agreed pre-training, decreasing to 88%.

Subscale 4 shows a statistically significant difference on the 5% level ($p \leq 0.05$) for two of the seven questions for the experimental group. For the control group, a significant difference was also noted for Question 21 ($p = 0.03$).

Teachers' Perceptions of the Inclusion of Learners with CCN

Subscale 5 showed that overall, teachers in both the experimental and control groups agreed that they were willing to have this learner in their classroom: 97% pre- and 94% post-training in the experimental group and 100% throughout in the control group. This correlated with the teachers'

perceptions of their willingness to modify their curriculum goals to ensure academic success for this learner (94% throughout the experimental group, 82% to 88% in the control group). Similarly, 100% of the teachers in the experimental group agreed pre-training (with 94% post-training) and 88% to 94% in the control group that they were willing to modify their instructional techniques to ensure academic success of this learner. Teachers also agreed that this learner would benefit from inclusive education (91% to 94% in the experimental group and 94% throughout the control group). A noticeable change in teachers' perceptions on Question 29 was observed, which was related to whether this learner would have a negative effect on the classroom environment. In the experimental group, 70% disagreed pre-training and 82% post-training, with no change in the control group (76%). The focus in Question 30 was on whether teachers thought that they would have enough time to educate this learner. In the experimental group, only 39% agreed pre-training, which increased to 70% post-training, while 53% agreed initially in the control group, decreasing to 47%.

Subscale 5 shows a statistically significant difference on the 5% level ($p \leq 0.05$) for two of the six questions for the experimental group but none for the control group. The two questions were related to teachers' perceptions of whether they would have enough time to educate the learner (Question 30) and their willingness to modify their instructional techniques to ensure academic success of this learner (Question 32).

Discussion

The results show that the custom-developed AAC training programme provided special school teachers with a new perspective and offered a more comprehensive range of insights and knowledge to expand their previously held perspectives (Merriam, 2017). The training also provided them with information regarding AAC strategies and methods and the implementation thereof in the classroom to enhance the social and academic skills of learners with CCN. This training capitalised on teacher's previous experiences, beliefs, and attitudes and shaped these into new knowledge, skills, and positive perceptions. Furthermore, the andragogy used during the training, which included active participation and tentative listening, had a positive impact on the outcome of the study. This became clear when comparing the results of the experimental group to that of the control group (who received delayed training after the study was completed), thereby demonstrating the impact of the training.

The new training programme was developed from evidence-based practice following a rapid review of existing programmes (Andzik &

Cannella-Malone, 2019; Lee & Park, 2018; McCoy & McNaughton, 2021; Muttiah et al., 2018; Subihi, 2013), and it is proposed that this rigorous process was one of the main contributors why a significant change was observed in the teachers' perceptions after the training.

Despite being brief, the training had statistically significant positive effects on the experimental group with regard to 11 of the 32 questions on the MTAS, representing four of the five subscales. Changes were observed concerning teachers' perceptions of their own abilities regarding teaching learners with CCN, these learners' communication skills (including general communication and classroom interaction), and their perceptions of including such learners. However, no significant changes were reported for questions focused on teachers' perceptions of learners' academic abilities. This shows that the teachers in the experimental group were trained to understand that the social and communication performance of learners with CCN can be enhanced using AAC strategies. However, when analysing the teacher's perceptions regarding the general academic abilities of learners with CCN, the teachers in the experimental group already had high academic expectations of these learners prior to receiving the training (the so-called ceiling effect); therefore, a statistically significant higher post-test mean score is unlikely (Al Salman, Kopp, Thomas, Ring & Fatehi, 2020). Only one item showed a statistically significant change in the control group, related to teachers' perceptions about learners' communication interaction ("This learner will be able to start a conversation"). This shows that exposure to the MTAS was sufficient to impact teachers' perceptions regarding communication.

Teachers are life-long learners mandated to pursue continuous academic and personal development, thus enhancing their skills and knowledge for the betterment of their inclusive classrooms (Bornman, 2021). A statistically significant change with regard to several questions measuring teachers' perceptions regarding their abilities was reported for the experimental group post-training (see the questions "I will feel confident to teach this learner" and "I will be able to cope with this learner in my class"). This result is similar to trends noted in international literature as a result of AAC training (Hanline, Dennis & Warren, 2018; Therrien, 2021) as well as local literature which describes the teachers' own reflections on their confidence and competence in implementing aided AAC (Tönsing & Dada, 2016).

The experimental group also showed an increase in knowledge following the training ("I am trained to teach this learner"), which is similar to that in international literature (Lee & Park, 2018; McCoy & McNaughton, 2021; Senner & Baud, 2017; Stanford & Harris, 2019; Subihi, 2013). The

results from an older South African study were different in that teachers reported that they were not trained to teach learners with CCN (Dada & Alant, 2001) as opposed to our study in which 70% of teachers reported that they were trained to teach learners with CCN before the training. This suggests that since the start of the 21st century, South African teachers have received training regarding inclusion, AAC, and learners with CCN, which might also reflect the intensified emphasis of the DoE on teacher training following the adoption of the EWP6 in 2001 (DoE, 2001; Jez & Luneta, 2018). A South African study found that short, school-based training programmes raised more teacher awareness, instilled a desire for more training and enhanced the sustainability of training (Potgieter-Groot, Visser & Lubbe-de Beer, 2012). This is believed to also be true in our study as teachers in the experimental group reported a need for more training following the training to support the implementation of AAC strategies in their classrooms sustainably.

No statistically significant changes were reported regarding teachers' perceptions of learners' general academic abilities. It was also noted that although most teachers felt that learners with CCN wanted to learn, they would need extra help and disability grants. These results are comparable to those reported by Dada and Alant (2001). However, Dada and Alant (2001) report that most teachers felt that learners with CCN would find employment while most of the teachers in our study were, after the training, uncertain whether these learners would find jobs upon leaving school. The teachers in our study provided answers more comparable to those in the 2013 study by Bornman and Donohue in which teachers also stated that learners with CCN would be less likely to find employment. One possible explanation might be that since the inception of the Employment Equity Act 55 of 1998, in which it is proposed that 2% of the workforce should be persons with disabilities. However, the original target has now been reduced to 1% (Department of Labour, 2021).

We also found that most teachers felt that learners with CCN would not be able to attend a mainstream school, which is similar to an earlier South African study in which it was reported that teachers held the opinion that learners with CCN attend school for social development rather than for academic development (Donohue & Bornman, 2015). This result relates to the reality of the South African inclusion practice where learners who require moderate to high levels of support are placed in LSEN schools, separated from peers in mainstream education (DoE, 2001).

Classroom interaction directly impacts the academic and social development of learners with CCN (Bornman, 2021). Following training,

teachers in the experimental group were statistically significantly more positive about learners' classroom interaction, as noted in questions on learners answering questions appropriately in class and being able to participate appropriately in class. These results are similar to those of comparable international studies, which report that classroom interaction had improved through AAC training (McConachie & Pennington, 1997; Muttiah et al., 2018).

Learners with CCN are known to be restricted in communication and participating in social and academic activities. However, by using AAC strategies, communication interaction can be enhanced (Muttiah et al., 2018). In the experimental group, a statistically significant change was noted regarding teachers' perceptions of learners' communication skills after training. These results were similar to those of international studies in which positive effects on different aspects of communication following teacher training in AAC were also reported – specifically related to creating communication opportunities, providing communication turns, and reducing the rate of communication (Andzik & Cannella-Malone, 2019; Muttiah et al., 2018; Therrien, 2021; Wermer, Brock & Seaman, 2018). However, the results in our study differ from those of Bornman and Donohue (2013) who report that teachers were concerned about the ability of learners with CCN to initiate a conversation and ask for what they needed. This might be attributable to these specific aspects being addressed during the training in our study. Hence, teachers gained knowledge in AAC and the benefits thereof for learners with CCN, specifically focused on being able to ask for things and starting a conversation using AAC.

Positive teacher attitudes are one of the pillars to ensure the successful implementation of inclusion (Jury et al., 2021). Our study shows positive statistically significant changes regarding teachers' perceptions about the inclusion of learners with CCN. After the training, the teachers held positive perceptions regarding the inclusion of learners with CCN in their respective classrooms, specifically on having enough time to educate learners with CCN and the teachers' willingness to modify their instructional techniques to ensure academic success. Similarly, in a Finnish study (Saloviita, 2020) it is reported that, in comparison to other teachers, special school teachers scored above the neutral midpoint when asked about the inclusion of learners with special education needs. In France, however, special education teachers were reported to be negative towards the inclusion of learners with ASD, one condition often associated with CCN (Jury et al., 2021). These results tie into those noted in another South African study in which it was reported that teachers held negative attitudes towards the inclusion of learners

with ASD and spastic quadriplegia (a form of CP), although the teachers were positive about including learners with Down syndrome in hypothetical mainstream classrooms (Donohue & Bornman, 2015). In another study Bornman and Donohue (2013) found that teachers were more willing to include a learner with ADHD than one with CCN.

Limitations and Recommendations

The data collected during the coronavirus disease (COVID-19) pandemic contributed largely to the limitation of the study, in particular the relatively small sample ($N = 58$) and that participants could not be randomly assigned to the control group or experimental group. Furthermore, the number of participants was not equal in the control and experimental group.

It is recommended that special school teachers be trained on AAC. This will improve their knowledge of AAC, positively influence their perceptions and ultimately facilitate positive learning for learners with CCN in special schools. A future study is also recommended to be undertaken to determine the prevalence of learners with CCN who would benefit from AAC in South African LSEN schools; thereby adding new knowledge regarding the need for AAC in LSEN schools and planning of AAC service delivery.

Conclusion

Special school teachers who work with learners with CCN need knowledge and skills regarding AAC strategies. Our research shows that teachers were empowered with knowledge and skills through training and afterward held positive perceptions towards AAC and the inclusion of learners with CCN. Using the Pygmalion/Rosenthal effect as a point of departure, this type of training may result in positive outcomes for these learners in terms of academic and social skills.

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Authors' Contributions

BCN and JB contributed equally to the conceptualisation, writing and reviewing of the article and the training of the participants. BCN collected the data, using questionnaires.

Notes

- i. Prof. Juan Bornman was employed at the University of Pretoria at the time of the study. She is currently employed at Stellenbosch University.
- ii. This article is based on the masters mini-dissertation of Bathobile Charity Ngcobo.

- iii. Published under a Creative Commons Attribution Licence.
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