

**The education and training on Augmentative and Alternative
Communication for rehabilitation professionals working with
people who have little or no functional speech: A scoping review**

by

Sephiwe Selina Mthonxa

Student no: 18255265

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SUPERVISOR: Dr Alecia Samuels

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ETHICS STATEMENT

The author, whose name appears on the title page of this dissertation, has obtained, for the research described in this work, the applicable research ethics approval.

The author declares that he/she has observed the ethical standards required in terms of the University of Pretoria's Code of ethics for researchers and the Policy Guidelines for responsible research.

DECLARATION OF ORIGINALITY

This document must be signed and submitted with every essay, report, project, assignment, dissertation, and/or thesis.

Full names of student: SEPHIWE SELINA MTHONXA

Student number: 18255265

Declaration

1. I understand what plagiarism is and am aware of the University's policy in this regard.
2. I declare that this dissertation is my own original work. Where other people's work has been used (either from a printed source, Internet or any other source), this has been properly acknowledged and referenced in accordance with departmental requirements.
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ABSTRACT

Background: Health professionals working in rehabilitative settings often encounter clients with little or no functional speech (LNFS) who would benefit from Augmentative and Alternative Communication (AAC), however, their lack of knowledge and skills in AAC limits their ability to assess and provide effective AAC interventions for this population. For collaborative intervention to happen, health professionals need to be equipped with knowledge and skills in AAC. However, there do not appear to be clear and consistent educational and training goals for various rehabilitation professionals working in AAC such as speech-language therapists (SLT), occupational therapists (OT), or physiotherapists (PT). **Methods:** The aim of this scoping review is therefore to explore and chart the literature relating to the education and training in AAC of the aforementioned professionals who are mainly involved with the rehabilitation of people who require AAC with a view to identifying any gaps within their education and training. The Preferred Reporting Items for Systematic Reviews and Meta-Analysis Extension for Scoping Reviews (PRISMA-ScR) was used to guide this study (Tricco et al., 2018). Databases searched included Medline, ERIC, CINAHL, Psych Info as well as hand searches using the forward and backward citation of the included articles. Titles, abstracts, and full texts were screened independently by two reviewers for inclusion. **Results:** Thirty-two studies met the inclusion criteria for entry into this scoping review. An extraction tool was used to extract the necessary data to answer the review questions. A sequential narrative data synthesis sketched how the results linked to the aims of the scoping review. A description of the studies in terms of their purpose, where studies took place and the AAC training undertaken or discussed in the studies was reported on. **Discussion:** A discussion of the studies was done in relation to the sub-aims of the study focussing on (i) the level at which AAC education and training was discussed or undertaken for rehabilitation professionals (SLTs, OTs and PTs); (ii) the extent to which the education and training of PTs in AAC was part of the included studies; and (iii) to understand unique and common knowledge and skills surrounding AAC that need to be addressed in the education and training of health professionals in undergraduate or continued education to prepare these professionals to be contributing members of an AAC rehabilitation team. **Conclusions:** There was limited literature that focused on the actual education and training of rehabilitation professionals in AAC. Future research should focus on AAC education and training

of rehabilitation professionals and the AAC content that is covered in the education and training.

Keywords: Augmentative and Alternative Communication (AAC), education, occupational therapist, physiotherapist, speech-language pathologist, training

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LIST OF ABBREVIATIONS

AAC:	Augmentative and Alternative Communication
IOA:	Inter-observer agreement
IPE:	Inter-professional education
LAFF:	Listen Ask Focus Find
LNFS:	Little or No Functional Speech
OT:	Occupational Therapist
PT:	Physiotherapist
PRISMA:	Preferred Reporting Items for Systematic Reviews and Meta-Analysis
SLP:	Speech-Language Pathologist
SLT:	Speech-Language Therapist

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1. PROBLEM STATEMENT AND LITERATURE REVIEW

1.1 Problem statement

Assistive technology is a growing field that has the ability to increase independence and improve the quality of life of people with disabilities and this includes people with lifelong disability or the frail aged (Waller et al., 2005). The Augmentative and Alternative Communication (AAC) field as a form of assistive technology, has the potential to give people with little or no functional speech (LNFS) the ability to effectively communicate and be independent. According to Uthoff et al. (2021), AAC is a field that is focused on people who do not have natural speech. AAC includes the use of unaided AAC systems such as gestures and aided AAC systems such as communication boards or speech generating devices (Uthoff et al., 2021). Individuals who have LNFS, require AAC support that will provide integrated access to communication that is enjoyed by others without disabilities (Light et al., 2019).

The success of AAC service delivery is largely dependent on collaboration between various rehabilitation professionals involved in the management of the client requiring AAC (Uthoff et al., 2021). Collaboration is essential within AAC as it influences the AAC user's assessment, intervention and progress, with team members having the potential to learn from each other and have shared management goals (Kistasamy, 2016).

A lack of knowledge regarding AAC has been indicated as a barrier for effective AAC service delivery by many stakeholders (Uthoff et al., 2021). Effective AAC service delivery requires knowledge of AAC assessment, symbol systems and device selection amongst others (Dada et al., 2017). Health professionals such as speech-language therapists (SLT), occupational therapists (OT), and physiotherapists (PT) working in rehabilitative settings often encounter clients with LNFS who would benefit from AAC, however, their lack of knowledge and skills in AAC limits their ability to assess and provide effective AAC interventions for people with LNFS. For collaborative AAC intervention to happen, health professionals need to be equipped with knowledge and skills in AAC. As stated by Costigan and Light (2010), if rehabilitation professionals are not trained before pre-service graduation,

individuals with LNFS are at risk of not getting the correct services. Hence, having clear educational and training support structures for rehabilitation professionals in AAC is crucial in healthcare; as Alford et al. (2014) state, one of the determinants of effective healthcare is communication.

Siu et al. (2010) found that in Hong Kong, AAC training for rehabilitation professionals providing the necessary AAC intervention to people with LNFS was largely inadequate especially amongst OTs and PTs, however, it is not clear to what extent AAC forms part of their pre-service training, postgraduate training, or continued education in the form of in-service training.

A preliminary although not systematic search of the literature indicated that the education and training of rehabilitative healthcare professionals in AAC is not well documented for the various rehabilitation professionals who are recommended to be involved in AAC service delivery. It is also not clear from these preliminary searches what common and unique knowledge and skills surrounding AAC each of these professions should be receiving in their education and training. The transference of learning from the classroom to the workplace when it comes to inter-professional collaboration in AAC also needs to be explored. This information could help bridge the gap between pre-service professional training and professional practice that is essential for inter-professional education (IPE) in AAC rehabilitation (Yao, 2021). Costigan and Light (2010) have also suggested that evidence-based and compulsory pre-service AAC training should be a priority to make sure that rehabilitation professionals provide quality services.

A scoping review that forms the basis of this mini-dissertation will therefore be undertaken to explore and chart the literature that have undertaken or discussed the education and training of rehabilitation professionals working with the population of people who require AAC with a view to identify gaps within their education and training. As the student researcher is a PT by profession who is currently undertaking a Master's degree in AAC, there is an interest to discover to what extent the education and training of PTs in AAC is documented in the literature.

The expected outcome of the proposed review is relevant to the education and training of rehabilitation professionals in AAC. Understanding the training that is

currently available and what can be done to improve knowledge and skills development in support of rehabilitation professionals being equipped in the field of AAC is essential. This may allow rehabilitation professionals from SLT, OT, and PT to play a more effective role and form part of a collaborative team in the provision of services to people with LNFS. These professionals will also be better equipped to use AAC in healthcare or education settings and be able to identify the need for AAC intervention in the clients they assist. The review may also help to identify education, training gaps, and needs and assist in guiding the curriculum for the different health professions involved in AAC intervention services, particularly within the South African context.

1.2 Literature review

1.2.1 People who have LNFS

Many clients who are seen in rehabilitative settings may present with LNFS who rely on AAC for communication. LNFS as defined, is an individual who has significant communication difficulties or intelligible speech of less than 30 words (Bornman & Donohue, 2013). AAC users stem from all age groups, socioeconomic groups, and ethnic and racial backgrounds. The fact that such individuals require adaptive assistance for speaking and/or writing is their unifying characteristic. The use of AAC can be as a result of congenital causes such as severe communication disorders such as severe intellectual disability, cerebral palsy, autism, and developmental apraxia of speech or acquired medical conditions such as multiple sclerosis, traumatic brain injury, stroke, or amyotrophic lateral sclerosis (Beukelman & Mirenda, 2013). Hence, AAC has been used in a variety of settings and it has been proven to be an effective means of communication for many people who have communication challenges. The power of AAC technology not only augments expressive communication, it is also intended to support learning in different domains such as language learning, literacy instruction, receptive language, job coaching, community living, and meaningful volunteer activities (Light et al., 2019). AAC has been proven to be efficient and effective for engagement for people with LNFS in diverse interactions with participation in activities of daily living being the ideal goal for AAC intervention (Beukelman & Mirenda, 2013).

1.2.2 AAC for people who have LNFS

AAC refers to an area of research, clinical, and educational practice. AAC involves attempts to study and when necessary, compensate for temporary or permanent impairments, activity limitations and participation restrictions of individuals with severe disorders of speech-language production and/or comprehension, including spoken and written modes of communication (Beukelman & Mirenda, 2013, p4).

AAC aims to assist individuals who have challenges with speaking to meet their communication needs in order to interact with others (Beukelman & Mirenda, 2013). Strategies used in AAC for people who have LNFS includes modes and channels of communication that promote functioning of the individual in society. AAC has two types of systems; unaided AAC which is dependent on the body of the user to be able to relay a message. Examples of unaided systems include natural gestures and manual signing and aided AAC which requires external equipment to enable the user to convey a message. Examples of aided AAC include low-technology/non-electronic devices such as picture symbols, communication boards, or high-technology systems such as speech generating devices (Alsayedhassan et al., 2016).

1.2.3 AAC service delivery in terms of a team approach

AAC intervention for people with LNFS is best delivered within a team approach (Blockberger & Haaf, 1995). The most common rehabilitation professionals working with physical and language impairments and disabilities are SLTs, OTs, and PTs (Mathye & Eksteen, 2016). Support from a multidisciplinary healthcare team is needed for the introduction and continued use of AAC (Ishikawa et al., 2021).

In the context of people with disabilities with LNFS who may require AAC, a range of professional skills will be reflected in the multi-professional team in order to make decisions regarding an effective AAC system (Waller et al., 2005). This team includes the person using AAC technology, family, engineers, manufacturers, and rehabilitation professionals such as SLTs, OTs, and PTs (Waller et al., 2005). Knowledge regarding assistive technology, willingness to learn and sensitivity surrounding family and cultural values should be considered by rehabilitation

professionals who prescribe assistive technology such as AAC (Bortagarai & Ramos, 2013). As stated by Uthoff et al. (2021), AAC implementation and the success thereof, is dependent on collaboration with different stakeholders.

1.2.4 Rehabilitation professionals' education and training on AAC

General practice SLTs, OTs, and PTs typically form part of the AAC team members (Binger et al., 2012). The scope of practice for SLTs includes establishing AAC techniques and strategies, which is inclusive of the selection and prescription of AAC intervention options (Dada et al., 2017). Specific skills that SLTs contribute to the AAC team include their knowledge in communication sciences, normal and disordered language and communication, development, and disorders and communication management (Blockberger & Haaf, 1995). OTs and PTs form part of essential collaborators in AAC and aid with seating, positioning, and issues related to accessing the device (Binger et al., 2012). There are specific skills that OTs and PTs bring to AAC assessment and intervention. These skills include determining if a client has motor control for unaided means of communication, identifying body sites and movement patterns that can be used to control the AAC device, position determination that is ideal for the client and device, maintenance of muscle strength and range of motion, training of balance and coordination designing a device that matches the client's motor abilities, and developing strategies that promote movement components to enhance motor control of the AAC system (Rose & Alant, 2001; Van Niekerk & Moolman, 2015).

AAC has more often than not, formed part of the training of SLTs (Bortagarai & Ramos, 2013). However, for AAC to be successful, there needs to be an integrated and complementary team of professionals from different fields, with varying instrumental goals united by the goal to meet the needs of the users with LNFS (Bortagarai & Ramos, 2013). AAC should therefore form part of the theoretical and practical knowledge of rehabilitation professionals who seek to provide rehabilitation from a global perspective rather than only a discipline specific point of view (Bortagarai & Ramos, 2013). In the early 2000s, a study by Rose and Alant (2001) indicated that there was no formal AAC training at undergraduate level for PTs, although it is not clear whether this is still the situation. Academic institutions need to consider exposing a broader range of rehabilitation practitioners to AAC so

that they are able to provide information that can inform AAC intervention, communicate with clients with severe communication difficulties, and timeously refer for the necessary intervention (Rose & Alant, 2001).

As stated by Chua and Gorgon, (2019), 86% of speech-language pathologists (SLPs) in South Africa work alongside other professionals. This strong interdisciplinary practice observed in South Africa could be as a result of the specialised AAC centre (Centre for AAC at the University of Pretoria) that has been responsible for training healthcare professionals from various disciplines in AAC for more than 20 years. In South Africa AAC service providers include SLTs who are seen as team members who are the most supportive in AAC implementation. OTs play a role in aided AAC implementation for individuals with disabilities (Tönsing & Dada, 2016); in the absence of SLTs, OTs tend to take on the implementation role completely (Tönsing & Dada, 2016). The University of Pretoria's Centre for Augmentative and Alternative Communication offers four post graduate degree programmes, with AAC being one of the programmes offered (Van Niekerk & Tönsing, 2015). Currently, the Centre for AAC is the only institution in Africa where professionals can receive formal postgraduate education in AAC and also provides informal AAC training in the form of workshops.

Knowledge and skills related to AAC therefore appears to vary across the different professional disciplines involved with the population with LNFS (Binger et al., 2012). As stated by Wallis et al. (2017), professional skills in AAC in terms of the assessment, intervention, AAC symbols and systems, cultural competence, problem solving, and collaborative skills need to be developed in the pre-qualification AAC training. A contributing factor to limited training might be the lack of access or awareness of continuing education relevant to AAC (Chua & Gorgon, 2019). Siu et al. (2010) report that in Hong Kong, AAC for people with LNFS has been available for decades, with SLTs and OTs being the major service providers. While SLTs in their own context, receive AAC training as part of their undergraduate training, AAC training does not form part of the OT curriculum in this context. Despite the aforementioned, Tam et al. (2003) found in a survey of AAC service provision in Hong Kong, that of the 55 out of 401 respondents who prescribed AAC devices, only 7 of the 55 were SLTs. Other respondents who participated in the study included OTs

and PTs which implies that these professionals were making AAC service delivery decisions without the necessary knowledge and training on AAC.

In South Africa, in the scope of practice for SLTs, it is specifically mentioned that by “developing, selecting and prescribing multimodal augmentative and alternative communication systems” forms part of this discipline’s role and responsibilities (Health Professions Act, 1974). In the regulations relating to the undergraduate curricula and professional examinations in SLT, the Health Professions Council of South Africa the body that regulates the training of health professionals, state that “the academic and clinical curriculum must include education in communication modalities (e.g., oral, manual and augmentative and alternative communication techniques and assistive technologies)” (Health Professions Council of South Africa [HPCSA], 2014, p10).

While the regulations regarding the scope of practice of OTs in South Africa does not explicitly mention AAC, it indirectly implies it in relation to “adjust and adapt activities and occupations or prescribe assistive technology to facilitate active participation in all areas of occupation by persons who are occupationally at risk” (Health Professions Act of 1974, p124). In the core minimum standards of training for OTs, it also mentions that one of the outcomes that has to be achieved over the four years of undergraduate training is “assess, prescribe, customise and fit assistive technology to support occupational performance” (HPCSA, 2020, p8).

The regulations defining the scope of practice of PTs in South Africa (HPCSA, 1976) are, however, the least explicit in relation to AAC or assistive technology. The minimum standards for training in this profession, are “group work and inter-professional training are also part of the course. Incorporating technology to increase access, optimise teaching and learning and improve service delivery is also recommended” (HPCSA, 2020, p2). Furthermore, curriculum content should include biomechanics and human movement with training in movement analysis being one of the components. In addition, assistive and supportive devices is another curriculum content area mentioned with AAC possibly included in the “other medical technologies” component (HPCSA, 2020).

From the above, it is evident that there appears to be a decreasing level of explicitness and clarity in relation to the formal pre-service preparation and scope of practice of the three professions in terms of AAC knowledge and skills which may therefore also be reflected in research which deals with these health professionals' education and training on AAC. Therefore, the purpose of this study is to explore and chart the literature relating to the education and training in AAC of rehabilitation professionals, particularly SLTs, OTs, and PTs working with the population of people who require AAC with a view to identifying any gaps within their education and training.

2. METHODOLOGY

2.1 Aims

2.1.1 Main aim

The main aim of the scoping review is to explore and chart the literature relating to the education and training in AAC of rehabilitation professionals, particularly SLTs, OTs, and PTs working with the population of people who require AAC with a view to identifying any gaps within their education and training.

2.1.2 Sub-aims

The sub-aims of the review are:

- I. To identify studies that have undertaken or discussed the education and training (pre-service, postgraduate, or in-service) in AAC for rehabilitation professionals specifically SLTs, OTs, and PTs;
- II. To identify the extent to which the education and training of PTs in AAC forms part of the identified studies; and
- III. To understand the unique and common knowledge and skills surrounding AAC that need to be addressed in the education and training of each of the health professions in undergraduate, postgraduate, or continued education for them to be contributing members of the AAC team.

2.2 Research design

A scoping review was conducted to address the aims of the research. Over the past few years, there has been an increase in the use of scoping reviews which are being used more in the health research field (O'Brien et al., 2016). When not much is known about a particular subject or it is large or complex in nature, scoping reviews are a more useful starting point in order to understand the field (Peters, Godfrey, Khalil et al., 2015). The aim of a scoping review is to look at a research question that is being explored with the intention to map key concepts, the evidence types and gaps that are available in research related to the area or fields by

searching, selecting, and synthesising knowledge that already exists (Colquhoun et al., 2014).

The aim of this scoping review was therefore to summarise and communicate findings surrounding the education and training in AAC of rehabilitation professionals working with people who have little or no functional speech, with the primary focus on SLTs, OTs and PTs. Initially the scope was only going to be with respect to the physiotherapy profession, which is the authors background, however, since AAC is a multi-professional field, it was decided to review the training of the three rehabilitation professionals who work most closely with the population requiring AAC to understand what could be common and unique training requirements in AAC for each discipline.

The scoping review framework developed by Arksey and O'Malley (2005) guided the present scoping review. The framework is divided into six phases that are used to guide the research process. Identification of the research question was the first phase of the review. The research question used the PIO format (Levett, 2017; Liberati et al., 2009) and identified the population (rehabilitation professionals), the issue (AAC), and the outcome (education and training). The second phase was identifying the relevant studies that could answer the main research question. Using the developed inclusion- and exclusion criteria, reviewing the selection of studies then took place, which was the third phase of the process. The fourth phase was data charting, where data was extracted using the developed data extraction tool (Appendix A) to answer the review aims and sub-aims. The fifth phase was collating, summarising, and reporting the results.

The Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) was used for reporting findings from the scoping review, which allows for complete, transparent, and consistent literature reporting (Sucharew & Macaluso, 2019).

2.3 Ethical considerations

As the present study is a scoping review and does not involve any human participants, ethical requirements were reduced. Ethical approval was requested and

obtained from the ethics committee of the Faculty of Humanities at the University of Pretoria as per the university's protocol (Appendix B).

2.3.1 Accuracy

To ensure accuracy, the scoping review methods that were used in the study were provided; this also enables replication so that knowledge claims can be verified (McMillan & Schumacher, 2014). There was no data make up, modification, or omission and errors were immediately corrected (McMillan & Schumacher, 2014).

2.3.2 Plagiarism

Using other people's words or ideas as your own is known as plagiarism. To avoid plagiarism, credit was given by using quotation marks for direct quotes and referencing all sources that were used in the study (McMillan & Schumacher, 2014).

2.4 Protocol

A research protocol for this scoping review was developed as a research proposal, that highlighted the review procedures and was submitted for ethical approval as mentioned above. A protocol is essential in that it specifies the outcome for the primary study of interest and it also limits chances of being bias in terms of the review methods such as selective reporting (Liberati et al., 2009). Transparency of the review process is achieved through the development of a protocol (Peters, Godfrey, McInerney et al., 2015).

2.5 Pilot search

Pilot searches in consultation with a subject librarian were conducted to observe the practicality of the search terms, inclusion criteria, and guide the researcher in any changes that needed to be made (McMillan & Schumacher, 2014). Table 1 below, sets out the aims, results, procedure, and recommendations from the pilot search.

Table 1

Pilot Searches

Aim	Procedure	Results	Recommendations
1. To establish if the search terms are appropriate.	Searches were done using the preliminary search terms. The preliminary search terms used were: "augmentative and alternative communication" OR AAC AND technology OR device* OR aid* AND education OR training OR learning OR teaching OR curriculum AND physiotherapists OR "occupational therapists" OR "physical therapists" OR "AAC team"	Many irrelevant studies were identified, such as AAC in general, AAC education for users/parents.	<ul style="list-style-type: none"> • One database used different search terms. • The following adaptations were made to the search terms: searching in all text, the use of Boolean and more synonyms were added to the search terms for a broader search.
2. To establish the applicability of the inclusion and exclusion criteria.	The inclusion- and exclusion criteria tool was applied to identified studies.	The inclusion- and exclusion criteria was applicable and guided in identifying relevant studies.	No other recommendations or changes were done.
3. To establish the applicability of the data extraction form.	The data extraction form was used on two of the studies that were identified in the pilot search.	The data extraction form was applicable and able to extract the necessary information to address the study aims.	Adaptations were made to the following columns as not all studies offered training, however, could highlight the training and education aspects: training/paper focus, specific aspects of AAC training discussed or trained on and outcome of the study if training conducted.

2.6 Search strategy

Published, peer reviewed research studies as well as studies such as theses that undertook or discussed the training and education of the identified rehabilitation professionals were sought through the search strategy. To obtain relevant studies, online databases were chosen for data collection in consultation with the information specialist at the University of Pretoria. The databases selected included: Academic Search Complete, CINAHL, Medline, Eric, Health Source: Nursing/Academic Edition and APA PsychInfo. To account for studies that may not have been indexed by the included databases, additional hand searches were undertaken using backward and forward citation of included articles (Scholsser et al., 2005). Backward citation involved looking at who the included article authors cited in their studies. Forward citation was also conducted and this process involved trying to determine if the articles used have been cited by other authors after they were published. Using a multi-faceted database search which included hand searches, results in a more relevant outcome (Scholsser et al., 2005). To assist in the refinement of the search terms, an information specialist at the University of Pretoria, Merensky Library was consulted and search terms were piloted.

Table 2 below, shows the final search terms that were used in the electronic databases according to the PIO format.

Table 2

Boolean Search Terms

Criteria	Search Terms
Population terminology	"Speech-language therapist*" OR "Speech language pathologist*" OR "Speech therapist*" OR "Occupational therapist*" OR Physiotherapist* OR "Physical therapist"
Issue terminology	"Augmentative and Alternative Communication" OR AAC OR AAC devices OR "assistive communication device*" OR "dedicated communication device*" OR "non-dedicated communication device*" OR "aided AAC system*" OR "unaided AAC system*" OR "visual output system*" OR "communication board*" OR "speech generating device*" OR "aided language stimulation" OR "voice output communication aid*" OR "aided communication" OR "communication aid*"
Outcome terminology	"education and training" OR "preservice training" OR "in-service training" OR "undergraduate training" OR "post-graduate training" OR workshop* OR "OR "education" OR "training" OR "professional development"

Each database yielded a different number of results as seen in Table 3 below which were then screened and compared against the inclusion- and exclusion criteria.

Table 3

Search Strategy and Database Results

Database	Search Strategy	Results	Total Minus Duplicates
Academic Search Complete (Ebscohost)	TX ("Education and training" OR "Preservice training" OR "In-service training" OR "Undergraduate training" OR "Post-graduate training" OR Workshop*) AND TX ("Speech-language therapist*" OR "Speech language pathologist*" OR "Speech therapist*" OR "Occupational therapist*" OR Physiotherapist* OR "Physical therapist*") AND TX ("Augmentative and Alternative Communication" OR AAC OR AAC devices OR "Assistive communication device*" OR "Dedicated communication device*" OR "Non-dedicated communication device*" OR "Aided AAC system*" OR "Unaided AAC system*" OR "Visual output system*" OR "Communication board*" OR "Speech generating device*" OR "Aided language stimulation" OR "Voice output communication aid*" OR "Aided communication")	609	559
APA PsychINFO (Ebscohost)	TX ("education" OR "training" OR "professional development") AND TX ("Augmentative and Alternative Communication" OR "communication aid*") AND TX ("Speech-language therapist*" OR "Speech language pathologist*" OR "Speech therapist*" OR "Occupational therapist*" OR Physiotherapist* OR "Physical therapist*")	99	37
CINAHL (Ebscohost)	TX ("education" OR "training" OR "professional development") AND TX ("Augmentative and Alternative Communication" OR "communication aid*") AND TX ("Speech-language therapist*" OR "Speech language pathologist*" OR "Speech therapist*" OR "Occupational therapist*" OR Physiotherapist* OR "Physical therapist*")	189	183
MEDLINE (Ebscohost)	TX ("education" OR "training" OR "professional development") AND TX ("Augmentative and Alternative Communication" OR "communication aid*") AND	95	54

	TX ("Speech-language therapist*" OR "Speech language pathologist*" OR "Speech therapist*" OR "Occupational therapist*" OR Physiotherapist* OR "Physical therapist*")		
ERIC (Ebscohost)	TX ("education" OR "training" OR "professional development") AND TX ("Augmentative and Alternative Communication" OR "communication aid*" OR "means of communication") AND TX ("Speech-language therapist*" OR "Speech language pathologist*" OR "Speech therapist*" OR "Occupational therapist*" OR Physiotherapist* OR "Physical therapist*")	74	61
Health Source: Nursing/Academic Edition (Ebscohost)	TX ("education" or "training" or "professional development") AND TX ("Augmentative and Alternative Communication" OR "communication aid*") AND TX ("Speech-language therapist*" OR "Speech language pathologist*" OR "Speech therapist*" OR "Occupational therapist*" OR Physiotherapist* OR "Physical therapist*")	256	136

2.7 Inclusion and exclusion criteria

Eligibility for each study's inclusion for this review was determined by the inclusion and exclusion criteria as presented in Table 4 which was based on the population, issue, outcome, language, date, design of the study and publication type.

Table 4

Inclusion and Exclusion Criteria

Criteria	Inclusion	Exclusion
Population (P)	Rehabilitation professionals focusing only on qualified or student SLTs, OTs, PTs (Mathye & Eksteen, 2016). Multi-professional training that includes any or all of the above professionals.	<ul style="list-style-type: none"> • Training of other rehabilitation professionals (e.g., audiologists, educators, assistive technology specialists, doctors, nurses). • Multi-professional training where it is not clear who the professionals are that were trained.
Issue (I)	Any aspects related to AAC; AAC is defined as an area of research, clinical and educational practice. This involves the studying and compensating for temporary or permanent impairments, activity limitations and restriction to participation for individuals who have severe speech-language production disorders and/or compensation, inclusive of spoken and written modes of communication (Beukelman & Mirenda, 2013). Including but not limited to, feature matching and AAC device selection, AAC apps, switch selection for indirect selection, seating and positioning for device or switch selection, developing communication boards, developing other forms of symbol communication (e.g., visual schedules, making a switch for AAC access, aided language stimulation, key word signing).	<ul style="list-style-type: none"> • Focus on education and training of other aspects of communication (e.g., sign language). • Assistive technology other than AAC communication (e.g., wheelchairs, hearing aids).
Outcome (O)	Any training or education that is formal (e.g., pre-service training or postgraduate training) or informal (e.g., workshops, staff development, in-service training) on AAC.	Studies that focus on education and training other than AAC.
Study design	Qualitative studies. Quantitative studies. Mixed-methods studies.	Other systematic/scoping reviews.
Date	Unrestricted.	Not applicable.
Language	Only articles published in English.	Articles published in languages other than English.
Publication type	Articles published in full texts in peer reviewed journals or as a thesis accessible through the UP library or freely obtainable on the internet.	Abstracts, books, conference papers, and other grey literature besides theses not available through the UP library or free on the internet.

2.8 Materials and equipment

The resources used for the review were the two reviewers consisting of the author and the supervisor; internet access, and access to the library databases of the University of Pretoria. An online systematic review platform Covidence was used in the scoping review and a librarian was consulted to assist with databases and search terms that were used in the study.

2.9 Selection of studies

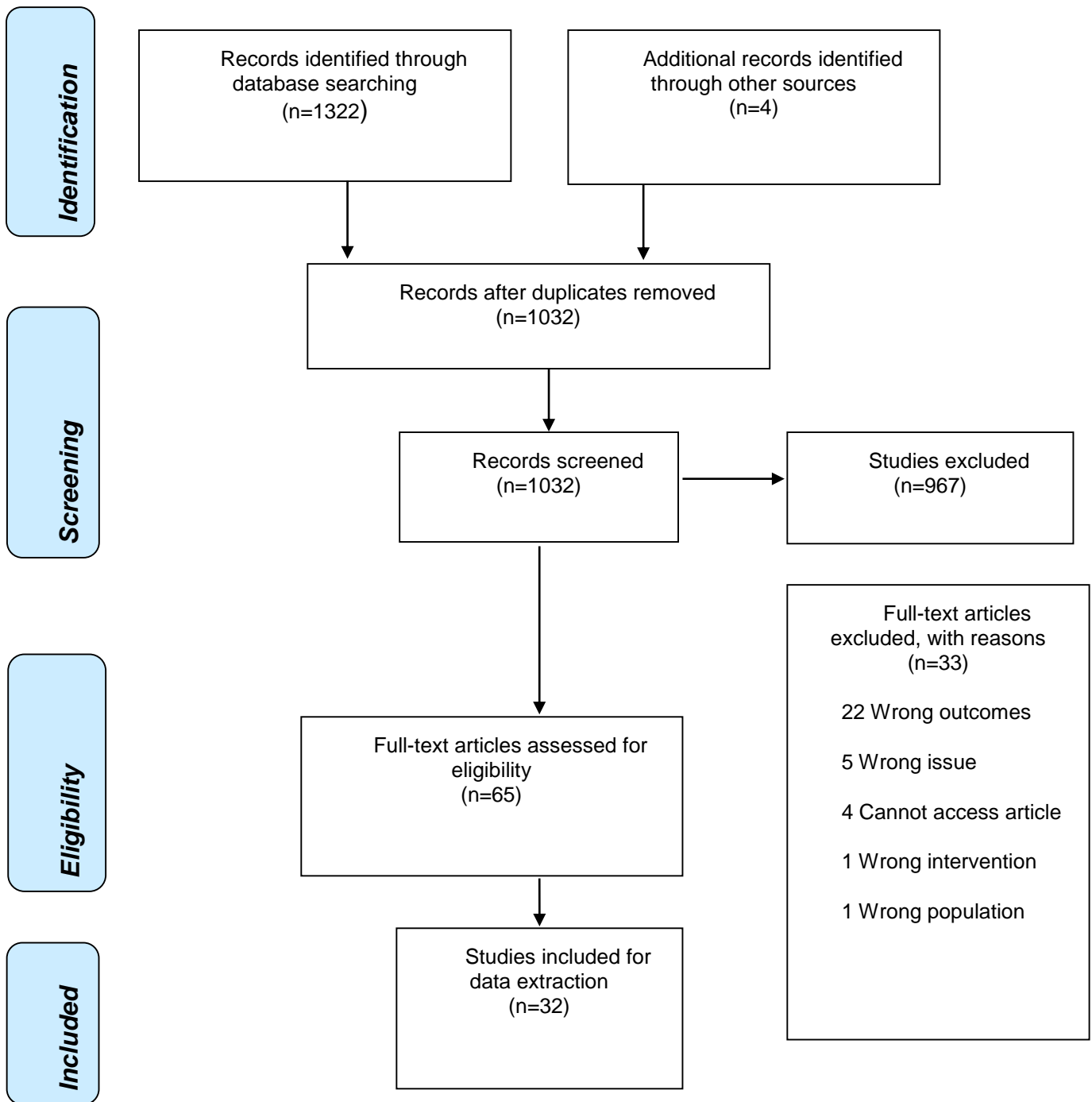
The search results were imported as RIS files to Covidence, an online systematic review platform, where the two researchers (researcher and supervisor) worked independently to screen study titles and abstracts using the inclusion- and exclusion criteria. A title and abstract screening relevance form was developed (Appendix C) to aid with the screening process. During the title and abstract screening process in Covidence, each independent reviewer could select 'Yes', 'No', or 'Maybe' in response to several questions related to the inclusion- and exclusion criteria by applying the title and abstract screening relevance tool. If screened articles contained at least one of the exclusion criteria, then the study was excluded. All inclusion criteria had to be met for the study to be included.

Where the reviewers were unsure or there was not sufficient information in the abstract to make a decision, the full text of the article was retrieved and full text screening was undertaken against the eligibility criteria. The full text for all studies which met all the inclusion criteria marked as 'yes' were retrieved and read, after which a final decision was made on their relevance for inclusion. Inconsistencies between the reviewers were resolved through discussion.

The PRISMA diagram (Figure 1 below) indicates the flow of decision making for the inclusion of articles through various phases of the scoping reviewing process.

Figure 1

PRISMA Flow Diagram (Liberati et al., 2009)



2.10 Data extraction and analysis

For the purpose of a scoping review, data extraction must include relevant data, that addresses the study's aim and sub-aims (Peters et al., 2015). A data extraction form that was used to extract data from the included articles was developed (Appendix A). An Excel spreadsheet was used to capture the extracted data. Text based data was extracted from the included studies, which was then analysed to answer the review question. Data was first extracted on general characteristics of the study that included the title, authors, year of publication, where the study took place, study design, and the purpose of the study. The characteristics of the participants that were extracted was the category of the rehabilitation professionals included in the study (i.e., SLTs, OTs, and PTs). This assisted in identifying in which professional category education and training took place. For the outcome aspect, the level of training data was extracted in terms of the stage of professional development education and training. The issue aspects of AAC were extracted based on the focus of the AAC training or the type of AAC training that was delivered or discussed in relation to the professions. Information was also extracted on the outcome of the training in terms of whether it was beneficial for the participants.

Finally, the author recommendations for future AAC training were also extracted to understand if there were indicators or an awareness regarding additional AAC training needs for the professions.

2.11 Data analysis

Thematic analysis (Braun & Clarke, 2021) was used to analyse the extracted data into themes that aimed to answer the review aim and sub-aims. The analysis was both deductive and inductive based on the aim of the review. Themes were derived from frequent, dominant and significant information from the raw data. Themes were grouped into categories that represented common trends, ideas or concepts found in the data. The researcher followed the 6 phases of Braun and Clarke (2021) to develop the themes that were used. Firstly, familiarisation with the data, which included the researcher being familiar with the collected data as the first phase. The second phase included coding the data, which allowed the researcher to identify data which had common information. Once the coding was done, this

allowed the researcher to come up with themes. In this third phase the codes are reviewed and analysed to form themes based on how codes can be combined based on their shared meaning. Phase four included reviewing the identified potential themes, where the researcher then reviews the themes provide enough information to answer the review question. Defining and naming themes followed as the fifth phase; where themes are expressed in relation to data and the review question. The theme should provide consistent data that can't be told by other themes. The last phase is producing the report, where the results were then discussed based on the following themes: Purpose of the study, research design and country, where the study was conducted; the level of AAC education and training for rehabilitation professionals; the level of AAC education and training for rehabilitation professionals and unique and common AAC knowledge and skills that need to be addressed in rehabilitation professionals' education and training. The results were presented in a sequential narrative synthesis format that linked the results to the aims of the scoping review (Peters, Godfrey, Khalil et al., 2015).

2.12 Reliability

Reliability means that there is consistency in the approach across different researchers and projects (Creswell, 2009). For reliability to be ensured, the procedure used all the steps needed to be documented (Creswell, 2009). To ensure reliability the following recommendations were made (Creswell, 2009):

- I. Have clearly stated study objectives/aims;
- II. Use multiple steps in the scoping review process as outlined in the PRISMA diagram;
- III. Use the inclusion- and exclusion criteria to select eligible studies; and
- IV. Have two independent reviewers to do the screening (at title, abstract and full text) and data extraction.

To ensure data extraction reliability, the first reviewer extracted the data from the included studies. The second reviewer then randomly selected 20% of the studies and extracted data from them. The data extraction was then compared to ensure that the two reviewers were extracting the needed information to answer the review questions.

Inter-observer agreement (IOA) calculations were done at title and abstract screening, full text screening, and data extraction level. The calculation for IOA was performed as follows: the total amount of agreements divided by the total number of agreements plus disagreements, multiplied by a 100. The title and abstract IOA was 93%. The full text screening IOA was 42,6%. The occurrence of disagreements was resolved by a discussion and reaching a common decision to include- or exclude a certain study.

3. RESULTS

The database searches initially yielded 1032 articles; 65 articles were evaluated at full text level; and 32 studies were included for data extraction (Figure 1). Based on the expected education and training outcomes in AAC, either formal (pre-service or postgraduate education) or informal (e.g., workshops) training was received; articles excluded at full text (n=33) either had wrong outcomes where the studies did not focus on AAC education and training, wrong issue meaning that studies were not AAC focused, wrong population that focused on professionals other than the rehabilitation professionals the present scoping review was focusing on, wrong indication, or could not be accessed. Studies that met the inclusion criteria to answer the review question are presented in Table 5 below. To begin this chapter, an overview of the included articles will be done in relation to: (i) the purpose of the study; and (ii) the country where the study was conducted. A discussion of the studies will be done in relation to the sub-aims of the study focusing on: (i) the level at which AAC education and training was discussed or undertaken for rehabilitation professionals (SLTs, OTs, and PTs); (ii) the extent to which the education and training of PTs in AAC was part of the included studies; and (iii) to understand the unique and common knowledge and skills surrounding AAC that need to be addressed in the education and training of health professionals in undergraduate or continued education for the professionals to contribute as members in AAC.

3.1. Purpose of the study, research design and country, where the study was conducted

A summary of the studies based on the purpose of the study, the country where the study was conducted and the AAC training undertaken or discussed is provided in Table 5 below. As indicated, the majority of studies were undertaken in the United States (n=22). Studies undertaken in South Africa, Scotland, Taiwan, and the Philippines were minimal, with one study (n=1) undertaken in each country. Australia, Canada, and Cyprus each undertook two studies (n=2) respectively. It was not hypothesised that the majority of the studies would have been undertaken in the United States and that there would be minimal studies in other countries, this could be because the AAC field in the United States is showing an upward trend in the

coursework and clinical practice of AAC, even though gaps remain regarding the pre-service education of AAC (Sauerwein & Wegner, 2020).

Many of the included studies did not conduct actual AAC education and training with rehabilitation professionals and did not compare pretest-posttest intervention. Many of the included studies provided feedback from the rehabilitation professionals or education and training providers on what AAC education and training they received or provided to rehabilitation professionals and how they viewed their AAC competence, their level of knowledge, and skills in AAC service provision and their future AAC training needs.

Table 5

Studies That Met the Inclusion Criteria and Addressed the Review Question

Authors	Date of Study	Title	Purpose of the Study	AAC Training Undertaken or Discussed	Geographical Setting
1. Balandin, S., & Hines, M.	2011	The involvement of people with lifelong disability and communication impairment in lecturing to speech-language pathology students	To assist students to have an increased knowledge and understanding of disability and communication impairments and for them to have a deep approach to learning.	Functional goal setting is an important element in intervention. Increased awareness of what people who use AAC and have disabilities are able to do. The lectures assisted with improved holistic view of the client. Exposure to different clients and clinical practice can also be the reason for positive attitudes to have been developed and strengthened.	Australia
2. Balandin, S., & Iacono, T.	1998	AAC and Australian speech pathologists: Report on a national survey	To get information on the speech pathologists' current AAC practices, their access to AAC resources, their view on their AAC knowledge and further education willingness. The study further investigated how the speech pathologists' educational background, employment place and geographical location affected their knowledge, practice and further education desire.	Many SLPs are knowledgeable about AAC unaided systems. They have knowledge about signs which can be as a result of the Makaton vocabulary which was largely promoted as being useful for individuals with developmental disabilities like autism or intellectual disability. SLPs have limited knowledge about aided systems, especially high technology systems.	Australia
3. Beck, A.R., Parette, P., & Bailey, R.L.	2005	Multimedia effectiveness in an AAC preservice setting	To investigate the effectiveness of culturally sensitive teaching tools for students registered for a speech-language pathology AAC course.	Training to develop the understanding of practitioners in relation to family and culture in AAC decision making. Family and culture have become an important factor in AAC service delivery as the family also plays a crucial role in the effectiveness of AAC.	United States

Authors	Date of Study	Title	Purpose of the Study	AAC Training Undertaken or Discussed	Geographical Setting
4. Blockberger, S., & Haaf, R.	1995	Professional preparation in augmentative and alternative communication in Canadian speech-language pathology training programs	To provide current information about AAC coursework (elective and required) and the availability of clinical placement for AAC.	Of the respondents in this study, 85% responded that they offer a separate AAC course with general information about AAC. Course content included assessment, graphic symbols, vocabulary selection, alternate access.	Canada
5. Chua, E.C.K., & Gorgon, E.J.R.	2019	Augmentative and alternative communication in the Philippines: A survey of speech-language pathologist competence, training, and practice	To describe the competence, pre- and post-professional training of Filipino SLTs in AAC.	SLPs are knowledgeable in no-tech solutions, with unaided and high-tech solutions being next. There was perceived limited knowledge on low-tech and mid-tech solutions. There is limited competence in AAC assessment and intervention competence which can be linked to a lack of pre-service training.	Philippines
6. Collier, B. & Blackstien-Adler, S.	1998	Building competencies in augmentative and alternative communication among professionals	To give professionals AAC awareness so that they can identify individuals who could benefit from AAC.	Techniques to build competencies to support styles of learning for adult learners included: modelling, practice in simulated and real-life settings. Skills facilitated include: goal setting, client assessment, conducting team meetings, selection and customisation of AAC devices, training clients and partners.	Canada
7. DePaepe, P.A., & Wood, L.A.	2001	Collaborative practices related to augmentative and alternative communication: Current personnel preparation programs	The discussion team members' pre-professional preparation in AAC skills and skills needed for AAC service collaboration.	There is an increase in AAC courses, with limited exposure to hands-on training and interdisciplinary AAC. With an increase in AAC pre-service training, it is not clear to what extent clinical collaboration experiences are included. Incorporating collaboration training will be essential in preparing SLPs for future collaboration with other professionals.	United States

Authors	Date of Study	Title	Purpose of the Study	AAC Training Undertaken or Discussed	Geographical Setting
8. Dishman, K.M., Duckart, J., & Hardman, L.J.	2021	Perceptions of assistive technology education from occupational therapists certified as assistive technology professionals	To gain insight on what OTs perceive regarding AT training in entry-level programmes.	OTs reported to have had little or no training in AAC, computer access and technology, which indicates that there is a need for these aspects to be incorporated into occupational therapy assistive technology training programmes at entry level.	United States
9. Dissinger, F. K.	2003	Core curriculum in assistive technology: In-service for special educators and therapists	Describes how the course sequence in assistive technology was developed.	With SLPs being the primary AAC service providers, however, having little pre-service education and training and are expected to provide AAC services for children. The training recommended the use of multimodal communication which uses a combination of unaided, aided, and voice output communication systems and case studies were used to achieve the needed training. Computer access such as switches, switch interfaces, switch software, screen enlargers, mouse alternatives and such-like were part of the training.	United States
10. Fields, A.	2015	Examining barriers with implementing augmentative and alternative communication in a Midwest school	To explore AAC implementation experiences by SLPs.	Collaboration between different professionals which is hindered by limited knowledge in AAC. Family involvement is also very important as it assists with implementation at home, the stage of which the family is involved is also an important factor to get their buy in.	United States
11. Gormley, J., & Light, J.	2019	Providing services to individuals with complex communication needs in the inpatient rehabilitation setting: The experiences and perspectives of speech-language pathologists	To get an understanding of SLP's experiences when providing AAC services in a rehabilitation setting, the challenges and facilitating factors related to AAC services in a rehabilitation setting.	The importance of collaboration that includes the family in goal setting as family members tend to be advocates of AAC initiation (family centred approach). There is a lack of AAC expertise that can be linked to limited	United States

Authors	Date of Study	Title	Purpose of the Study	AAC Training Undertaken or Discussed	Geographical Setting
				knowledge in AAC, AAC training participation, and a decrease in confidence in AAC implementation.	
12. Johnson, R.K., & Prebor, J.	2019	Update on preservice training in augmentative and alternative communication for speech-language pathologists	To report on academic programmes that provide pre-service training in AAC for SLPs.	There is a lack of clinical experience provided in graduate programmes, thus many graduates are not prepared to provide AAC services to clients who need them. In teaching AAC, the use of combination methods is essential, methods such as instructional videos and techniques, opportunity for learner input, virtual patients, and simulation are all examples of ways to provide clinical skills.	United States
13. Kent-Walsh, J., Stark, C., & Binger, C.	2008	Tales from school trenches: AAC service delivery and professional expertise	To identify service delivery and professional issues and professional expertise available in schools and to get AAC practical directives for clinicians.	Collaborative teaming is a central component identified as part of effective AAC service delivery. SLPs need to collaborate with different professionals and individuals; many SLPs have reported challenges with effective collaboration with professionals and family members, resulting in this challenge being a barrier to positive AAC outcomes.	United States
14. Kovacs, T.	2021	A survey of American speech-language pathologists' perspectives on augmentative and alternative communication assessment and intervention across language domains	To gather information on the pre-professional training, practice, self-perceived competence, resource availability, and the interest in continuing AAC education.	SLPs having skills in all language domains is essential to assist individuals who use AAC as they can benefit from intervention that targets skills in each language domain. There is therefore a need for improved training opportunities for SLPs providing language-based services (assessment and intervention).	United States

Authors	Date of Study	Title	Purpose of the Study	AAC Training Undertaken or Discussed	Geographical Setting
15. Mach, H., Baylor, C., Burns, M., & Yorkston, K.	2022	Training students form rehabilitation professions on communicating with patients with communication disorders	To determine the effects that the FRAME program will have on the knowledge, confidence and communication skills of students in the rehabilitation programmes.	The use of the FRAME programme on students within the rehabilitation disciplines. The programme aimed to get participants to understand the communication challenges of their patients, the use of simple and low-tech communication strategies which can be implemented in a quick and easy manner and ensuring patient respect and dignity.	United States
16. Mandak, K.	2018	The effects of an online training on pre-service speech language pathologists' use of family-centered skills	For SLPs to improve their relational skills when interacting with parents of children using AAC.	Training was on the LAFF strategy which encompasses relational skills such as family involvement and hearing their views which assists in interactions with parents of children with LNFS.	United States
17. Marvin, L.A., Montano, J.J., Fusco, L.M., & Gould, E.P.	2003	Speech-language pathologists' perceptions of their training and experience in using alternative and augmentative communication	To explore SLPs' AAC experience and education.	SLPs received training on 'high-tech' (e.g., computer software, speech synthesis) versus 'low-tech' (e.g., picture boards, gesture, sign). Most received on-the-job training which enabled a multidisciplinary approach with other professionals such as OTs and PTs.	United States
18. McCall, F., & Moodie, E.	1998	Training staff to support AAC users in Scotland: current status and needs	To determine the type of AAC training that is available and desired and the extent to which training was received by people involved in AAC implementation.	General training about AAC and working with technology (Low-tech and high-tech devices) was provided, this created awareness of the different AAC equipment available and thus improved the services provided to AAC clients.	Scotland
19. McConachie, H., & Pennington, L.	1997	In-service training for schools on augmentative and alternative communication	To train school staff on " <i>My turn to speak</i> " to equip adults to improve engagement of non-speaking children.	<i>My Turn to Speak</i> training has been an effective way to improve the interaction quality of adults with severely physically disabled young people; it has educated them on how they position themselves and the communication aid, leaving	United States

Authors	Date of Study	Title	Purpose of the Study	AAC Training Undertaken or Discussed	Geographical Setting
				sufficient time and asking open questions.	
20. Pampoulou, E., Theodoru, E., & Petinou, K.	2018	The use of augmentative and alternative communication in Cyprus: Findings from a preliminary survey	The aim was to gather information of SLTs current AAC practices in Cyprus.	AAC language systems training such as PECS, MAKATON, PODD, Grid 2, Symwriter, Keyword signing was provided. PECS, MAKATON, and PODD were reported to be more frequently used which can be as a result of training provided.	Cyprus
21. Ratcliff, A., Koul, R., & Lloyd, L.L.	2008	Preparation in augmentative and alternative communication: An update for speech-language pathology training	To examine SLP AAC training, to describe the lack of skills and knowledge in AAC with regards to practicing SLPs and to discuss ASHA AAC standards.	SLPs still feel uncomfortable delivering AAC services due to limited knowledge in the field. AAC content is an essential element that must be included in SLP training, they must receive in-depth AAC training during their pre-service.	United States
22. Rose, J., & Alant, E.	2001	Augmentative and alternative communication: Relevance for physiotherapists	For PTs to acquire knowledge and skills to be able to facilitate communication interaction with clients who are not able to use speech as a means of communication.	PTs bring the following skills to AAC assessment and intervention: Assessing if clients have motor control to use unaided means of communication, finding the best position for the client and device, designing AAC systems that match the client's motor abilities.	South Africa
23. Sanders, E.J., Keegan, L.C., & Culshaw, M.	2022	The flipped classroom model as applied to an augmentative and alternative communication course	To investigate the perspectives and experiences of pre-service SLP graduate students on the FCM in a graduate-level AAC course.	To provide opportunities for students to use tools they might encounter in a clinical setting, training focused on communication applications on iPads (e.g., Proloquo2Go, Touch Chat), low-tech tools (e.g., the development of communication boards), and software (e.g., Boardmaker, Tobii Dynavox).	United States

Authors	Date of Study	Title	Purpose of the Study	AAC Training Undertaken or Discussed	Geographical Setting
24. Sanders, E.J., Page, T.A., & Leshner, D.	2021	School-based speech-language pathologists: confidence in augmentative and alternative communication assessment	To determine the confidence that SLPs working in the education sector have in doing AAC assessments and what increases their confidence in AAC	Understand the SLPs' confidence in doing assessments with people who have complex communication needs and the ability to feature match to meet the needs of the student.	United States
25. Senner, J.E., & Baud, M.R.	2017	The use of an eight-step instructional model to train school staff in partner-augmented input	To use the eight-step model to train staff on the use of modelling in AAC intervention.	The use of Partner Augmented Input (Modelling) which can be used to teach children how to use their AAC system, the context and purpose thereof which then assists with effective use of the communication system. Teaching communication partner modelling which also assisted with them being familiar with the communication system and a change in behaviour (in that the speech rate was slower and they paused more).	United States
26. Simpson, K.O., Beukelman, D.R., & Bird, A.	1998	Survey of school speech and language service provision to students with severe communication impairments in Nebraska	To gather information from school based SLPs on AAC service delivery, their perceived competence and professional development.	For SLP professionals to increase their knowledge and skills, professional development is used. The need for professional development was evident especially for individuals with severe impairments.	United States
27. Solomon-Rice, P.L., Soto, G., & Robinson, N.B.	2018	Project building bridges: Training speech-language pathologists to provide culturally and linguistically responsive augmentative and alternative communication services to school-age children with diverse backgrounds	SLTs were engaged in a programme to educate students on the provision of culturally and linguistic services to school-aged children who have complex communication needs.	Culturally responsive AAC assessment, culturally responsive AAC programming and intervention, culturally responsive collaborative teaming, culturally responsive development of AAC application to support language and literacy skills.	United States
28. Soto, G., Müller, E., Hunt, P., & Goetz, L.	2001	Professional skills for serving students who use AAC in general education classrooms: A team perspective	Describe professional skills identified by educational team members as needed to support students who use AAC within the inclusive classroom.	Training programmes should include roles and responsibilities of the SLP within the AAC team and how these roles will change depending on the	United States

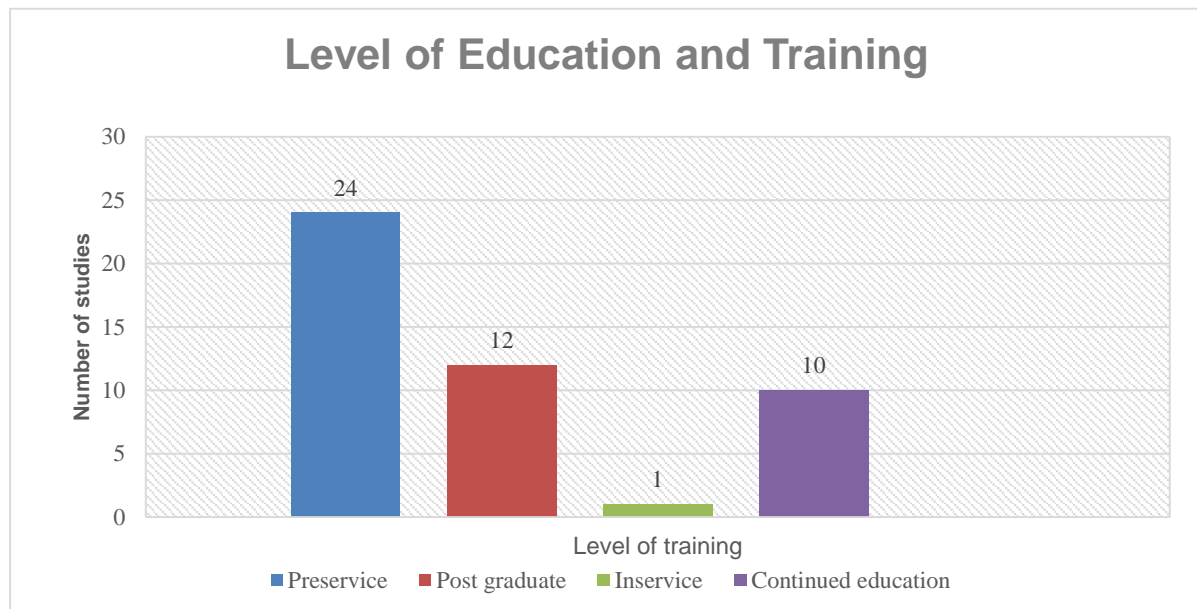
Authors	Date of Study	Title	Purpose of the Study	AAC Training Undertaken or Discussed	Geographical Setting
				client and service context and develop skills in collaborative teaming.	
29. Theodorou, E., & Pampoulou, E.	2022	Investigating the assessment procedure for children with complex communication needs	For the exploration of SLPs assessment practices used by those working with students with complex communication needs in public schools.	The study questionnaire was based on the participation model and looked at participants' profile, AAC provision, and the AAC assessment process; with particular focus on AAC assessment in terms of opportunities and barriers, inclusive of individual constraints.	Cyprus
30. Tsai, M.J.	2019	Augmentative and alternative communication service by speech-language pathologists in Taiwan	To review AAC service revolution provided by SLPs, including current practices, demographics, and continuing education needs.	High- and low-tech communication device programming, available communication devices, assessment protocols and strategies for AAC introduction; these were the most explored AAC resources that SLPs practiced due to their knowledge in them.	Taiwan
31. Wallace, S.E., & Benson, J.D.	2018	Bringing inter-professional case-based learning into the classroom for occupational therapy and speech-language pathology students	To learn about discipline roles in AAC device selection.	IPE programmes aim to improve team work amongst professionals in the provision of patient care. At the end of the training, students had a clear understanding of their role in AAC and increased awareness of other disciplines' role in AAC intervention and the team.	United States
32. Wolf, J.	2014	Effects of online professional development in augmentative and alternative communication for special education teachers and speech-language pathologists	To analyse the effects of online professional development used in training special educators and SLPs for children who can benefit from AAC systems.	Knowledge and self-efficacy in AAC were measured across various skills. There were significant differences in self-efficacy, which increased with the training and improvement in knowledge.	United States

3.2. The level of AAC education and training for rehabilitation professionals

The first sub-aim of the study was to identify studies that either discussed or undertook AAC training and education in pre-service or in-service for health professionals. Most of the included studies (n=24) undertook or discussed AAC training and education during pre-service years, indicating that health professionals are exposed to some form of AAC education and training before they obtain their qualification. Of the included studies, rehabilitation professionals received AAC education and training during post graduate (n=12), in-service (n=1) and continued education (n=10). Figure 2 below, reflects the level at which training took place.

Figure 2

Level of Education and Training



Pre-service training

From the included studies, AAC education and training at a pre-service level focused on team members' pre-professional preparation skills SLTs need for AAC collaboration (DePaepe & Wood, 2001), with a focus on collaborative problem-solving and collaborative planning and provision of AAC services. These studies looked at the SLPs' education and training, skills, and knowledge in AAC; pre-professional training practice, available resources and interest in continuing education and the competence of pre- and post-professional training of Filipino SLPs

(Chua & Gorgon, 2019; Kovacs, 2021; Ratcliff et al., 2008). Mandak et al. (2020) used the LAFF strategy (a training strategy that focuses on relational skills such as family involvement and hearing their views which results in better interactions with the parents of children with CCN) to improve SLPs' relational skills when interacting with parents of children who use AAC. The study explored the experiences of SLPs in the implementation of AAC (Fields, 2015). Studies by Balandin and Iacono (1998); Pampoulou et al. (2018); Theodorou and Pampoulou (2022); and Tsai (2019) explored the assessment practices that are used by SLPs working with students who have LNFS in public schools; the current AAC practices used by SLPs in Cyprus and SLPs' current AAC practices; access to resources and their view regarding their AAC knowledge and AAC service revolution provided by SLPs, including current practices; and demographics and continuing education needs. In the aforementioned studies, more than half the SLP respondents stated they have adequate knowledge of low-tech devices. The quality of AAC resources was ranked moderate, indicating that there is room for improvement. SLPs also indicated that there is a need for collaboration with AAC teams (PT or OT). Marvin et al. (2003) explored SLPs' AAC experience and education with a focus on four key components: self-perceived qualifications; education/training; frequency of recommendation; and frequency of use. Even though participants in this study recommend AAC, they report to have received minimal education and training in AAC. Kent-Walsh et al. (2008) focused on identifying service delivery and professional issues as well as the professional expertise that are available in schools and to get practical AAC directives for clinicians, with a focus on the importance and effectiveness of collaborative teaming with different professionals and how this then becomes a barrier for effective AAC implementation.

The study by Wallace and Benson (2018) focused on learning about specific roles for SLTs and OTs in AAC device selection and found that at the conclusion of the training, students had a clear understanding of their role in AAC, increased awareness of other disciplines roles in AAC intervention and the team. A study by Dishman et al. (2021) aimed to gain insight into what OTs perceived about their pre-service training programmes in assistive technology. The study found that OTs believe that their entry level curricula is inadequate in preparing them for assistive technology which included AAC and computer access amongst others. SLPs

showed interest in continuing education in AAC assessment and intervention. Training programmes at pre-service level need to be updated for new SLPs, create continuing education opportunities for practicing SLPs and collaborate with partners in the industry to provide resources that are evidence-based (Kovacs, 2021). Rose and Alant (2001) focused on the knowledge and skills that PTs need to acquire to equip them to facilitate communication interaction with clients who do not use verbal speech as a means of communication such as knowledge regarding AAC systems and AAC communication strategies (such as modelling). The study by Soto et al. (2001) described professional skills that were identified by educational team members as a need to support students who use AAC in an inclusive classroom. These skills include being able to operate, maintain, and integrate AAC system elements, be able to facilitate AAC use across all activities and have advocacy skills to build a supportive school community. Another study by Balandin and Hines (2011) focused on assisting students to have an increased knowledge and understanding of disability and communication impairments and improve their approach to learning. This study showed that functional goal setting is an important element in intervention. Increased awareness of what people who have disabilities and use AAC are able to do. The lectures assisted with an improved holistic view of the client. Exposure to different clients and clinical practice can also be the reason for positive attitudes to have been developed and strengthened.

A study to investigate the effectiveness of culturally sensitive teaching tools for SLP students in the AAC course (Beck et al., 2005) found that lectures and classroom participation achieved better retention of information than independent studying. The studies by Gormley and Light (2019) looked at understanding SLPs' experiences when providing AAC services in a rehabilitation setting as well as the challenges and facilitating factors in AAC services within a rehabilitation setting. This study found that there is a lack of AAC expertise that can be linked to limited knowledge in AAC, AAC training participation, and a decrease in confidence in AAC implementation.

The study by Johnson and Prebor (2019) reported on academic programmes that provide pre-service AAC training for SLPs and found that there is a lack of clinical experience provided in graduate programmes, thus many graduates are not

prepared to provide AAC services to clients who need them. In teaching AAC the use of combination methods is essential, methods such as instructional videos and techniques, opportunity for learner input, virtual patients and simulation are all examples of ways to provide clinical skills.

Dissinger (2003) described how the course sequence in assistive technology was developed and with SLPs being the primary AAC service providers, they have little pre-service education and training and are expected to provide AAC services for children. The training recommended the use of a multi-model approach which uses a combination of unaided, aided, and voice output communication systems. Case studies were used to achieve the needed training. Computer access such as switches, switch interfaces, switch software, screen enlargers, mouse alternatives and so forth were part of the training. The study by McCall and Moodie (1998) determined the type of training that is available and the desire and extent to which training was received by people involved in AAC. In this study general training surrounding AAC and working with technology (low-tech and high-tech devices) was provided which created awareness of the different AAC equipment available and thus improved the services provided to AAC clients.

Simpson et al. (1998) gathered information from school-based SLPs on AAC service delivery, their perceived competence and professional development. The study found that SLPs providing AAC services perceived themselves to have a higher competence than those who did not provide the service. To ensure that AAC service providers are competent, AAC education needs to be expanded. Their need for professional development was evident.

With the knowledge that many SLPs graduate with experience in AAC, the eight-step instructional model was used to train SLPs on modelling (Senner & Baud, 2017); modelling increased across all activities and there was increased familiarity with student devices. The eight-step instructional model was effective and did not affect classroom time, students' existing Speech Generating Device were used in the training. Over the period of the training, an improvement in skills amongst staff was noted. In a study by Blockberger and Haaf (1995), the aim was to provide current information regarding AAC coursework (elective and required) and the availability of clinical placement for AAC. This study found that there is limited AAC content in the

compulsory course. A study to determine the confidence levels of SLPs working in the education sector in conducting AAC assessments and what increases their confidence in AAC was conducted (Sanders et al., 2021) and found that the amount of training received in AAC could influence confidence in the AAC assessment process.

In-service training

Only one study (Gormley & Light, 2019) discussed SLPs' experiences when providing AAC services in a rehabilitation setting. The specific focus of AAC training at this level looked at the importance of collaboration that includes the family in goal setting as family members tend to be advocates of AAC initiation (family centred approach). It was reported that there is a lack of AAC expertise that can be linked to limited knowledge in AAC, AAC training participation, and a decrease in confidence in AAC implementation.

Post-graduate training

Post graduate education and training (n=10) was ranked as the second highest level of training used to equip rehabilitation professionals with AAC knowledge. The focus of AAC education and training at this level looked at education and training related to SLPs improving their relational skills when they interact with parents. Training was done using the Listen, Ask, Focus and Find a solution (LAFF) strategy to improve SLPs relational skills (Mandak et al., 2020). Fields (2015) explored SLPs' experiences when implementing AAC, including collaboration challenges they experience with other professionals and the family. Marvin et al. (2003) explored SLPs' AAC experience and education and found that more than half of the participants recommend AAC systems, even though they received limited education and training in their pre-service education.

Another study explored the assessment practices that are used by SLPs working with students who have complex communication needs in public schools (Theodorou & Pampoulou, 2022). These included AAC provision and the AAC assessment process; with particular focus on AAC assessment in terms of opportunities and barriers, inclusive of individual constraints. Dishman et al. (2021) conducted a study to gain insight to the perception of OTs regarding their assistive

technology education and training at entry-level. Training was conducted for SLPs to educate them on the provision of cultural and linguistic services for school-aged children who have LNFS (Solomon-Rice et al., 2018). Pampoulou et al. (2018) conducted a study to gather information about the current practices used by SLPs in Cyprus. Johnson and Prebor (2019) conducted a study with academic institutions to gather information regarding academic programmes that provide pre-service education and training in AAC for SLPs. A study by Tsai (2019) reviewed the evolution of the AAC service that SLPs provide, including the current practices, demographics, and the needs that they have for continuing AAC education and training. Chua and Gordon (2019) investigated pre- and post-professional training in AAC of Filipino SLPs to describe their levels of competence. The focus of the study by Simpson et al. (1998) was to gather further information regarding AAC service delivery, the perceived competence and professional development of SLPs. Sanders et al. (2022) investigated the perspectives and experiences of pre-service SLP graduate students on the Flipped Classroom Model in a graduate-level AAC course.

Continued education

Another level at which education and training in AAC was conducted from the included studies was from continued education (n=10), which included workshops. In these studies, Wolf (2014) analysed the effects of online professional development used in training special educators and SLPs for children who can benefit from AAC systems. Theodorou and Pampoulou (2022) explored assessment practices that are used by SLPs working with students who have complex communication needs in public schools. The study by Chua and Gorgon (2019) described the competence, pre- and post-professional training of Filipino SLTs in AAC. The study by Sanders et al. (2021) aimed to determine the confidence of SLPs working in the education sector in doing AAC assessments and what increases their confidence in AAC. Senner and Baud (2017) used the eight-step model to train staff on modelling in AAC. Balandin and Iacono (1998) focused on gathering SLPs' information on current AAC practices, the access they have to AAC resources, and how they view their AAC knowledge and the willingness they have to further their AAC education and training. The study further investigated the impact that educational background, place of employment, and the geographical setting of SLPs had on their knowledge, practice, and the desire to further their studies.

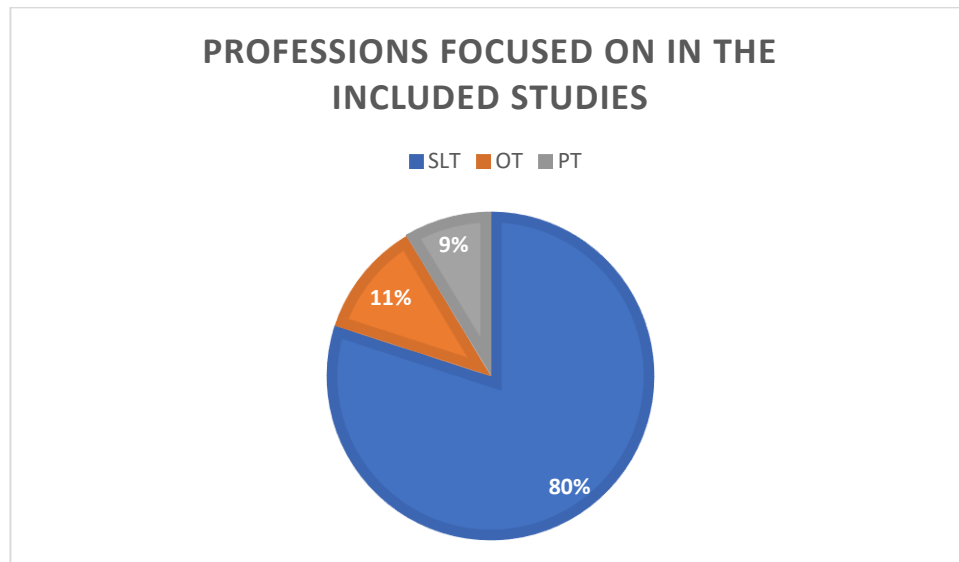
A training was conducted to give professionals awareness in AAC to enable them to identify individuals who may benefit from AAC (Collier & Blackstien-Adler, 1998). Dissinger (2003) described how the course sequence in assistive technology, including AAC was developed. In the study by Mach et al. (2022), the effects the FRAME programme will have on the knowledge, confidence, and communication skills of students in the rehabilitation programmes were investigated. McConachie and Pennington (1997) trained school staff on “*My turn to speak*” to equip adults to improve the engagement of non-speaking children.

3.3. The extent to which education and training of Physiotherapists in AAC forms part of the included studies

Professional teams need to work together to improve their clients’ communication (DePaepe & Wood, 2001). PTs form part of the rehabilitation team and often assist clients with LNFS. Figure 3 below, shows the rehabilitation professionals that were the focus of AAC education and training in the included studies.

Figure 3

Rehabilitation professionals included in the studies



The majority of the studies (80%) focused on the AAC training and education of SLTs, followed by OTs (11%), and PTs (9%).

The education and training of PTs in AAC was discussed in the studies by Mach et al. (2022); and Rose and Alant (2001). In the study by Mach et al. (2022), the following aspects of AAC training were discussed or undertaken. The FRAME programme was applied on students within the rehabilitation disciplines. The programme aimed to get participants to understand the communication challenges of their patients, the use of simple and low-tech communication strategies which can be implemented in a quick and easy manner and that ensures client respect and dignity. The study by Rose and Alant (2001) highlighted the role and skills PTs bring to the AAC team, skills such as assessing if clients have motor control to use unaided means of communication, finding the best position for the client and device, and designing AAC systems that match the client's motor abilities. A third study by McConachie and Pennington (1997) conducted a training package called “*My turn to speak*” which aimed at educating adults to facilitate communication for children who use AAC. The study showed that the training package was effective in improving the quality of interaction between adults and children who use AAC with regards to how they position themselves and the communication aid, the questions they ask and leaving enough time for communication.

Based on the summary presented in Table 6 below, the AAC education and training of SLTs (n=28) focused on the following aspects of AAC: collaboration with other professionals for AAC provision; interdisciplinary AAC education and training; the confidence levels of SLPs in the provision of AAC services; the roles and responsibilities of SLPs in AAC service provision; knowledge and skills in AAC (including how SLTs rate themselves and their knowledge regarding AAC systems); functional goal setting in intervention and how they relate with families and the decision making process in AAC. In two studies (Johnson & Prebor, 2019; Senner & Baud, 2017), the focus was to give a report on the academic programmes available that provide SLPs with education and training in AAC; training was conducted for SLPs on the use of modelling in AAC which can be used to teach children how to use their AAC systems.

As can be seen in Table 6 below, the AAC education and training of OTs (n=5) focused on the following aspects of AAC: discipline specific roles in AAC device selection; understanding OTs' perceptions regarding their education and

training in assistive technology during pre-service; and improving their AAC awareness and the development of the course sequence in assistive technology. In the studies by Collier and Blackstien-Adler (1998); and Mach et al. (2022), the focus was on giving professionals awareness in AAC to enable them to identify individuals who could benefit from AAC intervention and determine the effects of the FRAME programme on the knowledge, confidence, and communication skills on students in rehabilitation programmes.

Table 6

Summary Of What Was Trained/Discussed For Each Profession

Profession	Pre-service AAC Training	Post-graduate Service Training	Continuing Education Training and AAC Workshops Training
Speech Therapy	<ul style="list-style-type: none"> • Collaboration • LAFF strategy • Family involvement • Inter-professional education • AAC language systems (PECS, PODD, Makaton, Grid 2, symwriter, keyword signing) • Roles and responsibilities in AAC team • Functional goal setting • Family and culture in AAC decision making • Language domains skills • AAC technology solutions • AAC clinical experience • High- and low-tech device programming and available communication devices • Confidence levels in AAC assessments. • Graphic symbols, vocabulary selection, alternate access 	<ul style="list-style-type: none"> • LAFF strategy • Family involvement • Culturally responsive AAC intervention • AAC language systems (PECS, PODD, Makaton, Grid 2, symwriter, keyword signing) • AAC technology solutions • AAC clinical experience • High- and low-tech devices programming and available communication devices • Communication applications on iPads (e.g., Proloquo2Go, Touch Chat), low-tech tools (e.g., the development of communication boards), and software (e.g., Boardmaker Tobii Dynavox) 	<ul style="list-style-type: none"> • Self-efficacy • Collaboration • AAC technology solutions • Competencies in goal setting, assessments, AAC device selection, team meetings, clients and partner training • Use of multimodal communication and computer access • Partner augmented input (modelling) in AAC • Confidence levels in AAC assessments

Profession	Pre-service AAC Training	Post-graduate Service Training	Continuing Education Training and AAC Workshops Training
Occupational Therapy	<ul style="list-style-type: none"> • Inter-professional education • Assistive technology (AAC access) 	<ul style="list-style-type: none"> • Assistive technology (AAC access) 	<ul style="list-style-type: none"> • Competencies in goal setting, assessments, AAC device selection, team meetings, clients and partner training • Use of multimodal communication and computer access • Communication challenges, the use of low-tech communication strategies
Physiotherapy	<ul style="list-style-type: none"> • AAC assessment and intervention skills (positioning, motor abilities assessment) 		<ul style="list-style-type: none"> • Communication challenges, the use of low-tech communication strategies. • How they position themselves and the communication aid, leaving sufficient time, asking open questions

3.4. Unique And Common AAC Knowledge And Skills That Need To Be Addressed In Rehabilitation Professionals' Education And Training

The last sub-aim aimed to understand the unique and common knowledge of skills surrounding AAC that need to be addressed in education and training for health professionals. Table 7 below, shows the unique and common AAC education and training practices from the included studies.

Table 7

Unique And Common Education and Training Practices

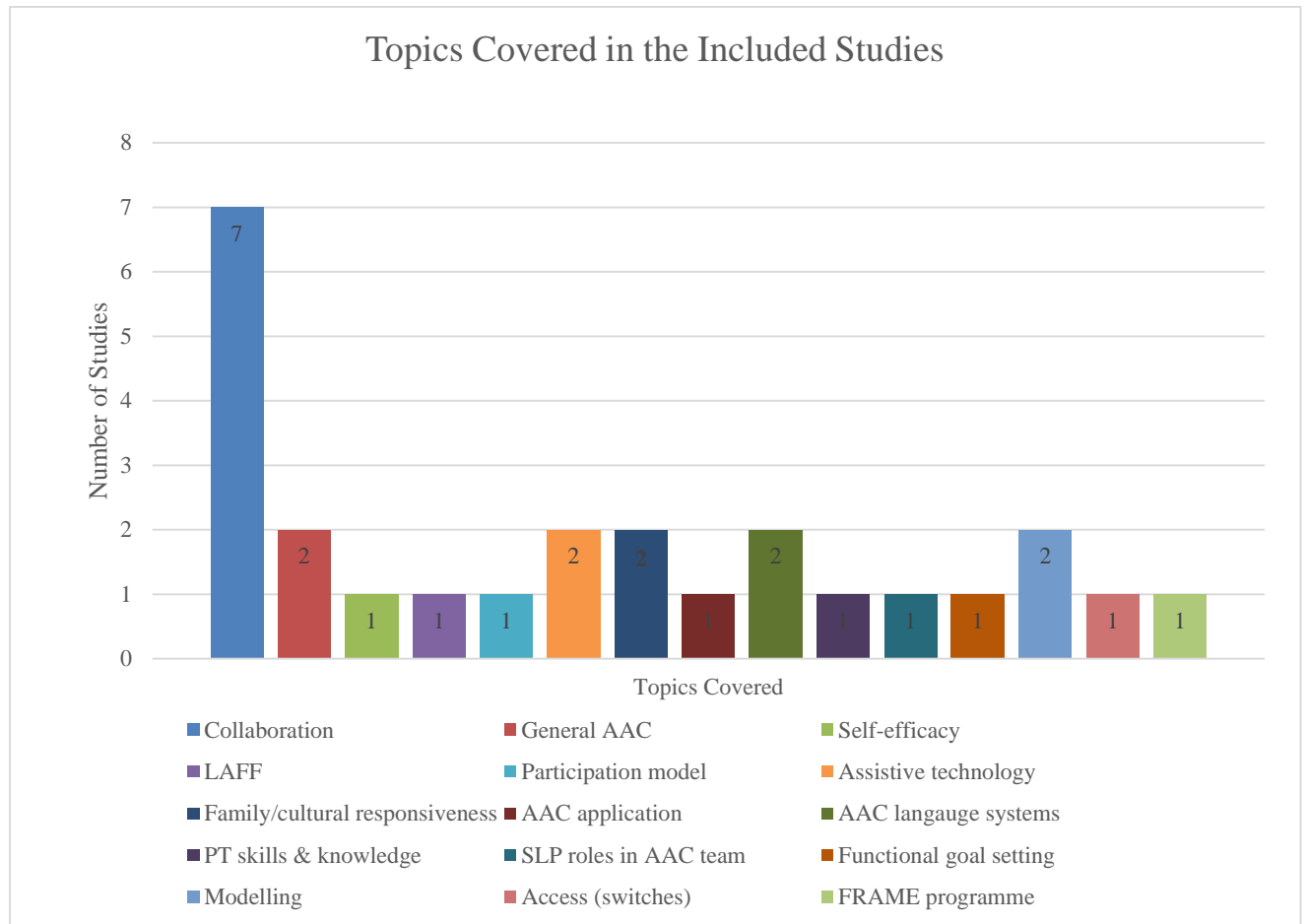
	Common AAC Education and Training Practices	Unique AAC Education and Training Practices
Speech-language Therapy	<ul style="list-style-type: none"> • Inter-professional education • Competencies in goal setting, assessments, AAC device selection, team meetings, clients and partner training • Use of multimodal communication and computer access 	<ul style="list-style-type: none"> • LAFF strategy • Collaboration • Family involvement • Roles and responsibilities in AAC • Functional goal setting • Family and culture in AAC decision making • Language domain skills • AAC technology solutions • AAC clinical experience

Common AAC Education and Training Practices	Unique AAC Education and Training Practices
	<ul style="list-style-type: none"> • High- and low-tech device programming and available communication devices • Confidence levels in AAC assessments • Self-efficacy • AAC language systems (PECS, PODD, Makaton, Grid 2, symwriter, keyword signing) • Family involvement • Culturally responsive AAC intervention • Partner augmented input (modelling) in AAC • Communication applications on iPads (e.g., Proloquo2Go, Touch Chat), low-tech tools (e.g., the development of communication boards), and software (e.g., Boardmaker Tobii Dynavox) • Graphic symbols, vocabulary selection, alternate access
<p>Occupational Therapy</p> <ul style="list-style-type: none"> • Communication challenges, the use of low-tech communication strategies • Inter-professional education • Competencies in goal setting, assessments, AAC device selection, team meetings, clients and partner training • Use of multimodal communication and computer access 	<ul style="list-style-type: none"> • Assistive technology (AAC access)
<p>Physiotherapy</p> <ul style="list-style-type: none"> • Communication challenges, the use of low-tech communication strategies 	<ul style="list-style-type: none"> • AAC assessment and intervention skills (positioning, motor abilities assessment) • Position themselves and the communication aid, leaving sufficient time, asking open questions.

Of the total number of included studies, 16 studies had education and training that was AAC focused and 12 studies blended the AAC education and training into other courses. Figure 4 below, shows the different topics that were covered in the included studies.

Figure 4

Topics covered in the included studies



Collaboration

Seven of the studies focused on collaboration with both the family and other health professionals (DePaepe & Wood, 2001; Fields, 2015; Gormley & Light, 2019; Kent-Walsh et al., 2008; Solomon-Rice et al., 2018; Soto et al., 2001; Wallace & Benson, 2018).

Participation

A study by Theodorou and Pampoulou, (2022) based on the participation model framework offered to SLTs, is a good example of education given to one group of professionals, however, it applies to all health professionals. Aspects such as motor abilities and control need to be assessed as they will inform access to the communication device is another example (Theodorou & Pampoulou, 2022). This study emphasises the importance of including such areas for development in education and training of other health professions.

AAC technology and access

Reports have been made by OTs that they have had little or no training on AAC, computer access, and technology (Dishman et al., 2021), which indicates that there is a need for them to be incorporated into occupational therapy assistive technology training programmes at entry level. They also mentioned that they believe that their entry level curricula are inadequate in preparing them for assistive technology which included AAC and computer access amongst others (Dishman et al., 2021). Many SLPs are knowledgeable regarding AAC unaided systems. They have knowledge on signs which can be as a result of the Makaton vocabulary which was largely promoted as being useful for individuals with developmental disabilities such as autism or intellectual disability. SLPs have limited knowledge regarding aided systems, in particular high-technology systems (Balandin & Iacono, 1998). The study by Tsai (2019) also found that more than half the SLP respondents stated that they have adequate knowledge of low-tech devices and the quality of AAC resources was ranked moderate, indicating that there is room for improvement to gain more knowledge. Another study pointed out that SLPs are knowledgeable in no-tech solutions, with unaided and high-tech solutions following, however, there was perceived limited knowledge on low-tech and mid-tech solutions (Chua & Gorgon, 2019). The study by Blockberger and Haaf (1995) found that most institutions offered AAC courses and the course content included assessment, graphic symbols, vocabulary selection, and alternate access methods.

4. DISCUSSION

The extent of research on the education and training of rehabilitation professionals was determined by means of a scoping review. A total of 28 articles met the inclusion criteria and were evaluated in terms of the extent to which they undertook or discussed the education and training on AAC for the three rehabilitation professionals which literature suggests are most commonly involved in AAC service delivery, namely SLTs, OTs and PTs.

Most of the studies discussed rather than reported on actual AAC training conducted and most were discussed in relation to the training of SLTs. This finding indicates that there is still a significant need to expand AAC education and training to other rehabilitation professionals that form part of the AAC team, especially PTs and OTs. It is important to note that the majority of the studies (n=22) were conducted in the United States which could prove to be a challenge when applying these findings generally. In South Africa where there is an established AAC practice, there is a limited evidence-based in AAC, this could be due to lack of evidence or a limitation in continuing educational opportunities for trained professionals (Chua & Gorgon, 2019).

With most of the included studies coming from the United States, there is a lack of research being conducted on AAC education and training for rehabilitation professionals within the South African context. Although this training may be happening, the nature and results of the training at all levels (i.e., pre-service, postgraduate, and in-service or continued education) is not being reported in the literature. This may be contributing to the lack of clarity and specificity in the curriculum on each of the various discipline roles within the AAC team and what core knowledge as well as discipline specific knowledge and skills in AAC may be needed. The development of evidence-based, compulsory pre-service AAC training should be a priority to ensure that rehabilitation professionals provide quality services (Costigan & Light, 2010).

Many of the professionals who participated in the studies indicated that they only attended a class in AAC in their pre-service studies. An approach in education using AAC focused courses or sections thereof and implementing it into current

courses can be an effective method of delivery to improve AAC education and training (Dishman et al., 2021). A study was conducted to provide opportunities for students to use tools they might encounter in a clinical setting, training focused on communication applications on iPads (e.g., Proloquo2Go, Touch Chat), low-tech tools (e.g., the development of communication boards), and software (e.g., Boardmaker, Tobi Dynavox), (Sanders et al., 2022).

Professional training programmes should include the roles and responsibilities of the different health professionals with the aim of developing skills in collaborative teaming. Collaborating with the family and including them in goal setting is important as the family tends to be advocates of AAC. It is also noted that families play an essential role in AAC assessment and intervention as they are also affected by decisions that are made (Beukelman & Light, 2020). Beck et al. (2005) presented the same finding which is that family and culture have become an important factor in AAC service delivery since the family plays a crucial role in the effectiveness of AAC. LAFF strategy training includes skills such as family involvement assisted in an increase in family-centred skills which contribute to supportive and respectful services (Mandak et al., 2020). This also puts an emphasis on the importance of family centred skills in the same way as the previously stated studies.

Due to an increase in AAC strategies and assistive technology, communication opportunities have increased for people with communication needs which requires professional teams to work together for improved communication of their clients (DePaepe & Wood, 2001). For professional teams to work together effectively; a holistic approach should be followed to developing AAC services and a transdisciplinary staff training, while peer coaching may be an effective and efficient way to develop AAC services that are specialised (Collier & Blackstien-Adler, 1998). It was previously stated that collaboration is essential for positive and improved outcomes and this was also indicated by SLPs that there is a need for collaboration with AAC teams such as PTs or OTs (Tsai, 2019).

A large focus was placed on SLTs which could be because there may be more AAC guidance in the SLTs' scope of practice (Forbes, 2018). Another reason for the majority of the focus being on SLTs could be attributed to communication being their main focus of training and since AAC forms part of communication, it is

understandable why SLTs are the profession mostly reported on in the included studies. Even though most of the included studies focused on SLTs, education and training on other aspects of AAC would be beneficial for OTs and PTs. All health professionals must receive in-depth AAC education and training during pre-service so as to improve their knowledge and skills in AAC (Ratcliff et al., 2008).

Even with some form of AAC education and training being offered in pre-service training; there is a lack of clinical experience provided in graduate programmes which has resulted in many graduates not being prepared to provide AAC services to clients who need them. In AAC education and training, the use of combination methods to equip rehabilitation professionals is essential; methods such as instructional videos and techniques, opportunity for learner input, virtual patients and simulation are all examples of ways to provide clinical skills (Johnson & Prebor, 2019).

The outcome of this review indicates that even with some AAC education and training being provided in pre-service, although mainly for SLTs, there is still a need for AAC postgraduate education and training for all three professions as pre-service education and training was either inadequate or was not provided. Formal AAC training for rehabilitation professionals providing the necessary AAC intervention to individuals is largely inadequate (Siu et al., 2010). Education and training in AAC at a postgraduate level increase and builds on the knowledge that already exists or is a form of equipping health professionals who do not have the basic AAC education and training.

Even though SLTs are the most represented health professionals in the included studies, a lack of AAC knowledge and competence is still reported. To overcome this, academic institutions need to deliver in-depth AAC education and training since most of the AAC education happens during the bachelor's degree (Pampoulou et al., 2018). There is a need to support health professionals by preparing them better to communicate with clients who have communication disorders. PTs and OTs can benefit from AAC training as effective communication is necessary for improved patient outcomes (Mach et al., 2022).

Rehabilitation professionals regularly engage and are in contact with clients who have complex communication needs and SLTs regularly provide services to people with complex communication needs. The study by Gormley and Light (2019) also indicated that even though SLPs provide services to people with complex communication needs, they still lack knowledge and skills in AAC, resulting in decreased confidence in providing AAC services. SLPs report that they still feel uncomfortable delivering AAC services as a result of the limited knowledge they have regarding the AAC (Ratcliff et al., 2008). As stated by Ratcliff et al. (2008), some of the reasons for the lack of AAC service delivery comfort could be attributed to limited knowledge in the field, inadequate in-depth AAC training during pre-service training, and a lack of practical coursework included in the academic course so that students can gain practical experience.

Other forms of education and training such as online professional development can have an effect on the knowledge and skills of rehabilitation professionals (Wolf, 2014). Both knowledge and self-efficacy improved with continued education and training in AAC done through other strategies of education and training (Wolf, 2014). The use of these education and training strategies has shown that it is effective in increasing knowledge and skills that would be beneficial for use in implementing AAC in practice. There are many methods of equipping health professionals with AAC knowledge and skills at different educational levels. The success of education and training is also reliant on the manner in which the training is provided. There is a need for the development of teams that assist in AAC provision to assist professionals working with clients who are in need of AAC (Kent-Walsh et al., 2008). One of the studies found that there is a need for ongoing education in the AAC community, including SLPs, as education is needed on the different forms of AAC and intervention developments for individual learners (Balandin & Iacono, 1998). AAC education needs to be part of continuing education and training to ensure that all rehabilitation professionals and teams who provide intervention to people with LNFS stay informed about new developments in the field (McCall & Moodie, 1998).

PTs are important AAC team members in that their knowledge in assessing clients' motor control for unaided means of communication, positioning the client and device, and finding an aided AAC system that meets the clients' motor abilities are

essential elements to consider in AAC intervention (Rose & Alant, 2001). Therefore, it is essential for PTs and OTs to have knowledge and skills to effectively use AAC strategies in a functional way and be able to intervene and assist potential AAC users timeously. There is a need for rehabilitation professionals to be supported by preparing them adequately to have improved communication with clients. In the selected studies, there is minimal information surrounding AAC education and training for PTs and OTs. PTs and OTs can benefit greatly from AAC education and training because effective communication is essential for improved patient outcomes (Mach et al., 2021).

5. CONCLUSION AND RECOMMENDATIONS

More AAC awareness is taking place and rehabilitation professionals are becoming aware of their roles and responsibilities in AAC. Future research should include the type of AAC education and training that professionals receive and AAC education and training being extended to all health professionals. There is a need to research what kind of AAC education and training is being provided for health professionals in their pre-service years which is their grounding foundation for AAC education and training. To add to that, the kind of AAC clinical practice that is offered in pre-service also needs to be researched; this research needs to include the education and training within different contexts and with a variety of conditions. Pre-service educational training programmes across all disciplines (SLT, OT and PT) should provide up to date information regarding AAC use. In-service programmes must do the same to ensure that professionals who trained a few years back have the same information and intervention strategies Rominski et al. (2015).

This scoping review has shown that the majority of AAC education and training is focused on SLTs and that other health professionals such as OTs and PTs receive minimal AAC education and training. Another factor that the scoping review highlighted is that there is minimal AAC education and training that is offered to health professionals and even lesser practical exposure in their training; which results in these professionals not feeling confident or qualified enough to offer AAC services to clients. It would be beneficial if future research could investigate AAC education and training of rehabilitation professionals that form part of the AAC team. One of the other important components that future research should explore is the extent to which AAC education and training forms part of the rehabilitation professionals' pre-service education and training.

Most of the included studies did not report on the actual training that was offered, which makes it challenging to determine if AAC education and training that was offered covered adequate AAC content and the duration of the training provided. The studies included in the review were mostly conducted in the United States, with few studies being done in the South Africa context, thus it is challenging to apply the results generally as the status of AAC education and training in South Africa is not fully known.

The strength of this scoping review is transparency, all steps and methods used to answer the review question were clearly stated. To keep the review linguistically applicable, the search strategy was limited to studies conducted in English and thus language bias might have affected the outcomes of the study. Even though two reviewers extracted data from some of the studies independently, data of all included studies was not independently extracted and compared by the two reviewers. This could have resulted in extractor bias.

Researchers are encouraged to focus on researching AAC education and training with a focus on the kind of education and training health professionals who are mainly involved in the rehabilitation of people with LNFS receive, with more specific focus on the practical component of education and training. They also need to expand their focus in AAC education and training to a wider range of health professionals. To have a better perspective on AAC education and training in South African, more studies reporting on AAC education and training within the South Africa context need to be conducted.

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* All references with asterisks refer to studies that were included in the review.

Appendix A

Data Extraction Tool

General information			
Title			
Date of publication			
Authors			
Purpose of study			
Research questions			
Place of study			
Participants	SLT	OT	PT
Type of education/training			
Preservice	Postgraduate	In-service	Workshop
Continued Professional Development			
Duration of training			
Results and conclusions			
Outcome of study			
Limitations of study			
Reviewer's comments			

Appendix B

Ethical Clearance Letter



Faculty of Humanities

Fakulteit Geesteswetenskappe
Lefapha la Bomotheo



1 November 2021

Dear Miss SS Mthonxa

Project Title: The education and training on Augmentative and Alternative Communication for rehabilitation professionals working with people who have little or no functional speech: A scoping review
Researcher: Miss SS Mthonxa
Supervisor(s): Dr AE Samuels
Department: CAAC
Reference number: 18255265 (HUM006/1021)
Degree: Masters

Thank you for the application that was submitted for ethical consideration.

The Research Ethics Committee notes that this is a literature-based study and no human subjects are involved.

The application has been **approved** on 28 October 2021 with the assumption that the document(s) are in the public domain. Data collection may therefore commence, along these guidelines.

Please note that this approval is based on the assumption that the research will be carried out along the lines laid out in the proposal. However, should the actual research depart significantly from the proposed research, a new research proposal and application for ethical clearance will have to be submitted for approval.

We wish you success with the project.

Sincerely,



Prof Karen Harris
Chair: Research Ethics Committee
Faculty of Humanities
UNIVERSITY OF PRETORIA
e-mail: tracey.andrew@up.ac.za

Research Ethics Committee Members: Prof KL Harris (Chair); Mr A Bizos; Dr A-M de Beer; Dr A dos Santos; Dr P Gutura; Ms KT Govinder Andrew; Dr E Johnson; Dr D Krige; Prof D Maree; Mr A Mohamed; Dr I Noomé; Dr J Okeke; Dr C Puttergill; Prof D Reyburn; Prof M Soer; Prof E Taljard; Ms D Mokalapa

Room 7-27, Humanities Building, University of Pretoria, Private Bag X20, Hatfield 0028, South Africa
Tel +27 (0)12 420 4853 | Fax +27 (0)12 420 4501 | Email pghumanities@up.ac.za | www.up.ac.za/faculty-of-humanities

Appendix C

Title and abstract screening relevance tool

The education and training on Augmentative and Alternative Communication for rehabilitation professionals working with people who have little or no functional speech: A scoping review

Title and Abstract Screening Relevance Tool

General Information	
Article title	
Publication year	
Authors	

1. As the study target group rehabilitation professionals?
 - Yes
 - No
 - Maybe
2. Are the rehabilitation professionals in the study any of the following SLPs, OTs or PTs?
 - Yes
 - No
 - Maybe
3. Is the study reporting on education and training?
 - Yes
 - No
 - Maybe
4. Is the focus of training in the study on AAC?
 - Yes
 - No
 - Maybe
5. Is the language of publication English?
 - Yes
 - No
 - Maybe

Screening outcome:

- If the response to any question is “No” then the study will be excluded.
- If the study gets a “Yes” to any question, the study will be included for further screening.
- If the study gets a “Maybe” to any question, the study will be included for further screening.

Appendix D

Turnitin submission report



Digital Receipt

This receipt acknowledges that **Turnitin** received your paper. Below you will find the receipt information regarding your submission.

The first page of your submissions is displayed below.

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Assignment title: **AAK 895 Year 2**
Submission title: **Mthonxa AAK895 mini-dissertation 2022**
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File size: **1.08M**
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By

SS (Sephiwe) Mthonxa
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A submission is made as part of the requirements for the degree.

Accepted for submission on 15-Nov-2022 10:35AM (UTC+0200)

In the Office for Assessment and Alternative Communication

UNIVERSITY OF PRETORIA
P.O. BOX 2034, TLOKENG

SUPervisor: Dr. J. S. S. S.
15-Nov-2022

Appendix E

Declaration of language editor

JANINE ELLIS
LANGUAGE EDITING / TRANSCRIPTION / TYPING

janine.ellis4@gmail.com

Cell: 083-6563660

Client

Sephiwe Selina Mthonxa

Student No. 18255265

Mini-Dissertation

University of Pretoria

P O Box 28164

Sunridge Park

6008

13 November 2022

DECLARATION

To whom it may concern,

I hereby declare that I language edited the mini-dissertation of Sephiwe Selina Mthonxa, titled: ***The education and training on Augmentative and Alternative Communication for rehabilitation professionals working with people who have little to no functional speech: A scoping review***

All aspects of this mini-dissertation were looked at carefully, corrections made and suggestions given with regards to certain wording and sentence structure, however, the academic content was not influenced in any way. The layout and presentation as well as the referencing of this mini-dissertation were edited as per the referencing and technical/style template/guide provided by the client. Final acceptance of all proposed corrections/changes/comments is at the discretion of the author.

Kind regards

Janine Ellis

Janine Ellis