SAUDI SPECIAL EDUCATION STUDENT TEACHERS' KNOWLEDGE OF AUGMENTATIVE AND ALTERNATIVE COMMUNICATION (AAC)

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Speech-language pathologists (SLPs), special education teachers (SETs), and occupational therapists (OTs) are all expected to encounter individuals with complex communication needs, who need for Augmentative and alternative communication (AAC) (Costigan & Light, 2010). This study aimed at investigating special education student teachers' knowledge of AAC, and its relation to their academic levels and unique- specializations. To achieve this objective, the researcher administered a ten questions test on 30 participants all of whom met the study including criteria. The means and standard deviations relevant to their responses to the test were counted and then analyzed by means of Analysis of Covariance ANCOVA. Results of ANCOVA haven't shown any statistically significant difference in the participants' knowledge of AAC attributed to their academic levels and unique-specializations. The percentage of fully accurate responses of all participants to the ten tests' questions was 2.66%. This result suggests an inadequacy of participants' knowledge of AAC and a dire need for relevant education and training. Results and implications for future research and practices are discussed.

Individual with Disabilities Education Act (IDEA) of [1997 P. L. 105-17] requires that assistive technology (AT) should be considered in preparing individualized education program (IEP) [29 U.S.C 2201, §3 (1)] .For the time being there are about 26,000 assistive technology tools which can be included in individualized education program IEP. AAC tools and systems are one of the most important assistive technology categories. AAC is defined as an *integrated group of components, including the symbols, aids, strategies and techniques used by individuals to enhance communication* (American Speech-Language Hearing Association, 1991, p. 10). In the previous decade and particularly since the latest amendment of the IDEA and the mandated items therein concerning assistive technology, AAC has become an important and pressing issue in educating professionals who provide services to children with disabilities and their families (Foley, 2001). SETs and SLPs are highly important members among the multidisciplinary team which takes the responsibility for AAC planning, administration, and making relevant decisions (Parette, Huer, & Brotherson, 2001; Prelock, 2000). AAC also includes other specialists who are responsible for doing suitable modifications required for AAC systems and tools, a thing that enables students with disabilities to access public education curricula by means of their own AAC systems and to use them in the classroom (ASHA, 1997-2004; Parette & Marr, 1997).

While the most acceptable estimations point out that the numbers of individuals who need for AAC services are likely to be in the tens of millions worldwide (Segafoos, Schlosser, & Sutherland, 2010), and such numbers totaled around 3.5 million in the USA alone (Beukelman & Mirenda ,2005), however, there is similar data that confirms, despite the wide acceptance of AAC as a supportive means for children with complex communication needs, the education and training related to the AAC as well as the number of well trained professional are not parallel to the amount of the required services (Lebel, Olshtain & Welss, 2005). In this context, many researchers have suggested that the lack of specially trained professionals on AAC would in turn lead to a lack of AAC services provided to a large portion of

individuals with complex communication needs (ASHA, 1981; Merill,Yilon-Hamivitz, Weiss, lebelm, & Seligman-Wine,2000).

Despite increased attention which the AAC enjoys recently among SLPs (Marvin, Monato, Fusco, & Gould, 2003); however, the studies conducted in the most advanced countries reveal divergent results. For example, Marvin et al., (2003) conducted a survey included seventy-one SLPs in order to explore issues related to their experience with and education in the use of AAC. Results indicated that more than half of those surveyed believed that they received a limited or poor training in AAC, and over 80% declared that they hadn't received adequate education during their post graduates study. Although about one third of respondents referred to their work with the users of AAC, but the majority of them (63%) expressed their inconvenience in using it, and (72%) expressed inadequacy in using it. On the other hand, Balandin and Iacono (1998) found out in their survey conducted on Australian SLPs that the most common reason that SLPs do not recommend the use of AAC, is the limited knowledge and skills of families and teachers related to this kind of communication. After almost ten years of the last study, Iacono and Cameron (2009) reported that SLPs working with young children in early intervention programs in Australia showed broad knowledge of AAC and its various advantages. Also their reported intervention and assessment approaches reflected the best documented practices in the literature. However, the only exception of AAC implementation was for family-centered intervention programs. Participants expressed their displeasure of family's negative attitudes towards the use of AAC. In the USA, Ratcliff, Koul, and Lloyd (2008) conducted a survey in an attempt to collect data about current status of academic and clinical education in AAC, and comparing its results with earlier surveys to determine any changes being made as programs in the US adopt new standards of the American Speech-Language Hearing association in the field of speech - language pathology. The Survey results showed that 73% of the respondents said they received an independent syllabus of AAC, and 80% said the content of AAC was infused in other courses. The study concluded that academic preparation of AAC has increased in the last decade; however, there is still need for further clinical preparation in this regard.

AAC services in developing countries are limited in general (Alant & Lloyd, 2005), and the reason behind that is the lack of financial, clinical and educational resources (Sutherland et al., 2010). The same reasons apply to many Arab countries; where there are many different obstacles hinder AAC. In this context, Hock and Lafi (2011) pointed out that AAC applications in most Arab countries witnesses' big problems which negatively affect the use of communication technology in general. Such problems are associated with interwoven cultural, economic, educational, and political issues as well as other problems related to current AAC systems. In Egypt for instance, Wormnaes and Abdel Malek (2004) conducted a survey included 30 participants of SLPs which aimed to discover their experiences and attitudes relevant to AAC. The survey results showed that only 10 out of 23 participants (44%) who worked with children with limited and/or nonfunctional speech abilities felt they were sufficiently qualified to work in the field of AAC, while 22 respondents (74%) believed that it is very important for SLPs to learn more about AAC. AAC programs in Israel seem no better than that, as in a study conducted there, Merrill et al (2000), pointed out that all AAC training programs have been concentrated in Jerusalem which makes SLPs and other professionals in rural areas isolated from AAC resources and from different educational opportunities.

There is vast range of individual and contextual factors affecting communication through AAC alternatives (Light, 1997). As a result of that ACC services are delivered by a collaborative team of professionals of different experiences and specialties including SLPs, SETs, and OTs (Suto, Muller, Hunt & Goetz, 2001). It is expected that such specialists would come across individuals with complex communication needs during their field clinical and educational practices (Costigan & Light, 2010). According to a survey included a number of professionals, 45% of SLPs and 80% of SETs said they have delivered services to individuals with complex communication needs, (Locke & Mirenda, 1992; ASHA, 2002). And because it is likely that SLPs, SETs, and OTs would meet individuals who are in need for ACC services, they are required to have at least the basic competences related to ACC services as part of their professional knowledge and skills (Hammel & Angelo,1996).

The Kingdom of Saudi Arabia is a leading Arab country in providing different services for individuals with disabilities, either in preparation of trained staff, or launching of specialized educational and inclusive programs. However, there is very limited information on the status of AAC whether in terms of pre-service or in-service preparation programs, or in terms of the competences of practicing professionals. In their programs dedicated to SETs preparation, most Saudi universities tend to be category-oriented. King Abdul Aziz University is one of the leading universities in SETs preparation.

When a student joins the Bachelor program in special education, he/she receives introductory courses on the subjects of special education over two terms (semesters) and then joins one of the unique majors available in the university including speech- language disorders, autism disorder, intellectual disability, learning disabilities, and others. The researcher conducted the current study in an attempt to explore the knowledge of special education student teachers majoring speech language disorders, autism disorder, and intellectual disability of AAC, as they are supposed to have basic knowledge about AAC because it is likely to come across individuals that their training would require AAC services. More precisely, the researcher conducted the present study to explore the participants' knowledge of AAC and demonstrate to what extent this knowledge is influenced by their academic levels and unique specializations.

Method

Participants and setting

In this study, the researcher selected the participant students according to the following criteria:

1. Participants should be in the two academic levels of third and fourth years.

2. Participants' unique-specializations should be among one of the following study pathways: (speech-language disorders, mental disability, autism disorder).

3. They should not have previous field experience.

4. They should agree to participate in the study and to abide by its procedures till the end**.**

In light of the above criteria, 30 special education students at the faculty of education belonged to King Abdul Aziz university in Jeddah, participated in the study (N=30). Participants were divided into 16 participants in third year academic level *(n*=16), and 14 participants in fourth year academic level (*n*=14). As well as, Participants were distributed according to the unique-specializations into12 students in speech and language disorders pathway (*n*=12) and 9 students in intellectual disability pathway (*n*=9) and 9 again in autism disorder pathway (*n*=9). For more details about participants (see table1). Participants responded to the ten questions test at the micro instruction hall pertaining to the section of curriculum and teaching methods at the Faculty of Education, it is specious and quiet hall, and appropriate for applying the study tool.

Procedures

Design and statistics

The study was done according to Quantitative descriptive research design, and the researcher used a survey tool (the ten questions test) to explore the participants' knowledge of AAC. Descriptive statistics was used for counting means and standard deviations of the participants' responses as well as ANCOVA was used to find out to what extent they were affected by academic levels and unique-specialization variables or the interaction between them.

Data collection and test administration

The researcher prepared ten questions test similar in its construction and coding schemes to the questionnaire of Patel and Khamis-Dakwar, 2005. Even the researcher quoted seven questions with their typical responses from it. Those questions are written in italics in table (3). The test was made up of two parts: the first part contains primary data of the respondent such as academic level, unique-specialization as well as response instructions, whereas, the second part was made up of ten questions, eight of which measure basic knowledge of AAC. The test didn't include any question that measures practice or attitudes domain, because all respondents were still students and have not begun their field experience yet. To check test validation and the appropriateness of the translated questions, the researcher presented the test to three raters holding Masters Degree in speech language disorders and Ph.D. in special education at the Faculty of Education in King Abdul Aziz University. They rated the test in terms of: (a) relation of questions to AAC and how far they represent it, (b) checking that all questions measure knowledge domain related to AAC, and (c) appropriateness of language phrasing (wording). Researcher took their comments into account, and made the necessary changes. Also the researcher counted test reliability through test – retest method, as the researcher administered it twice on eight-students pilot sample, equal to the study's participants in terms of academic levels and unique -specializations and with seven-days time interval. Test- retest reliability coefficient reached 0.89. The final copy of the ten questions test was applied on the participants. They were asked to answer all questions in the test – each participant separately- seriously and objectively without resorting to any information source. The

researcher explained to them the answer to the test requires approximately half an hour, without obliging them to do so.

Responses/Answers coding schemes and correction process

The researcher prepared a form to encode participants' responses to the ten questions based on examples of typical answers mentioned in Patel and Khamis-Dakwr, in addition to the review of related literature (e.g., Sigafoos et al., 2010; Light & Drager, 2007; Beukelman, Fager, Ball & Dietz, 2007; Balandni & Morgan, 2001; Subihi, 2012; Chress & Marvin, 2003; Mirenda, 2003). The form included three proposed levels to respond to the first question until the eighth ranging from (inaccurate answer) given 0 score, and (partially accurate answer) and was given 1 score, and (fully accurate answer), and was given 2 scores. The ninth and tenth questions were coded within two response levels: Yes; and was given 2 scores, No; and was given a 0 score. In order to correct participants' responses and to encode them within the previously mentioned levels, two independent faculty members separately reviewed the participants' responses and encoded them based on the responses encoding form prepared for this purpose, then the agreement coefficient between them was counted. The agreement coefficient reached (0.85).

Results

The study was mainly conducted to explore the participants' knowledge of AAC and to show whether that knowledge would differ according to the difference of their academic levels and unique-specializations. Table (1) shows results of means and standard deviations of the participants' responses according to the academic level and unique-specialization, accordingly, there is a seemingly difference in means and standard deviations of the participants' responses related to the academic level and unique-specialization variables.

ANCOVA results show no statistically significant difference in the means of the participants' responses attributed to the academic year F (0.737) = 0.309, $P \geq 0.05$, or unique-specialization F (0.600) = 0.282 $P \geq 0.05$, or the interaction between them F (0.921) = 0.082 $P \geq .0.05$.

Table (3) shows the participants' responses to the ten questions of the test according to typical response coding. Hence, the percentage of inaccurate responses was 53.64% while fully accurate responses were 2.66% and the partially accurate responses were 43.67%.

Discussion

The study aimed at investigating special education student teachers' knowledge related to AAC, and its relation to their academic level and unique-specializations. The total means of the participants' responses based on their different academic levels and unique-specializations was (M=4.90). ANCOVA results of their responses based on the variables of academic level, and unique-specialization, and the interaction between them, showed no statistically significant differences attributed to these two variables, or the interaction between them, which means that the academic level of the participating students (the level of third, and fourth years), and their unique-specializations in (speech-language disorders, autism or intellectual disability) were not influential variables in their knowledge of AAC. This result implicitly assumes the participants' equal knowledge of AAC despite different specialties and academic levels. If we take the proportion of participants' responses to the ten questions as an objective criterion to describe their knowledge of AAC, we find as much as 53.64% of the total responses were absolutely inaccurate versus only 2.66% fully accurate and 43.67% partially accurate. So, it can be said that the participants' knowledge of the AAC was very limited.

In fact this result involves different meanings with negative predictive significances. It means that these student teachers would engage later in field work with only a minimum theoretical knowledge and without any essential practical relevant skills, bearing in mind that the efficiencies of AAC are part and parcel of the professional competence of SLPs, SETs and other specialists (Hammel & Angelo, 1996). Even some countries such as the United States will not grant students majoring speech and language, for instance, certificates and career practice license until they prove that they have knowledge and skills related to AAC (ASHA,2002). It also means that until the date of this study the participants haven't received any specialist course, or a chapter of a course, or any training concerning AAC during their study period and this was clear from their responses to the ninth, and tenth questions. This is consistent in part with what is referred to in the literature concerning the lack of educational and training programs available for AAC (Lebel, Olshtain & Welss, 2005), and the consequent parallel lack of AAC services that are supposed to be available to a large portion of individuals with complex communication needs

(ASHA, 1981; Merill et al, 2000). Also; this result Partially correspond to what was referred to by Costigan and Light (2010) that a significant proportion of pre-service preparing programs for SLPs, OTs and SETs have failed to provide AAC specialist course; which means that a large proportion of students learning these disciplines may graduate with minimal knowledge or without exposure to AAC at all.

Table 1. Means and Standard Deviations of the Participants' Responses to the Pre- Post Tests According to Variables of Academic Level and Unique Specialization.

Academic level	Unique specialization	*M*	*SD*	Number of participants
Third year	Speech and language disorder	4.43	.787	7
	Intellectual disability	4.75	.500	4
	Autism	5.2	2.168	5
	Total	4.75	5.291	16
Fourth year	Speech and language disorders	5.00	1.414	5
	Intellectual disability	5.00	1.871	5
	Autism	5.25	1.500	4
	Total	5.07	1.492	14
Total	Speech and language disorders	4.67	1.075	12
	Intellectual disability	4.89	1.364	9

	Autism	4.90	1.373	9
	Total	4.90	1.373	30

Table 2. ANCOVA Results of the Impact of Academic Level and Unique -Specialization and the Interaction Between Them on the Participants' Response to the Test.

Variation source	Sum of squares	df	Mean squares	F value	Sig
unique-specialization	1.338	2	.669	.309	.737
Academic level	.611	1	.611	.282	.600
Unique –specialization × Academic level	.357	2	.179	.082	.921
Error	52.014	24	2.167		
Total	54.700	29			

Significant at $P \geq 0.05$

The following lines contain in more detail the connotations of results listed in Table 3. It is clear from this table that some of the participants have had limited knowledge or logical expectation to answer the first question, as the responses of ten participants (33.3%) lie within partially accurate coding level, and may be such an answer was a result of a personal experience irrelevant to framed academic course or study course requirements; because all the participants, without exception, were not subjected to a

specialized course, or specialized chapter in AAC, and that was clear from their responses to the ninth question. The same thing applies to the second question, as the answers of five participants (16.6%) lie within the coding level (2); they mentioned three categories of disability suffer from weakness in expressive language and communication. In answering the fourth question, 21 participants (70%) were rated within the coding level (1); seventeen of them answered (sign language), while four of them answered (Picture Exchange Communication System. PECS). For question 6, responses of all participants lie within the coding level of (0), it means that the participants either answered no, or they did not answer this question, and no doubt that this question was more precise than the preceding ones, as it reflects a more advanced level of knowledge, and it would be difficult for those who haven't studied a specialized course to answer it. For the seventh and eighth questions, the researcher will assume there were random answers to them, because by reviewing the two questions, the researcher found out that all the participants answered Yes or No without providing justifications for their answers. In general; the study results provide additional support for the literature, as the previous studies conducted on specialists' knowledge of AAC, and the assessment of their skills have expressed the need of these specialists for more knowledge and training (Marvin et al, 2003; Blandin & Iacono, 1999; Ratcliff, Koul,Lloyd, 2008; Wormanes & Abdel Malek, 2004).

Table 3. Coding schemes of participants' responses to pre-post tests' questions

Question	Response Category	Response Code	Examples of Typical responses	Number and percent of responses	
Can you define the AAC?	Inaccurate	0	No response, or any inconsistence response with 1 or 2	20	66.6
	Partially Accurate	1	Tools, strategies, or systems that support verbal communication	10	33.3
	Fully Accurate	2	Wide concept that points to any means that supports verbal communication or temporally or permanently compensates it, and it includes aided and non-aided communication through low and high technology.	0	0
What are disabilities that need to AAC?	Inaccurate	0	No response at all, or mentioning a categrey that doesn't need AAC, such as non-exceptional children, or children with learning disabilities.	2	6.6
	Partially Accurate	1	Individuals with speech impairmnets	23	76.6
	Fully Accurate	2	Individuals with expressive and communication impairments	5	16.6
Who are those specialists responsible for AAC training and monitoring?	Inaccurate	0	No response at all, or mentioning a member in 2 or somone contrary to that	0	0
	Partially Accurate	1	Speech-language pathologist and/or special education teacher	30	100
	Fully Accurate	2	SLPs, OTs, SETs	0	0
What examples of AAC that you know?	Inaccurate	0	No answer at all, or answering computer and stickers	9	30
	Partially Accurate	1	Mentioning one example only, such as (PECS) or sign language	21	70
	Fully Accurate	2	Mentioning at least four examples such as PECS, PCS, VOCAs, Signs, Communication board, writing	0	0

What are the functions that AAC serves?	Inaccurate	0	No answer at all	7	23.3
	Partially Accurate	1	Mentioning one function only such as communication or speech intelligibility .	23	76.6
	Fully Accurate	2	Mentioning all functions: speech intelligibility, communication, and social adaptaion	0	0
Is there any difference between alternative and augnentative communication? What is it?	Inaccurate	0	Answering No, or no answer at all.	30	100
	Partially Accurate	1	Answering Yes, without any explanation	0	0
	Fully Accurate	2	Answering yes: communication system performs the same function and what determines its role as alternative or augmentative is the existence or non-existence of language with the individual subjected to training.	0	0
Is there any age limit for AAC use?	Inaccurate	0	Yes. Or no answer at all.	16	53.3
	Partially Accurate	1	No. without any explanation	14	46.6
	Fully Accurate	2	No. AAC can be used for different age levels (children, adults, and old people)	0	0
Does the use of AAC negativelly affect the ability of producing speech?	Inaccurate	0	Answering yes, or no answer	20	66.6
	Partially Accurate	1	Answering no without sufficient explanation	10	33.3
	Fully Accurate	2	No, the AAC supports language development and speech production if it is perfectly used.	0	0
Have you recently read anything about AAC? What was it?	Yes	2		3	10
	No	0		27	90
Have you ever had any training or supervision on AAC?	Yes	2		0	0
	No	0		30	100
Total percent of fully accurate responses					2.66
Total percent of partially accurate responses					43.67
Total percent of inaccurate responses					53.64

Implications for Future Research and Practices

Future studies should focus on several research areas, some of which are directly related to the results of the current study and some respond to what is referred to by the educational literature as impediments of the AAC technology activation in the Arab countries. As most of the Arab countries including Saudi Arabia lack clear and precise statistics about the prevalence rates of disability therein (Al-Thani, 2006), and they are absolutely lacking data and statistics related to the numbers and proportions of individuals with communication disorders, so, there is urgent need to conduct studies supported by governmental and non-governmental bodies based-on clear categorization basis to reach accurate statistics on the prevalence rates of disability, types of disabilities, especially communicative ones, and the different needs resulting from them which will help in determining the size and sort of the required services. Therefore, any initiative to activate the AAC services in the Kingdom of Saudi Arabia and other Arab countries must be based on accurate statistics of the prevalence rates of communication disorders, and the number of candidates entitled for these services.

As cultural, educational and economic factors have emerged as crucial and influential factors in activating the AAC in the Arab countries in general (Hock & Lafi, 2011), such countries, as well as higher education institutions, educational institutes, and local and regional organizations should direct their research efforts towards the studies that endeavor to understand the community culture, its prevailing intellectual stereotypes and the attitudes of its members towards the use of the AAC. They are also required to direct similar research efforts for developing outreach programs that are capable of changing the attitudes of the community members, as well as the attitude of individuals with complex communication needs towards the use of the AAC.

Another important implication for future research on the one hand, and for governments, legislators and policy makers in the Arab countries on the other, is the necessity of discussing economic challenges faced by many AAC users and their families and their repercussions on them. The high cost of some AAC tools and devices constitute another challenge that hinders the activation of the AAC technology in the Arab countries and other countries in the world (Hock & Lafi, 2011; Alant & Lloyd, 2005; DeRuyter, McNaughton, Caves, Bryan, & Williams, 2007) especially the high technology aided communication (Glennanm, 1997). The Arab countries have to deal seriously with the results of these studies and take their recommendations into account to confront such problems.

Wormanes and Abdel Malek (2004) expressed their concerns about the inability of many individuals with complex communication needs and their families, particularly in rural and disadvantage areas to use the high-tech AAC systems as many of them know the local language only and do not have technical skills to deal with tools and devices of the AAC, whereas the English language in particular and other European languages dominate such tools and devices. This problem constitutes a rich research area that calls for the attention of researchers in the Arab countries in general to identify the technical problems associated with AAC technology and the literacy ability required, for reaching practical solutions thereon, which will eventually be adopted by influential persons and decision makers.

Also the universities and higher education institutes concerned with SETs and SLPs preparation in the kingdom of Saudi Arabia and other Arab countries should direct their research potentials to evaluate and update their existing programs to conform to international standards for SETs and SLPs preparation, namely the standards of the Council for Exceptional Children. CEC (2008) and ASHA (2012). As such they can graduate qualified professionals that are capable to apply the AAC on individuals with complex communication needs. In addition they have to direct similar research efforts to assess AAC training needs related to veteran SETs, SLPs and other professionals, as well as to prepare appropriate training programs to update the knowledge and skills of teachers and professionals of different specialties to improve their performance and enable them to be more competent in using the AAC technology.

There is still need for conducting other studies to assess how disability acts and regulations in the Arab countries and their amendments are compatible to the international acts and conventions concerning the communication rights of persons with disabilities (e.g., IDEA, 1997, 2004; the United Nation Convention on the Rights of Persons with Disabilities, 2006; the National Joint Committee for the Communication Needs of Persons with Severe Disabilities, 1992) and to what extent have the Arab countries succeeded in raising the awareness about such acts and regulations as being an abiding force which guarantees the different rights of the persons with disabilities, particularly their right to communicate.

Limitations to the study

While the study sought to achieve its objectives, it's advisable to deal cautiously with its results, as they are unlikely to be generalized, because the study was confined to assess the AAC knowledge on limited number of the student teachers within only one program out of the preparation programs of SETs and of other supportive services in Saudi universities, in addition to the characteristic nature of the test's questions. As these questions, while they require a great part of the response to be by the respondent, they remain subject to corrector subjectivity.

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