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A SCOPING REVIEW OF TEACHING AND LEARNING OF ENGLISH AS AN ADDITIONAL LANGUAGE AMONG AUTISTIC INDIVIDUALS

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ABSTRACT

Purpose - The purpose of this scoping review was to examine research studies relating to autistic students in learning English as an Additional Language (EAL) to outline potential research agendas and to inform EAL educators of current related issues.

Methodology - PRISMA-ScR protocol outlined by Tricco et al. (2018) was followed when selecting the relevant studies published before July 2020 from six prominent databases: Education database, ERIC; Linguistics database, PsycINFO; SAGE, and Scopus. In addition, a hand search of Google Scholars was conducted. Inclusion and exclusion criteria were applied to screen the identified data.

Findings – From the evidence provided in the eighteen studies identified, the researcher found that current autism research in EAL focused more on teaching strategies and much less on autistic individuals' EAL learning processes. The 118 autistic participants in the identified studies displayed highly diverse characteristics, which may explain why the case study was the dominant research approach. They were reported by the identified studies to have strong micro-linguistic skills (phonology, morphology, syntax-related) but were weak in macro-linguistic skills (e.g., reading comprehension). The researcher noted that some learning behaviours of autistic students have been reported in addition to some teaching strategies perceived effective for teaching autistic EAL learners such as utilisation of technology and a visual approach.

Significance – While there is an increasing number of autistic individuals learning EAL, research on autistic students learning EAL and on teaching autistic students EAL has been limited to date. This present study is the first scoping review to investigate existing relevant studies. Despite calling for further investigation into the teaching and learning of autistic students in EAL that involve the perspectives of parents of non-autistic peers, and of the autistic students themselves, interactive patterns of teaching and learning of autistic individuals in EAL classrooms remains an area for further research in the future.

Keywords: Autism, English as an additional language, language instruction, scoping review, PRISMA-ScR, teaching English as a foreign language, teaching English as a second language.

INTRODUCTION

Many autistic students learn English as an Additional Language (EAL) in schools given that EAL has been integrated into school curricula, with various learning objectives, across countries. In the US and the UK, autistic students whose mother tongue (L1) is not English must learn English to follow other courses and to support both their school and social life (Thompson, 2015). Meanwhile, in many non-English speaking countries, autistic students learn English to fulfil their national curriculum, which acknowledges the importance of English for global communication (Jindapitak, 2019; Kirkpatrick, 2017).

The debate regarding autistic people learning additional languages is still ongoing in the autism research field (Hampton & Strand, 2017;

Iarocci et al., 2017; Kay-Raining Bird et al., 2012; Seung et al., 2006; Yu, 2013). A majority of the parents of autistic students who participated in the studies by Hampton et al. (2017) and Yu (2013) have reported that the professionals in autism fields often suggested that their children learn only one language as they believed that exposing these children to additional languages would exacerbate existing issues such children have in communication. This belief, however, contrasts with what Ratto et al. (2020) found in their study. The autistic bilingual children were reported by Ratto et al. (2020) to have fewer executive functioning issues and repetitive behaviours compared to monolingual autistic children.

According to the Diagnostic and Statistical Manual of Mental Disorder (the Fifth Edition) or DSM-V, autistic individuals are characterised as having social communication issues and exhibiting unique repetitive behaviours (American Psychiatric Association [APA], 2013). As autism is gauged on a spectrum, autistic individuals may demonstrate various learning characteristics (Tsatsanis, 2004) depending on the uniqueness of their behaviours. Some of the autistic individuals may require high, moderate, or low support than others (APA, 2013), while some may be verbal or non-verbal (APA, 2013). This heterogeneity may affect the EAL learning of autistic students. Therefore, information about the diverse characteristics of autistic individuals may help to increase the awareness of EAL practitioners when teaching EAL to autistic learners whose learning needs are specific. Such awareness of their specific needs is expected to assist teachers in developing the EAL communication of autistic students. Awareness of and knowledge about autism are two key factors that will help educators deal with autistic students in schools (Roberts & Simpson, 2016).

Research on autistic students learning EAL as well as teaching autistic students EAL are currently, limited and emergent. EAL practitioners would benefit from more information in this field to design, select, and implement appropriate teaching approaches for their autistic students. Thus, further research is needed, and a scoping review would be an essential method to provide the knowledge and skills required for researchers and educators, particularly in the EAL field, to conduct such research.

Scoping studies (or scoping reviews), by definition, aim to "map rapidly the key concepts underpinning a research area and the main sources and types of evidence available, and can be undertaken as

stand-alone projects in their own right, especially where an area is complex or has not been reviewed comprehensively before" (Mays et al., 2001, p. 194). They are "concerned with contextualising knowledge in terms of identifying the current state of understanding; identifying the sorts of things we know and do not know, and then setting this within policy and practice context" (Anderson et al., 2008, p. 10). Scoping reviews could be conducted to know how existing studies depict a current issue and to provide key information from emerging evidence (Peters et al., 2015). According to Tricco et al. (2016), scoping reviews are usually conducted to capture research agendas and pinpoint implications for policy and practice. As the research on autism in the EAL field is emerging but scarce, a scoping review as an initial exploration could help to identify gaps in research regarding autistic students in EAL classrooms, provide information for future researchers, and point out implications for practitioners in EAL and autism fields of study. The following research questions frames what this study investigated.

1. How did previous studies investigate the learning of autistic students in EAL classrooms?
2. How is the EAL learning of autistic students depicted in previous studies?

The first research question examines how research aims and designs were depicted in identified studies. Meanwhile, the second question explores the EAL learning process of autistic students as captured in selected studies.

METHODOLOGY

This present study followed the scoping review protocol by the Joanna Briggs Institute Methods Manual for scoping reviews (Peters et al., 2015) as outlined in the PRISMA-ScR or PRISMA extension for scoping review (Tricco et al., 2018). There are 22 items in a scoping review. Of the 22 items, two items are optional (Items 12 and 16). Item 12 (critical appraisal of individual sources of evidence) and Item 16 (critical appraisal within sources of evidence) were regarded as irrelevant, and thus not included in this study. Appendix A summarises the items to be included in the PRISMA-ScR as shown by Tricco et al. (2018) together with a simplified description of each item.

Review Protocol

The review protocol proposed by Tricco et al. (2018) guided the reviewers in conducting the present scoping review. First, we identified the study as a scoping review by putting the phrase "scoping review" in the Title (Item 1) and providing a structured summary of the review in the abstract section (Item 2). Then, we described the rationale and objectives of the review in the introduction section (Items 3 and 4). We illustrated the protocol in the Methodology section (Item 5). The protocol described the eligibility criteria (Item 6), information sources (Item 7), search strategy (Item 8), methods of selecting evidence (Item 9), and its sources (Item 14) and data charting process (Item 10). After all these steps, we reported data items (Item 11) and provided the characteristics (Item 15) and results (Item 17) of the sources of evidence in the results section (Table 1). Then, we presented the synthesis of the results (Items 13 and 18) in a narrative form. Subsequently, we summarised the evidence (Item 19) in the discussion section, explained the limitations (Item 20) and presented the conclusion (Item 21) of the review in the conclusion section. We also stated information about funding (Item 22) in the acknowledgement section. The following outlines in detail the methodology employed in the present study.

Eligibility Criteria

We set the inclusion and exclusion criteria to select the relevant studies based on the research questions (Refer to search strategy in the following section). The articles included had to be about studies investigating the teaching and learning of English of autistic individuals whose mother tongue is not English. In addition, the articles had to be reported in English and published before July 2020. Only studies reported in English were selected because it is the operating language used by the authors of this scoping study. In addition, we included a wide range of publication dates as each and every relevant study would be of great importance since this topic is an emerging topic.

We set three exclusion criteria. First, articles about teaching English as a Language Art (ELA) were excluded. This is because its learning context is different from teaching English as an additional language. ELA courses are usually offered in English-speaking countries and are not designed for those who are still learning English. Second, grey literature other than conference proceedings, non-peer-reviewed

journals, and postgraduate theses were excluded. This study sought literature involving research methodology; therefore, non-research methodological literature, such as government reports, opinions, newsletters, and lecture notes were excluded. This criterion is related to the first research question—namely, to discover the methodological characteristics of available EAL research involving autistic students. Lastly, articles published in journals that were not indexed by an international body other than Google Scholar were also excluded. This step was taken to ensure that the identified studies met the expected standards of academic research.

Information Sources and Search Strategy

The search strategy involved keywords and database identification. A research librarian from the university which the authors are affiliated was involved at this stage. The words: "autism", "English", "learning", and "teaching" were identified as the keywords for database searches. We included synonyms and other similar, related acronyms of the keywords in the search. Three combinations of keywords were identified and used in the database search:

1. "(Autis* OR asperger*) AND (EFL OR "English as a Foreign Language" OR TESOL OR "Teaching English to Speakers of Other Languages" OR ELT OR "English Language Teaching" OR ESL OR "English as a Second Language" OR EAL OR "English as an Additional Language")
2. (Autis* OR asperger*) AND English AND Teaching
3. (Autis* OR asperger*) AND English AND Learning

The six most prominent databases for research in EAL education and autism were used in this study. They are Education database, ERIC; Linguistics database, PsycINFO; SAGE, and Scopus. Hand-searching on Google Scholar was also conducted to mine grey literature data that was not listed in the six selected databases. All identified studies were filtered through the database of the university affiliated with the authors for double-checking of their peer-reviewed status.

Methods of Selection and Source of Evidence

The screening process took place in two stages and involved two reviewers. The first stage involved the screening of the title and abstract. Inclusion criteria were employed at this stage. This was to

make sure that any studies related to both English teaching and autism were not overlooked. A total of 108 articles and higher degree research theses were found during the initial screening. Full-text reading was applied in the second stage. Exclusion criteria were employed while reading the texts. Reviewers resolved disagreements during the screening process by consensus and discussion. After the second screening process, a total of 18 studies were determined as meeting the selection criteria and hence to be included in the present study.

Data Items and Abstracting Process

The selected studies were reviewed to discern the patterns of the research topics, the settings, and the methodology. The information obtained from this process answered the first research question in the present study. The review revealed the characteristics of available studies featuring autistic students' EAL learning. To answer the second research question, the findings, discussions, and recommendations of the selected studies were reviewed. The present review focused on several main themes, including research aims, participant profiles, learning context, methodology, EAL learning characteristics of autistic students, and the communication of autistic students in EAL classrooms. The first reviewer charted the data using Microsoft Excel; then the second reviewer checked the accuracy of the charted data in the table by revisiting the identified papers. Disagreements between the two reviewers were resolved through discussions. Figure I shows the data charting process of the present review, while Table 1 shows the synthesis of the charted data.

RESULTS

Selection Result of Identified Studies

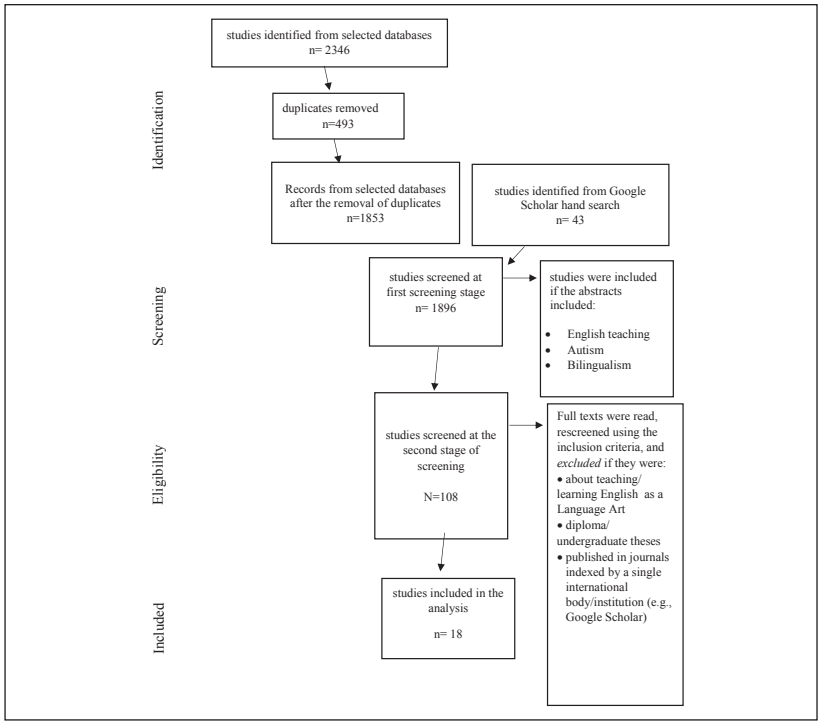
A total of 18 studies were included in the present scoping review. Originally, the identification of relevant studies from the six databases resulted in 2,346 papers. Another 43 studies were identified by hand searching on Google Scholar. After the removal of duplicates, 1,896 studies were screened. The first screening applied the inclusion criteria to titles and abstracts, resulting in 108 studies. Following that, the second stage of screening was conducted to assess the eligibility of the studies to be included. The eligibility stage resulted in 18 studies being included. Figure 1 shows the flowchart outlining the study's selection process.

Characteristics of the Identified Studies

All 18 identified studies were published before July 2020 and were conducted across continents where English is mostly learnt as an additional language. From among the 18 studies, 65 percent were conducted in Asia, 24 percent in America, and 11 percent in Europe. We found that 35 percent of the studies were published in peer-reviewed journals, and another 35 percent were published in journals that were not listed or identified as peer-reviewed journals in our university library databases. The non-peer-reviewed journals, however, were indexed by a certain body other than Google Scholar. We also identified two proceedings and four post-graduate theses. Of the 18 identified studies, only 3 of them, all conducted in Asia, indicated their source of funding. Detailed findings from the scoping review to answer Research Questions 1 and 2 are presented in Figure 1 as follows.

Figure 1

PRISMA-ScR Chart Outlining the Study Selection Process



Q1: How did previous studies investigate the learning of autistic students in EAL classrooms?

Topics/Aims of the Research Reported in the Identified Studies

Several aims were identified across the 18 studies: 14 (78%) were related to teaching strategies/techniques and their effectiveness in EAL classrooms when teaching autistic students; three (17%) focused on the language development of autistic learners, and one (5%) investigated the perception of autistic students and their teachers in the EAL learning process.

Fourteen of the 18 identified studies were aimed at investigating specific teaching strategies for EAL autistic students. The teaching techniques for EAL autistic students were reported to be mostly technology-based (Alemi et al., 2015; Alison et al., 2017; Golshan et al., 2019; Omori et al., 2011; Sagia, 2015; Shi, 2018; Wahdi & Dzulkifli, 2018) and visual-based (Chong, 2006; Padmadewi & Artini, 2017; Varro-Tharpe, 2012). Technology-based techniques applied included technology-based interventions, such as computer-assisted instruction (CAI), interactive whiteboard (IWB), Corpus, Humanoid robot, and software/application-based (e.g., *Go Talk Now* apps on IPad). One other study by Gałązka and Dick-Bursztyn, (2019) examined the effectiveness of some teaching strategies proposed in the literature, such as teacher modelling, IWB and other audiovisual aids, language games, drama-based techniques, etc. Another two more studies by Yahya and Yunus (2012) and Yahya et al. (2013) specifically looked at strategies used in teaching EAL autistic students sight vocabulary, by using students' L1 and visual cues. From among the 14 studies, one study did not relate to any of the above techniques but focused on the Montessori Method of teaching EAL autistic students (Rezvani, 2017).

Three out of the 18 identified studies explored the English language development of autistic students. Barletta (2018) examined the features of EAL development in an autistic child; Bradley (2019) observed the progress of an autistic EAL student over two years, while Yusoff et al. (2019) specifically looked at students' acquisition of morphology and syntax in English present tense.

One study examined the perspective of individuals related to autistic students' EAL learning. Kuparinen's (2017) study investigated the

perspectives of EAL teachers and school assistants on autistic students. Additionally, they sought the views of autistic students, EAL teachers and school assistants on the role of EAL study materials, teachers, and school assistants in autistic students' EAL learning process.

Participants

High-functioning characteristics dominated the profiles of the autistic participants in the selected studies. A total of 118 autistic EAL students had participated in the 18 selected studies. Of the 118 participants, 60 (51%) were identified as high functioning autistic (HFA) students and 10 (8%) were reported to have an intelligence quotient (IQ) score lower than 70.

The remainder of the participants could not be identified. Some studies involved autistic students from mixed levels of the spectrum, while some others did not specify the level of autistic students. One study described its 29 participating students as having mild to moderate level autism (Wahdi & Dzulkifli, 2018). However, the study did not clarify whether they had intellectual disability. From among the studies that did not specify the autism level of participants, some gave brief descriptions of their participants. For example, in two studies, autistic participants were described as verbal and having no retarded impulsivity (Rezvani, 2017; Yahya & Yunus, 2012). In another study, the participant was described as having severe tantrum-like and self-injurious behaviour (Chong, 2006). Two studies did not involve autistic students but concerned teachers who taught autistic students ESL (Gałązka & Dick-Bursztyn, 2019; Yahya et al., 2013).

We also identified the gender and age of participants. We found that most autistic participants were male. Of the 118 participants, 72 were autistic male students (61%), 28 were autistic female students (24%), and the remaining 18 were unspecified (15%). In terms of age of the 118 participants, 67 were identified as primary school students, 30 were pre-school students, and 20 were secondary students. One participant was a university student.

Research Design

Four research designs were identified in the reviewed studies: case studies, qualitative, experimental, and mixed-method research designs.

Nine out of the 18 studies (50%) utilised a case study design (Alemi et al., 2015; Bradley, 2019; Padmadewi & Artini, 2017; Rezvani, 2017; Sagia, 2015; Varro-Tharpe, 2013; Yahya et al., 2013; Yahya & Yunus, 2012; Yusoff et al., 2019). Five (28%) were experimental studies (Alison et al., 2017; Chong, 2006; Omori et al., 2011; Shi, 2018; Wahdi & Dzulkifli, 2018). Three other studies (17%) employed a qualitative research approach (Barletta, 2018; Gałązka & Dick-Bursztyn, 2019; Kuparinen, 2017), and one study (5%) employed a mixed-method design (Golshan et al., 2019).

Regarding data collection techniques, interviews and observation were the most common data collection techniques involved. Some identified studies were noted to have employed multiple types of data collection whereas others employed a single type of data collection. Twelve of the 18 studies indicated more than a single type of data collection technique (Alemi et al., 2015; Barletta, 2018; Bradley, 2019; Golshan et al., 2019; Kuparinen, 2017; Padmadewi & Artini, 2017; Rezvani, 2017; Sagia, 2015; Varro-Tharpe, 2013; Yahya et al., 2013; Yahya & Yunus, 2012; Yusoff et al., 2019). These studies included two or three combinations of data collection techniques such as interview, observation, audio-video recording, questionnaire, survey, field notes/diary, teacher's journal, and tests (refer Table 1 for details). Six studies were identified as reporting a single type of data collection method, such as tests (Omori et al., 2011; Shi, 2018; Wahdi & Dzulkifli, 2018), observations of interventions (Alison et al., 2017; Chong, 2006) and interviews with teachers only (Gałązka & Dick-Bursztyn, 2019).

Q2: EAL Learning Characteristics of Autistic Students

Strength Areas

English verbal skills were identified as strong areas of mastery for some autistic students. Some studies identified that their teaching interventions (visual-based approach) could stimulate the verbal expressions of autistic students (Chong, 2006; Golshan et al., 2019; Sagia, 2015; Rezvani, 2017; Wahdi & Dzulkifli, 2018). Some components of speaking skills such as vocabulary, could be considered as potential areas of mastery for autistic students, (Barletta, 2018; Kuparinen, 2017; Yusoff et al., 2019). Similarly, grammar was identified as such (Bradley, 2019; Yusoff et al., 2019),

and pronunciation (Padmadewi & Artini, 2017; Varro-Tharpe, 2013). In addition, some autistic students were identified as claiming that speaking was one of their favourite EAL lessons (Kuparinen, 2017).

However, as opposed to the aforementioned studies, certain studies found that some autistic students tended to be less interactive with their speaking partners (Barletta, 2018; Bradley, 2019). One autistic student participant appeared dominant in conversation (Bradley, 2019), another student in Barletta's (2018) study often suggested irrelevant topics, and another autistic student in Rezvani (2017) seemed to go rigid due to verbal repetitions.

Writing skills are considered to be strong areas of mastery for some autistic students. At the word level, some autistic students were observed to perform well after some intervention (Omori et al., 2011; Rezvani, 2017). One autistic student at the university level was found to prefer writing as a communication mode compared to speaking (Bradley, 2019). He acknowledged that writing provided him more room to understand and formulate responses when communicating with others.

Areas for Autistic Student Improvement

Reading skills were identified as the learning area in which most autistic students need to improve. Autistic students were found to have difficulty in making inferences (Alison et al., 2017; Kuparinen, 2017; Padmadewi & Artini, 2017; Rezvani, 2017; Sagia, 2015). According to Bradley (2019), Barletta (2018), and Kuparinen (2017) they demonstrated a limited ability to understand abstract concepts in studies.

However, autistic students were found to show adequate reading ability in certain areas, such as reading aloud (Padmadewi & Artini, 2017; Varro-Tharpe, 2013; Yahya & Yunus, 2012). In addition, participants in some of the studies were able to comprehend certain texts with some assistance, such as visual promptings (Alison et al., 2017; Sagia, 2015).

Learning Behaviours

Some unique behaviours of autistic students were identified in the studies under review such as difficulty in finishing tasks, tantrums,

echolalia, and anxiety. Despite these challenging behaviours, autistic students could show a similar pattern of EAL development as typically developing EAL students.

Some autistic students were identified as having difficulty in completing their work for several reasons. One of the reasons was that some students were perceived to lack self-direction, which was noticeable in the challenges they faced in taking the initiative and in their struggle to advance when doing their assignments (Kuparinen, 2017). Besides, they were often reported to be distracted by other factors such as sounds (Varro-Tharpe, 2012; Yusoff et al., 2019); to be dragged into their "own world" (Barletta, 2018; Yahya & Yunus, 2012); and to demonstrate little engagement during lessons (Shi, 2018). In addition, some failed to finish tasks due to a short attention span (Yahya & Yunus, 2012) and overwhelming instructions (Bradley, 2019).

Several studies described certain challenging behaviours of some autistic students. Chong (2006) reported that the autistic child was better able to use English (L2) than L1 to communicate with peers and teachers. When the communication was unsuccessful in L1, the child would engage in temper tantrums, screams and hit himself/herself. Another study reported that some autistic students fought to dominate technology aids employed in class (Alemi et al., 2015; Sagia, 2015). In addition, teacher respondents in Rezvani's study (2017) reported that their autistic students often cried and shouted during class. Moreover, Kuparinen (2017) reported that some of the students would yell and shout when they felt anxious due to a noisy classroom atmosphere.

One study on an autistic young adult participant reported that he often had conflicts with his peers (Bradley, 2019). This study did not specify what had initiated the conflicts. The participant was also stigmatised by his peers. Besides, as the participant was direct in his response to the lecturer, the latter perceived the participant's attitude as being rude.

Echolalia was demonstrated by autistic participants in two studies. An autistic Spanish student in a school in the U.S. (Barletta, 2018) was reported to repeat numbers initially, then longer chunks if the tutor split sentences and certain questions, and gradually repeated all that he had heard. He could in fact, at a later stage, repeat pieces of

language without any auditory stimuli as if he was recalling previous meaningful encounters with the language. In addition, another autistic primary student in Malaysia often echoed the last words of his teacher (Yahya & Yunus, 2012). Another study did not highlight the echolalia of the autistic participants in its discussion, but the dialogue transcribed in the report uncovered the echolalia of the participants (Varro-Tharpe, 2013).

Anxiety was often found in autistic participants. Their anxiety was triggered by several factors, such as the presence of the parent (Varro-Tharpe, 2013), sensory sensitivity (Kuparinen, 2017; Yusoff et al., 2019) and examination (Kuparinen, 2017).

Learning Features

Three learning features were discussed in the identified studies: the use of the first language (L1), the utilisation of technology, and the use of visual approaches.

L1 was identified as employed for three main reasons: to introduce new vocabulary/expression (Alemi et al., 2015; Yahya et al., 2013; Yahya & Yunus, 2012); to give instructions (Alemi et al., 2015; Yahya et al., 2013; Yahya & Yunus, 2012); and to explain difficult words (Barletta, 2018; Yahya & Yunus, 2012). The studies found that L1 use was initiated by teachers (Yahya et al., 2013), or students (Barletta, 2018), or both (Yahya & Yunus, 2012). Some students were found to ask for clarification in L1 (Barletta, 2018; Yahya & Yunus, 2012).

Some studies depicted the use of technology for facilitating the EAL learning of autistic students. The researchers in these studies employed some technology-based teaching aids such as a humanoid robot (Alemi et al., 2015), Corpus (Shi, 2018), interactive white board (Gałązka & Dick-Bursztyn, 2019; Sagia, 2015), programs from websites (Gałązka & Dick-Bursztyn, 2019; Kuparinen, 2017), and computer/phone/pad applications (Alison et al., 2017; Wahdi & Dzulkifli, 2018). These researchers also found that, besides facilitating learning, the use of technology improved the motivation, participation, and interaction of autistic students in class.

Some studies discussed the use of visual approaches in the teaching of EAL to autistic students. Some found the use of pictures as teaching

aids and/or stimuli to be effective (Alison et al., 2017; Chong, 2006; Gałązka & Dick-Bursztyn, 2019; Kuparinen, 2017; Omori et al., 2011; Padmadewi & Artini, 2017; Rezvani, 2017; Sagia, 2015; Varro-Tharpe, 2013; Wahdi & Dzulkifli, 2018; Yahya & Yunus, 2012). One study used colours to introduce English sounds when facilitating autistic students' learning of pronunciation (Varro-Tharpe, 2013). Some autistic students also acknowledged their preference for pictures in their learning (Kuparinen, 2017).

Learning Recommendations from Identified Studies

The identified studies offer some recommendations that can be applied when teaching autistic students EAL. First, autistic students perform better in a calm and quiet environment (Varro-Tharpe, 2013). Some of them were found to be sensitive to sounds that could stimulate challenging behaviours (Rezvani, 2017). Besides, routine activities were perceived to work best for autistic students because they can focus well (Kuparinen, 2017; Sagia, 2015). Furthermore, relating tasks to student interests was considered to boost their learning performance (Chong, 2006; Kuparinen, 2017). Moreover, a teacher's calm presence was required when dealing with tantrums or inadvertent *rude* behaviour as perceived by the teacher (Bradley, 2019; Kuparinen, 2017). Additionally, giving clear, direct, and brief instructions, such as chunking down instructions, is more helpful for students than lengthy instructions (Barletta, 2018; Bradley, 2019; Rezvani, 2017). An autistic young adult student stated that further explanation made him feel overwhelmed (Bradley, 2019). Table 1 summarises information or data items of studies identified in the present review.

Table 1

Summary of reviewed EAL papers on autism

No.	Author	Topic/ aims	Country	No. of autistic participants	Profile	Research Design	Learning Characteristics				Source type
							Potential areas	Need support	Behaviour	Instructional approach	
1	Bradley 2019	LE	Costa Rica	1	University students second year Male HFA	Case study (qual) Observation Survey Interview	Speaking (grammar) Writing	Speaking (communication) Understanding abstract concepts	Failed to finish task ~~Had~~ Conflict with peers Less interactive		Journal
2	Gałązka & Dick-Bursztyn 2019	LE	Polandia	0	-	Qual Interviews with teachers			Preference for routine	Technology	Journal
3	Golshan, et al., 2019	TT	Iran	18	8–12 years old Various levels of the spectrum (mild, moderate, special)	Mixed method Pre-& post tests Observations Questionnaires completed by parents and caregivers.	Speaking			Visual approach	Journal
4	Yusoff et al., 2019	LE	Malaysia	1	8-year-old old female HFA	Case study (qual) Audio-video recordings Observations on some linguistic features	Speaking (vocabulary) Grammar		Easily distracted Anxiety		Peer-reviewed journal

(continued)

No.	Author	Topic/ aims	Country	No. of autistic participants	Profile	Research Design	Learning Characteristics				Source type
5	Wahdi & Dzulkifli 2018	TT	Malaysia	29	4–7 years old Mild to moderate level ASD 83% male (24); 17% female (5).	Non-randomised experimental design Pre-& post tests CAI teaching interventions	Speaking		Meltdown, Occasionally, not cooperative during intervention	Technology Visual approach	Proceedings
6	Barletta 2018	LE	USA	1	6 years old male HFA	Qual audio recording Teachers' journals	Speaking (vocabulary)	Understanding abstract concepts	Dragged into *their own world* Echolalia Less interactive	Chunked instruction Code-switching	Peer-reviewed journal
7	Shi 2018	TT	China	30	8–10 years old 15 males; 15 females HFA Good aptitude in L1	Pre-experimental design Pre-& post vocabulary tests Profile measurement tests		Low engagement in learning	Less eye contact	Technology	Journal
8	Alison et al., 2017	TT	USA	3	8–10 years old All-male IQ <65 2 Hispanics; 1 African American	multiple probes across participant study design Observations towards the intervention		Reading comprehension		Visual technology	Peer-reviewed journal
9	Kuparinen, 2017	LE	Finland	8	4 primary school 4 secondary school All-male HFA	Qual Interviews with teachers, school assistants, and autistic students Observations	Speaking (pronunciation) Concrete vocabulary	Writing long text Comprehension	Anxious about noise and exams	Visual computer programs Personal interest-related activities	Postgraduate thesis

(continued)

No.	Author	Topic/ aims	Country	No. of autistic participants	Profile	Research Design	Learning Characteristics				Source type
10	Padmadewi & Artini, 2017	LE	Indonesia	1	10 years old Male	Case study (qual) Interviews with teachers Observations	Speaking (Pronunciation)	Reading (comprehension)		Visual	Peer-reviewed journal
11	Rezvani, 2017	TT	Iran	10	14–17 years old Verbal, No retarded impulsivity, no visual impairment 6 males; 4 females	Case study (qual) Interviews with teachers Observations	Speaking (some respondents) Writing	Reading (comprehension)	Shouting Crying	Visual Use simpler words	Postgraduate thesis
12	Alemi et al., 2015	TT	Iran	4	7–9 years old 3 HFA; 1 LFA male	Case study Pre-& post tests Audio-Video recordings			Fight with peers to get things	Code-switching Technology	peer-reviewed proceeding
13	Sagia 2015	TT	Greek	2	14 years old child and teenage level 1 male; 1 female HFA	Case study (qual) Observations Field notes Questionnaires Interviews with parents & autistic students	Speaking	Reading (comprehension)	Fight with peers to get things	Visual technology	Postgraduate thesis
14	Varro-Tharpe 2013	TT	US	2	Primary school, 1 male; 1 female Chinese	Case study (qual) Interviews with students, parents, and teachers Questionnaires Surveys Observations	Speaking (pronunciation)		Easily distracted Echolalia Anxious	Visual	Postgraduate thesis

(continued)

No.	Author	Topic/ aims	Country	No. of autistic participants	Profile	Research Design	Learning Characteristics			Source type
15	Yahya et al., 2013	LE	Malaysia	0	-	Case study (qual) Observations Interviews with teachers	Vocabulary		Code-switching	Peer-reviewed journal
16	Yahya & Yunus 2012	LE	Malaysia	3	9–10 years old 2 males; 1 female Malay	Case study (qual) Observations Interviews with teachers	Speaking (pronunciation)	Failed to finish task echolalia	Visual Code-switching	Journal
17	Omori et al., 2011	TT	Japan	4	13–17 years old All-male IQ 82#-99	Multiple pre-post experimental designs Multiple pre-& post tests	Writing		Visual	Peer-reviewed journal
18	Chong 2006	TT	Singapore	1	6 years old male Self-injured, tantrum-like	single case experimental design Observations towards the baseline phase followed by four PECS training phases	Speaking	Tantrum	Visual	Journal

Note: The articles were placed in the order of the time published, from the latest to the oldest article. Abbreviations include TT= teaching technique(s); LE= learning exploration; EAL= English as an additional language; ELL= English language learner, a context where English is taught in English spoken countries; ASD= autism spectrum disorder; PECS= picture exchange communication system; qual= qualitative; MTS=Matching to Sample; CRMTS= Constructional response matching-to-sample; L1= first language; L2=Second language; IWB=Interactive whiteboard; HFA= High-functioning autism; LFA=Low-functioning autism. IQ=Intelligence Quotient.

DISCUSSION

Recent Research

The findings in this review have revealed the current characteristics of autism research in EAL education. First and foremost, most of the identified problems arose from special educational contexts where EAL practitioners are likely to encounter in autistic students. We have identified a research trend in which researchers mostly conduct a small number of in-depth case studies. These researchers generally examined the effectiveness of teaching techniques in facilitating EAL learning among autistic students. Some of the techniques implemented are technology or visual-based (e.g., Humanoid robot, iPad, and Picture Exchange Communication System), including adopting certain teaching interventions from previous studies in the field of autism education (Bouck, 2017; Odom et al., 2015). This research trend seems to show that EAL researchers have been increasingly aware of the special needs of autistic individuals in the EAL classroom.

The research trends seem to follow the characteristics of autistic students. The autistic participants in the 18 identified studies revealed highly varied characteristics. To accommodate the heterogeneity, more experiments about teaching strategies/interventions are required to collect more evidence-based practice or practice-based evidence (Boyd et al., 2019). The findings from these experiments are expected to extend the repertoire of educators in teaching autistic students (Boyd et al., 2019). In the same vein, the researchers expect that their recommendations would benefit EAL educators. Further, the findings of the identified studies also concur with those found in previous multidisciplinary autism studies. Previous studies noted that autistic male individuals were more prevalent than female, and that autistic individuals were generally comorbid with other conditions, such as intellectual disability, sensory issues, and anxiety (Lai et al., 2014; Gillberg, 2019; Maenner et al., 2020). In addition, younger individuals are more likely to receive an autism diagnosis than older individuals, which apparently makes the number of younger autistic individuals higher than that of older autistic individuals (Maenner et al., 2020).

The heterogeneity of these individuals might have made case study the dominant approach in current EAL research on autistic EAL students because it provides an in-depth analysis of specific cases despite criticisms of its generalisability (Yin, 2018).

Current Teaching and Learning of Autistic EAL Students

This review has indicated the academic abilities of autistic EAL students and the challenges they may encounter. Autistic students in some of the identified studies were reported to perform well, generally at micro-linguistic skills (phonology, morphology, and syntax-related). Some learnt spelling and new vocabulary more quickly than others, while others demonstrated accurate pronunciation and structure. These strengths were also captured in previous studies in mother tongue contexts (Hopkins et al., 2016; Manolitsi & Botting, 2011; Su et al., 2018). Generally, most autistic students were reported to demonstrate poor macro-linguistic skills. These skills require students to draw inferences by integrating their micro-linguistic knowledge with extralinguistic features of communication, such as contextual cues. Reading and listening comprehension are areas that EAL practitioners should pay attention to in order to support learning for autistic students. Their limited mind-reading ability (the ability to attend the mental state of others) is hypothesised to be responsible for their poor comprehension (Baron-Cohen et al., 1985). This mind-reading ability is responsible for helping people understand thoughts, make predictions, and draw conclusions – skills that are related to comprehension (Carnahan & Williamson, 2010).

Our findings also captured two specific learning behaviours of autistic EAL students. These behaviours were not the main topic in the identified studies but were reflected in their discussions. One of the behaviours was echolalia, in which students echoed what their instructors said in response. This might be considered as a strength in pronunciation- or vocabulary-related lessons because they could perfectly imitate the articulation. Previous studies noted that echolalia may serve a communication function (Sterponi & Shankey, 2014) and that this condition may be reduced as communication develops (Fein et al., 2013). Apart from this, some challenging behaviours such as tantrums, yelling, crying, conflicts with peers, and "shutting down" were also highlighted. Identified triggers of such behaviours include failure in expressing thoughts, a noisy environment, and overwhelming verbal instructions. These triggers might spark anxiety among such students. Previous studies highlighted the cause-effect relationship of anxiety and challenging behaviours in autistic individuals (Ambler et al., 2015; Hallet et al., 2013) and noted that challenging behaviours at school may be reflections of their anxiety (Adams et al., 2018).

A majority of autistic individuals reported that their life is largely affected by anxiety (Attwood et al., 2014).

The findings of this review also presented some learning features often used in EAL learning involving autistic students. One of the learning features is the use of L1 by instructors to bridge L1 and L2 knowledge. In EAL classrooms, this strategy is commonly employed to introduce new topics, explain difficult vocabulary, and to enhance classroom management (Tódor & Dégi, 2018). The use of L1 may suit autistic students according to Jordan (2019) who pointed out that autistic students could benefit from explicit and brief instructions.

Furthermore, the EAL instructors reflected in this review seemed aware of the benefit of a visual approach to teaching autistic students. The reviewed studies acknowledge the advantage of visual features, either hand-made designs such as cards, or features displayed through video, in securing the attention of autistic students. This finding could relate to the thinking style of autistic students, who are often visual learners (Grandin, 2006; Kunda & Goel, 2011), and thus could benefit from this approach.

Besides, technology-based instruction is also often employed when teaching EAL students. Technology has been a prominent assistive feature in facilitating the learning of autistic students. Not only does it offer technical assistance to aid students with non-verbal and poor motoric system to speak and write, it also increases social interaction and fosters independence (Bouck, 2017; Odom et al., 2015). The present review noted that some autistic EAL students have become more motivated and competitive with the inclusion of technology-assisted material in their lessons.

CONCLUSION

Autism research in the EAL field emerged a little more than a decade ago. Only eighteen relevant studies that were conducted before July 2020 were identified for this review. This limited number of studies show that the topic of autism in the EAL field is still in its infancy. Despite the limited number of identified sources, this review has portrayed the current practice in researching into and teaching autistic students EAL. These students seemed to have potential for mastery

of micro-linguistic skills, but their macro-linguistic skills need more training and practice. It would benefit autistic students in EAL classrooms if EAL practitioners could find more ways to develop, for instance, the comprehension skills of autistic students. Setting a calm atmosphere for learning, planning more explicit instructions, creating learning routines, and setting realistic learning goals would also benefit both students and instructors.

There were more studies focusing on teaching EAL autistic students than there were on the process of their EAL learning and language acquisition. The limited number of identified studies in the present scoping review does not provide sufficient data for drawing conclusions regarding how autistic individuals learn/acquire EAL. Therefore, more research is urgently needed in this area when conditions permit.

Future autism research in EAL also needs to pinpoint the perspectives of other credible sources in understanding autistic individuals. Current autism research lacks representation of the perspectives of parents of autistic children, their non-autistic peers, and the autistic students themselves. Most researchers in the identified studies purportedly acquired their participants' profiles from schools or from teachers' descriptions. We noted only 22 percent (four studies) involved parents (Chong, 2016; Golshan et al., 2018; Sagia, 2015; Varro-Tharpe, 2013). As parental involvement is crucial in the education of autistic individuals (refer to discussion by Bennie, 2019), the perspectives of parents on EAL education of their children would be invaluable in EAL research. In addition, the view of older autistic students is still rather limited. Only two studies depicted the opinions of autistic adolescent students (Kuparinen, 2017; Sagia, 2015). There is a need to involve the perspective of autistic individuals, especially adults, in autism research (e.g., Gillespie-Lynch, et al., 2017). Incorporating perspectives from autistic individuals will enable researchers to broaden their findings. Lastly, we found that none of the identified studies involved peers of autistic students.

In addition, because autism is an emerging topic in the EAL field, further aspects of autistic EAL learning are accessible for research. One key issue in autism is social interaction. No recent research in EAL has explored the communication of autistic students in EAL interactions, especially with peers. Previous research in the autism field has acknowledged the role of peers in the education of autistic

individuals (Matthews et al., 2015; Nevill & White, 2011). Likewise, peers could play an important role in developing students' EAL communication (Gholami Pasand & Tahriri, 2017; Liao, 2019; Siew et al., 2017). Therefore, further research investigating whether autistic EAL individuals demonstrate similar communication styles with their peers as in their L1 or whether peer interaction could develop the communication of autistic students would be worth exploring. Such investigation would provide insights for new researchers seeking effective educational interventions for autistic students.

This review, however, has some limitations. First, the findings in this review cannot be claimed to fully represent current EAL research. The inclusion and exclusion criteria in this review did not allow EAL studies written in languages other than English to be reported. While EAL is a wide research field, many countries publish their research in their own language, targeting readers speaking the language. Conducting other reviews in specific contexts that involve a country as a variable, could present more comprehensive findings. Moreover, the findings regarding the learning characteristics of participants in this review cannot be generalised. Diverse research contexts and student profiles have increased the heterogeneity of autistic participants. Therefore, careful thought needs to be given when considering to pursue the suggestions presented. Furthermore, the findings of this review did not present the best research design for EAL research about autistic students. A systematic follow-up review is suggested for informing future researchers of best practices in EAL research involving autistic students.

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Appendix A

Item descriptions to be included in the PRISMA-ScR as summarized from Tricco et al. (2018) and their presentation in the current study.

Item	Item description as summarised from Tricco et al. (2018)	Item presentation in the current review
1. Title	Reviewers identify the document as a scoping review.	Presented in Title.
2. Structured Summary	Reviewers provide background, aims, review methods, and findings related to the objectives of the review.	Presented in Abstract.
3. Rationale	Reviewers explain what leads to the objectives of the scoping review from the existing known contexts.	Presented in Introduction.
4. Objectives	Reviewers provide explicit statements of the questions and objectives of the reviewed issues.	Presented in Introduction.
5. Protocol and Registration	Reviewers describe the protocol schema of the review and provide (if any) the registration link of the protocol.	Presented in Methodology (under sub-section: Review Protocol).
6. Eligibility Criteria	Reviewers specify the characteristics of the literature sought.	Presented in Methodology (under sub-section: Eligibility Criteria).
7. Information Sources	Reviewers describe the information sources and the date of the relevant literature.	Presented in Methodology (under the sub-section Information Sources and Search Strategy).

(continued)

Item	Item description as summarised from Tricco et al. (2018)	Item presentation in the current review
8. Search	Reviewers outline the full electronic search strategy for at least 1 database by identifying some elements such as the combination of keywords, publication time limit, language, and type of literature.	Presented in Methodology (under sub-section: Information Sources and Search Strategy).
9. Selection of Sources of Evidence	Reviewers select the literature captured by selected databases by employing the eligibility criteria set.	Presented in Methodology (under sub-section: Methods of Selection and Source of Evidence).
10. Data charting process	Reviewers document how the data would be charted and whether the data charting process is conducted independently or in duplicate among reviewers.	Presented in Methodology (under sub-section: Data Items and Abstracting Process).
11. Data items	Reviewers list down the variables or information investigated or extracted from captured literature.	Presented in Methodology (under sub-section: Data Items and Abstracting Process).
12. Critical Appraisal of Individual Sources of Evidence	If conducted, reviewers should describe what methods they use to appraise individual sources of evidence (e.g., appraising the validity of the methodology of the literature sought using a scaled measurement). This step is optional.	Not available.
13. Synthesis of Results	Reviewers illustrate how the charted data is handled and presented.	Presented in Methodology (under sub-section: Data Items and Abstracting Process).

(continued)

Item	Item description as summarised from Tricco et al. (2018)	Item presentation in the current review
14. Selection of Sources of Evidence	Reviewers identify a number of literature excluded in the screening process with explanations of their exclusion at each stage (suggested in the form of flow diagram).	Presented in Results section (under sub-section: Selection Result of Identified Studies).
15. Characteristics of Sources of Evidence	Reviewers present the characteristics of each source of evidence, along with their citations.	Presented in Results section (under sub-section: Characteristics of Identified Studies).
16. Critical Appraisal within Sources of Evidence	Reviewers conclude the findings of appraisal based on the method used in item 12. This item is included only if the reviewers conduct an appraisal on an individual source (item 12).	Not available.
17. Results of Individual Sources of Evidence	Reviewers present specific data from each evidence (the charted data) relevant to the review questions or objectives.	Presented in Table 1.
18. Synthesis of Results	Reviewers present the charting results from all the data presented in item 17.	Presented in Results section (under sub-sections: Q1 and Q2).
19. Summary of Evidence	Reviewers summarise the main results and link them to the review questions and objectives. Reviewers may elaborate the findings to specific knowledge user groups, such as policymakers.	Presented in Discussion.
20. Limitations	Reviewers discuss the limitations encountered during the review process.	Presented in Conclusion.

(continued)

Item	Item description as summarised from Tricco et al. (2018)	Item presentation in the current review
21. Conclusion	Reviewers provide an overall inference(s) of the results based on the review questions and objectives, including potential implications or further steps.	Presented in Conclusion.
22. Findings	Reviewers document funding sources of each including the literature and the (current) scoping review.	Presented in Results section (under sub-section: Characteristics of Identified Studies) and Acknowledgement section (for funding source of the current scoping review).