





RESEARCH ARTICLE

Self-reported competency, knowledge and practices of teachers teaching primary children with autism in government schools of West Malaysia: a cross-sectional study [version 1; peer review: awaiting peer review]

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Abstract

Background: Disability brings challenges and demands in the family and society which last for a long time. Children that are affected by disability are often kept at home, without access to opportunities other children might have, and education is one of the most effective ways to break the cycle of discrimination and poverty. Malaysia is committed to achieving the Sustainable Development Goals, and teacher quality issues are among the Ministry of Education's focuses to ensure a successful journey for pupils with disabilities. In this study, we evaluated the competency, knowledge and implementation practices of teachers serving government schools in West Malaysia regarding teaching children with autism spectrum disorder (ASD).

Methods: 832 primary teachers from different states of West Malaysia participated in a web-based survey that assessed self-reported competency, knowledge and implementation practices with regards to managing children with autism spectrum disorder.

Results: Respondents rated themselves as quite competent, and believed that they were knowledgeable regarding ASD and could implement ASD tasks. Frequency of training was a consistent predictor of competency. Respondents who had never attended a training course had significantly lower self-competency, lower level of knowledge, and lower implementation ratings than those who had attended even one course.

Conclusions: Investments in training teachers on ASD are highly recommended to ensure these students are provided with quality of education they deserve.

Open Peer Review

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Any reports and responses or comments on the article can be found at the end of the article.

Keywords

competency, knowledge, implementation, autism, teachers, Malaysia, government schools

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Introduction

Disability brings challenges and demands in the family and society which last for a long time. The financial burden associated with accessing health, education and social services is responsible for the cycle of poverty in society. Education is one of the most effective ways to break the cycle of discrimination and poverty that children with disabilities and their families often face by allowing them a greater degree of independence and better quality of life¹. Disabled citizens are often underestimated for their sufficient capabilities to contribute to society resulting in not being prioritized. Education for All (EFA), a global movement, which aims to ensure that every child and adult receives basic education of good quality, has realized failure in its objectives because disabled children are not given proper attention. These children are often kept at home, without access to opportunities other children might have². Universal primary education is one of the eight international Millennium Developmental Goals (MDGs). MDGs had been established following the Millennium Summit of the United Nations in 2000, following the adoption of the United Nations Millennium Declaration. It is a commitment made by 191 United Nation States to be achieved by the year 2015³. According to the MDGs report in 2015, there has been a significant improvement in terms of universal primary education. The primary school net enrolment rate in the developing regions reached 91% in 2015, up from 83% in 2000. The number of out-of-school children of primary school age worldwide has fallen by almost half, to an estimated 57 million in 2015, down from 100 million in 2000. The literacy rate among youth aged 15 to 24 has increased globally from 83% to 91 % between 1990 and 2015⁴. But despite impressive strides, there are more people being left behind, especially the poorest and those disadvantaged because of their sex, age, disability, ethnicity or geographic location⁵. Targeted efforts are required to reach the most vulnerable people. ‘Children with disabilities’ is one of these groups identified in the report as holding back progress towards education for all. Children with disabilities demand increased attention and often require an education adapted to their needs. Ensuring that all people have an equal chance of education must be at the heart of new goals post 2015.

The Sustainable Developmental Goals (SDGs) were developed to accomplish the unmet MDGs which ended in 2015⁵. One SDG is to “ensure inclusive and equitable quality education and promote lifelong learning opportunities for all”⁶. This inclusive education is aimed at providing special education to students for them to be more successful in social interactions leading to further success in life. However, children with autism require specialized instructions and behaviour support to learn critical skills and improve long term outcomes⁷. The competency of teachers is important in the development of these special children. They should be well competent to ensure the quality of education that these children deserve.

Consequently, this research evaluates the characteristics of teachers teaching children with autism in primary government schools in West Malaysia and their self-reported competency, level

of knowledge and teaching practices implemented. The implications of this study are important as the results can impact the qualifications of teachers and guide professional development that will ensure potential development of children with ASD.

Methods

Study design and setting

This cross-sectional study, conducted in West Malaysia between June 2017 and January 2018, utilized a web-based survey to determine the level of competency, knowledge and implementation practices of primary government schoolteachers registered under the Program Pendidikan Khas Integrasi (PPKI) and Sekolah Kebangsaan Pendidikan Khas (SKPK). PPKI is a special education program for primary school children with disabilities, which was introduced by the Ministry of Education in 1962⁸. It provides a separate class for disabled individuals organized under mainstream primary schools within integrated setting so they can interact and play with other children of their age. SKPK is a special education school provided by the same ministry, which provides education for primary school children with special needs. At present, there are 22 SKPK all over the country, which offer special education for different groups of disabilities; some exclusively provide education to deaf and mute children, while 12 offer programs for autism enrollees. Due to the scarcity of the available enrollees from SKPK (Table 1), regular government schools offering PPKI programs were also targeted (Table 2) in the present study.

Participants

This survey was completed by teachers specifically teaching children with ASD employed in schools involved in SKPK and PPKI.

Table 1. Total number of autism enrollees in Primary Special Education Schools (SKPK), West Malaysia 2017.

No.	State	SKPK	Autism enrollees
1	Johor	SKPK Johor	9
2	Kedah	SKPK Alor Setar; SKPK Sungai Petani	8
3	Kelantan	SKPK Kelantan	3
4	Pahang	SKPK Kuantan	1
5	Perak	SKPK Taiping SKPK Ipoh	4
6	Perlis	SKPK Perlis	5
7	Pulau Pinang	SKPK Jalan Hutton; SKPK Persekutuan	21
8	Terengganu	SKPK Besu SKPK Kuala Terengganu	2
Total			53

Source: Ketua Unit, Unit Data dan Maklumat, Cawangan Perancangan dan Penilaian, Bahagian, Pendidikan Khas, Kementerian Pendidikan Malaysia.

Table 2. Total number of national schools offering Inclusive Special Education Program (*Pendidikan Khas Integrasi*), West Malaysia 2017.

No	State	Primary	Secondary	Total
1	Perlis	13	11	24
2	Kedah	112	75	187
3	Pulau Pinang	42	23	65
4	Perak	127	81	208
5	Kelantan	101	54	155
6	Terengganu	105	57	162
7	Pahang	148	70	218
8	Selangor	142	76	218
9	Kuala Lumpur	37	27	64
10	Melaka	104	40	144
11	Negeri Sembilan	81	54	135
12	Putrajaya	4	4	8
13	Johor	267	118	385
TOTAL		1385	588	1973

Source: Ketua Unit, Unit Data dan Maklumat, Cawangan Perancangan dan Penilaian, Bahagian, Pendidikan Khas, Kementerian Pendidikan Malaysia

Inclusion criteria was primary schoolteachers presently working with children with autism during the study period.

Questionnaire

This research adapted the same questionnaire used by Hendricks in the study ‘Skill competencies for professionals and paraprofessionals in Virginia supporting individuals with autism across the lifespan’⁹. This questionnaire was used to survey special education teachers employed in public schools in Virginia, USA. The Virginia Skill Competencies is a list of guidelines for educators who serve students with autism and it was generated to develop educational standards in autism¹⁰.

The questionnaire consisted of four sections: Section A, background information, which comprised questions covering the following: age, gender, race, position, state, highest level of education, number of years spent/experience in teaching children with autism, number of ASD students taught in the last five years, number of students in a class, and frequency of special trainings attended; Section B, self-reported competency, which included nine statements on the self-rating of competence in handling a child with autism using a four-point Likert scale; Section C, self-rating of level of knowledge; and Section D, self-rating of level of implementation. These last two sections included statements organized under the following focus areas:

1. General autism competencies
2. Environmental structure and visual support competencies

3. Comprehensive instructional programming competency
4. Communication competencies
5. Social skill competencies
6. Behavior competencies
7. Sensory motor development
8. Independence and aptitude competencies

Section C consisted of 16 statements on self-rating of level of knowledge and Section D included 25 statements on self-rating of the implementation practices. They used a five-point Likert scale when rating current level of knowledge, where 1 represented ‘little knowledge’ and 5 indicated ‘very knowledgeable’. When rating current level of implementation, 1 represented ‘rarely implemented’ and 5 indicated ‘frequently implemented’.

The questionnaire was translated into the Malay language by a professor teaching language studies. A pilot test was carried out to ensure validity and reliability of the questionnaire. Special Education Teachers at a private therapy center were asked to participate in the pilot survey and comment if the instructions were clear, comprehensive and easy to understand. They were also asked if the confidentiality was appropriately maintained in the questionnaire. Suggestions were collected and integrated into the questionnaires.

Data collection

The link to the online survey was sent to the email address of the State Education Department directors of the 13 states. The researcher followed up using telephone calls to confirm receipt of the email. Jabatan Pendidikan Negeri (State Education Department) officers were assigned to coordinate with the researcher. The online questionnaire was administered, and data collected, using [Google Forms](#).

Data analysis

Data was exported and analyzed using SPSS version 19. Frequencies, means and standard deviations were used to summarize the data. Linear regression procedures were conducted to determine whether certain socio-demographic variables would predict self-competence in ASD management, knowledge of ASD competencies, and knowledge of implementation of ASD competencies. For all tests, the level of significance was set at 0.05.

Ethical considerations

Approval for this study was obtained from the Institutional Review Board of Taylor’s University Centre for Research management and the Ministry of Education, Malaysia [KPM.600-3/2/3 Jld.34¹¹; KPM.600-3/3/3 Jld.35³⁷]. Written informed consent was obtained from the participants for participation in the study.

Results

Out of the 7,575 teachers teaching in West Malaysia (Table 3) in both SKPK and PPKI schools, 1073 responded and completed the survey (Table 4). A total of 242 responses were excluded due to missing information.

Table 3. Number of teachers teaching special children in primary government schools in West Malaysia.

State	PPKI	SKPK	Total	Survey completed
Johor	1033	128	1161	82
Kedah	602	76	678	46
Kelantan	462	30	492	1
Melaka	522	24	546	168
Negeri Sembilan	361	39	400	28
Pahang	614	35	649	72
Perak	757	57	814	247
Perlis	87	32	119	3
Pulau Pinang	352	76	428	20
Selangor	1146	40	1186	5
Terengganu	548	64	612	90
WP Kuala Lumpur	357	67	424	66
WP Putrajaya	66	0	66	3
TOTAL	6907	668	7575	831

PPKI, Program Pendidikan Khas Integrasi; SKPK, Sekolah Kebangsaan Pendidikan Khas.

As per Nunnally and Bernstein (1994), a measure is moderately reliable if its Cronbach's alpha is 0.70 or higher¹². Given this criterion, the three measures (Sections B–D) were all reliable. Mean composites were created for each of the measures; as such, four was the highest possible score. As shown in Table 5, the sample of respondents rated themselves as considerably competent ($M = 3.06$, $SD = 0.38$). They also believed that they were knowledgeable regarding ASD competencies ($M = 3.28$, $SD = 0.60$) and could implement ASD tasks ($M = 3.33$, $SD = 0.63$).

Overall procedure

Linear regression procedures were conducted to determine whether certain socio-demographic variables would predict self-competence in ASD management, knowledge of ASD competencies, and knowledge of implementation of ASD competencies. Prior to conducting the regressions, several variables were recoded. First, level of education was recoded into a three-category variable: diploma, Bachelor's, and graduate degree. Second, class size was recoded into a three-category variable: 1 to 5, 6 to 10, and 11 or more. Lastly, frequency of training was recoded into a four-category variable: never, once, once a year, and more than once a year. Indicator (or dummy) variables were then created, where the first category (i.e., diploma, 1 to 5, and never) served as the reference group. In addition, because the variable, number of ASD students taught, was severely skewed, this variable was transformed using natural log function. Skewness dropped to acceptable limits (i.e., skewness index fell below three, per Kline, 2011)¹³; thus, this transformed variable was used in subsequent regression procedures.

Table 4. Characteristics of teachers from Program Pendidikan Khas Integrasi and Sekolah Kebangsaan Pendidikan Khas schools in West Malaysia (N = 832).

Variables	n	(%)
Age, years	37.76	(7.63)
Years spent teaching ASD students	8.25	(5.04)
Number of ASD students taught, mean±SD	12.88±18.86	
Race		
Malay	737	(88.8)
Chinese	55	(6.6)
Indian	30	(3.6)
Other	8	(1.0)
State		
Terengganu	90	(10.8)
Pahang	72	(8.7)
Negeri Sembilan	28	(3.4)
Kuala Lumpur	66	(7.9)
Putrajaya	3	(0.4)
Melaka	168	(20.2)
Johor	82	(9.9)
Perak	247	(29.7)
Pulau Pinang	20	(2.4)
Kedah	46	(5.5)
Perlis	3	(0.4)
Selangor	5	(0.6)
Kelantan	1	(0.1)
Gender		
Male	167	(20.1)
Female	664	(79.9)
Position		
Administrator	63	(7.6)
Coordinator	12	(1.4)
Subject head	7	(0.8)
Teacher	739	(89.3)
Teacher helper	6	(0.7)
Counselor	1	(0.1)
Highest level of education		
Teaching certificate	23	(2.8)
Malaysia certificate of education	3	(0.4)
Teaching diploma	44	(5.3)
Bachelor's degree	693	(83.3)
Master's degree	68	(8.2)
Doctorate	1	(0.1)

Variables	n	(%)
Class size (number of students)		
1 to 5	655	(78.9)
6 to 10	118	(14.2)
11 or more	57	(6.9)
Frequency of training		
Never	103	(12.4)
Once	271	(32.6)
Once a year	218	(26.2)
Twice a year	77	(9.3)
Thrice a year	23	(2.8)
More than three times a year	140	(16.8)

ASD, autism spectrum disorder.

Table 5. Descriptive statistics and reliability for the measures of competence and implementation in teachers from West Malaysia (N = 832).

Measure	α	Range	M	SD
Self-competence	.76	1.11 to 4.00	3.06	.38
Level of knowledge				
Overall competency	.97	1.00 to 5.00	3.28	.60
Overall implementation	.98	1.00 to 5.00	3.33	.63

Assumptions of multivariate normality (assessed through a normal probability plot), linearity, and homoscedasticity (both assessed through a plot of the studentized deleted residuals by the standardized predicted values) were checked; all assumptions were met. The problem of multi-collinearity was also verified via the variables' tolerance values; multi-collinearity was not a problem as all tolerance values were above .20¹⁴

Predictors of self-competence

The findings in Table 6 reveal that the number of ASD students taught positively predicted self-competence ratings ($\beta = .11, p = .003$); the more ASD students the respondents had taught, the higher their self-competence ratings. Frequency of training also positively predicted self-competence ratings; respondents who had never attended a training course ($M = 2.88, SD = .41$) had significantly lower self-competency ratings than those who had attended even one course ($M = 3.06, SD = .36; p < .001$), those who attended a course once per year ($M = 3.11, SD = .41; p < .001$), and those who took more than one course a year ($M = 3.11, SD = .34; p < .001$).

Predictors of knowledge

The findings in Table 7 show that the number of ASD students taught positively predicted knowledge of ASD competencies ($\beta = .18, p < .001$); the more ASD students the respondents had taught, the higher their knowledge of ASD competencies scores. Level of education also significantly predicted knowledge of ASD competencies; respondents with a teaching

Table 6. Linear regression results for self-competency in ASD model (N = 832).

Variables	B	SE	β
Years spent teaching ASD	.00	.00	.04
Number of ASD students taught	.04	.02	.11*
Level of education			
Diploma vs. Bachelor's	.01	.05	.01
Diploma vs. graduate degree	.10	.06	.07
Class size			
1 to 5 vs. 6 to 10	.02	.04	.01
1 to 5 vs. 11 or more	.01	.05	.01
Frequency of training			
Never vs. once	.16	.04	.19***
Never vs. once per year	.20	.05	.23***
Never vs. more than once per year	.20	.04	.24***

ASD, autism spectrum disorder. Overall model $F(9, 822) = 5.71, p < .001, R^2 = .059.$ * $p < .05.$ ** $p < .01.$ *** $p < .001.$

Table 7. Linear regression results for knowledge in ASD model (N = 832).

Variables	B	SE	β
Years spent teaching ASD	-.00	.00	-.01
Number of ASD students taught	.11	.02	.18 *
Level of education			
Diploma vs. Bachelor's	.07	.07	.05
Diploma vs. graduate degree	.23	.10	.11 *
Class size			
1 to 5 vs. 6 to 10	-.09	.06	-.05
1 to 5 vs. 11 or more	-.03	.08	-.01
Frequency of training			
Never vs. once	.31	.07	.24 ***
Never vs. once per year	.38	.07	.28 ***
Never vs. more than once per year	.34	.07	.26 ***

ASD, autism spectrum disorder. Overall model $F(9, 822) = 7.73, p < .001, R^2 = .078.$ * $p < .05.$ ** $p < .01.$ *** $p < .001.$

diploma had significantly lower knowledge ratings ($M = 3.25, SD = .57$) than respondents with a graduate degree ($M = 3.43, SD = .68; p = .022$). Frequency of training also positively predicted knowledge ratings; respondents who had never attended a training course ($M = 2.95, SD = .71$) had significantly lower knowledge of competency ratings than those who had attended even one course ($M = 3.29, SD = .58; p < .001$), those who attended a course once per year ($M = 3.37, SD = .58; p < .001$), and those who took more than one course a year ($M = 3.34, SD = .55; p < .001$).

Predictors of implementation

The findings in Table 8 indicate that number of ASD students taught positively predicted knowledge of implementation ($\beta = .15, p < .001$); the more ASD students the respondents had taught, the higher their knowledge of implementation scores. Level of education also significantly predicted knowledge of implementation; respondents with a teaching diploma had significantly lower ratings ($M = 3.21, SD = .59$) than respondents with a graduate degree ($M = 3.52, SD = .62; p = .001$). Frequency of training also positively predicted implementation ratings; respondents who had never attended a training course ($M = 2.99, SD = .77$) had significantly lower implementation ratings than those who had attended even one course ($M = 3.29, SD = .59; p < .001$), those who attended a course once per year ($M = 3.45, SD = .59; p < .001$), and those who took more than one course a year ($M = 3.40, SD = .58; p < .001$).

Discussion

Increasing numbers of autistic students in primary schools demand competent and well-trained teachers who can confidently implement efficacious strategies to bring the best possible outcomes. It is crucial to understand the aptitudes of special education teachers as their understanding of autism and its spectrum, strategies to design individual teaching plans and assessment will help the students achieve their potential. This study highlights the self-reported competency, knowledge and implementation practices and its predictors among special education teachers in primary government schools in West Malaysia. Additionally, the findings can serve as a guide to realigning the content of teachers' preparation programs.

In our study, the majority of the participants had a Bachelor's degree (83.3%) and another 8.2% had a Master's degree. The average number of years of experience of teaching was 8.25 years, with an average of around 13 students with ASD, and

majority of the teachers were experienced in handling a class size of 1 to 5. A similar profile was reported in studies conducted by Toran *et al.* and Wei *et al.*^{15,16}. The teachers demonstrated intermediate to moderate levels of knowledge of autism and implementation practices. A study conducted in the city of Amman by AL Jabery *et al.*¹¹ reported a similar result. However, our finding contrasted with finding of low to intermediate autism knowledge among special education teachers from the Virginia state of the United States of America as reported by Hendricks. A study conducted by Mavropoulou and Padelidu among Greek educators reported and another by Toran *et al.* among teachers in Malaysia highlighted the low level of knowledge of autism among the special education teachers^{9,17,18}.

A moderate level of self-reported competency in determining appropriate intervention goals for the autistic children was reported by respondents in our study. Hendricks, Toran *et al.* and Wei *et al.* noted similar findings in their studies^{9,14,16}.

Our study revealed that the frequency of training strongly predicted self-reported competency and knowledge, as well as the implementation practices. Toran *et al.* emphasized the need to improve special education teacher training in order to increase the level of knowledge in autism and effective use of evidence-based teaching strategies by offering hands-on activities. Hendricks also highlighted the need for increased content related to autism and evidence-based practices during pre-service training^{9,15}. Scheuermann *et al.* recommended the use of specialized skills training and provision of technical assistance and support to teachers in the training programs in the United States. Similarly, Litton *et al.* recommended a one-year induction program in conjunction with the local school districts' programs with the express purpose of retaining highly qualified teaching personnel^{19,20}.

In this study, we also found that the level of education also significantly predicted knowledge of ASD competencies and implementation practices. Respondents with a graduate degree had significantly higher ratings as compared to those with a teaching diploma. This finding highlights the importance of recruiting teachers with a higher level of education in this setting.

The number of students with ASD taught by the respondents was found to be a significant predictor of self-competence and knowledge, as well as the implementation practices. This is of particular interest given the challenges educators face due to the multidimensional nature of the disability. As documented by Hendricks⁹, the wide range of cognitive abilities and verbal skills of learners affect the knowledge and competencies required. Dealing with students with varying capabilities warrant special practices that address communication and social needs and help the learners achieve academic success.

However, in our study the number of years of teaching experience did not predict self-competence or knowledge, which concurs with the finding reported by Alharbi *et al.*²¹. In contrast, AL Jabery *et al.*¹¹ reported statistically significant differences in the level of knowledge among teachers with a teaching experience of five years and more as compared to those with a teaching experience of less than three years

Table 8. Linear regression results for implementation in ASD model (N = 832).

Variables	B	SE	β	
Years spent teaching ASD	-.00	.00	-.01	
Number of ASD students taught	.10	.02	.15	***
Level of education				
Diploma vs. Bachelor's	.15	.08	.09	
Diploma vs. graduate degree	.35	.10	.16	**
Class size				
1 to 5 vs. 6 to 10	-.07	.06	-.04	
1 to 5 vs. 11 or more	-.01	.09	-.00	
Frequency of training				
Never vs. once	.27	.07	.20	***
Never vs. once per year	.41	.07	.29	***
Never vs. more than once per year	.37	.07	.26	***

ASD, autism spectrum disorder. Overall model $F(9, 822) = 7.98, p < .001, R^2 = .080. p < .05. **p < .01. ***p < .001$

Conclusion

From our results, we conclude that teachers rated themselves as considerably competent. They also believed that they were knowledgeable regarding ASD and could implement ASD tasks. Frequency of training is a consistent predictor of this competency; respondents who had never attended a training course had significantly lower self-competency, lower level of knowledge and lower implementation ratings than those who had attended even one course. Investments in training of these teachers is highly recommended to ensure these students are provided with the quality of education they deserve.

Data availability

Underlying data

Harvard Dataverse: Self reported competency, knowledge and practices of teachers teaching primary children with autism in government schools of West Malaysia, <https://doi.org/10.7910/DVN/TP5VJI>²².

This project contains the following underlying data:

- Raw data: ASD TEACHERS.tab

Extended data

Harvard Dataverse: Self reported competency, knowledge and practices of teachers teaching primary children with autism

in government schools of West Malaysia, <https://doi.org/10.7910/DVN/TP5VJI>²².

This project contains the following extended data:

- Questionnaire in English and Malay language (competency developed by Virginia Autism Council)

Data are available under the terms of the Creative Commons Zero “No rights reserved” data waiver (CC0 1.0 Public domain dedication).

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