Special Education Teachers and Student Academic Achievement in Saudi Arabia

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HOW TO CITE:
Almughyiri, S. (2022). Special Education Teachers and Student Academic Achievement in Saudi Arabia. *International Journal of Special Education, 37*(1), 40-49

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DOI:
https://doi.org/10.52291/ijse.2022.37.25

ABSTRACT:

Teaching evaluation has been used widely in learning institutions globally to address achievement gaps for students with special needs, math learning disabilities (MLD), and learning impairments, such as autism. In most cases, learners with disabilities impeding the acquisition of mathematics and languages receive preferential consideration for special education. Successful knowledge acquisition for special needs students usually involves teacher guidance, especially in the evaluation of learning needs and dissemination of curriculum content, and student interactions. In this study, data collected from 170 special education administrators drawn from three regions of the Kingdom of Saudi Arabia (KSA) (Riyadh, Makkah, and Medina) was used to explore the effectiveness of training and certification of special education teachers on the attainment of desirable academic outcomes in mathematics. A purposive sampling strategy was used to recruit the participants. A descriptive analysis design was applied to study the underlying characteristics of the sample population. The findings from the study, which were presented using graphs and tables based on the responses from the participants, showed the diversity in the composition of special education teachers in KSA. Specifically, qualified practitioners, uncertified personnel, and unfilled teaching vacancies accounted for 55.88%, 38.24%, and 5.88% of all positions respectively. A considerable proportion of special education teachers (52.94%) reported that they use teacher-directed instruction as opposed to student-centered learning (47.06%). The implications of the findings and the recommendations are discussed in the final sections of this report.

Keywords: special education, Saudi Arabia, students achievement, academic achievement, students with special needs

INTRODUCTION

Teaching evaluation is essential to effective special education (SE) because it helps institutions and policymakers address achievement gaps for students with special needs (SSN). In most cases, learners with disabilities impeding the acquisition of mathematics and languages receive preferential consideration for special education. Successful knowledge acquisition for SSNs usually involves teacher interventions, especially in the evaluation of learning needs and appropriate accommodations. However, Lockwood et al. (2021) contend that effective assessment of learning progress and competencies for SSN is impeded by the lack of skills, adequate support, and failure to implement evidence-based practices, such as norm-referencing and practical evaluations, by teachers. Mathematics education in general instruction classrooms and SE are biased toward student-centered problem solving and inquiry, which conflicts with direct instruction methodology (Ashman & Elkins, 2005; Lo & Hew, 2017). Lack of sufficient skills, knowledge, resources and flexible pedagogical approaches affects the educational achievements and life outcomes of SSNs. Consequently, this study investigated the level of educational attainment and certification for teachers of SSN in three cities in the Kingdom of Saudi Arabia (KSA) and their impacts on teaching and assessment methods for mathematics.

Problem Statement

The lack of reliable, effective, and inclusive assessment methods decreases the mathematics achievement of SSN in KSA. Aljohani and Alnatheer (2020) report that teachers in KSA experience challenges addressing gaps in mathematics achievement among girls, SSN, and gifted students, even though educational equality is one of the core Vision 2030 goals in education. There is insufficient information and research on the role of advanced training and accreditation on the learning outcomes of SSN in KSA. Research in SE has shown that reliable and effective assessment methods increase the achievement levels of SSN. In public schools in the United States, policymakers have bridged disparities in attainment between regular instruction students and SSN by abandoning generalized norms, which equate differences with deficiencies, and incorporating student-centered interventions (Healy & Powell, 2013). Therefore, the current policy and practice for SE teachers in the United States are increasingly becoming skewed towards self-assessments, portfolios, classroom observations, and student scores (Healy & Powell, 2013). These assessment methods reliably show the subjective impediments and competencies of students, which affect learning. Nevertheless, the prevalence of high-stakes evaluation frameworks in SE globally is problematic because they are ineffective, stressful, and retrofitted from assessment frameworks used in general instruction classes (Snyder & Pufpaff, 2021; Tai et al., 2021; Healy & Powell, 2013). The ideal approach to SE should be inclusive and evidence-based because teachers need diverse skills to identify and resolve highly variable learning disabilities and impediments in SSN (Guerriero et al., 2020; Tai et al., 2021; Baker et al., 2002). Highly educated and accredited teachers are likely to possess the competencies and capabilities required to overcome the impact of subjective and cultural impediments on mathematics achievement in diverse environments (Guerriero et al., 2020; Tai et al., 2021; Aljohani & Alnatheer, 2020). Consequently, this research addresses gaps in knowledge and challenges in SE practice by investigating how advanced training and certification for teachers of SSN in Saudi Arabia affect pedagogical preferences and the academic outcomes of learners in mathematics.

LITERATURE REVIEW

Children with disabilities have limited experience and learning opportunities. Kunwar et al. (2021) contend that teachers' understanding of mathematics learning disabilities (MLD) is inadequate despite their prominent role in the early diagnosis and the delivery of specialized instructions to address the impairments. Ideally, SE programs should be customized through realistic educational goals and personalized teaching styles designed to optimize the abilities and experiences of SSN (Guerriero et al., 2020). Failure to offer inclusive and evidence-based SE worsens the disparities associated with developmental and learning disabilities. Research has shown that pedagogical approaches used in mathematics for special needs students often fail to stimulate social interactions and trigger satisfactory academic performance (Scherer et al., 2017; Ho & Cheng, 1997). According to Borasi et al. (1999), teachers ofSSNsN find experience challenges in integrating them into group work and monitoring their academic performance. Inadequate teacher training, outdated content, and lack of inclusive approaches are often cited as the core factors responsible for poor student experience and academic outcomes (Tai et al., 2021; Moreira & Manrique, 2014). The inability to fill gaps in teaching mathematics induces frustrations and discontent among teachers (Kapperman & Sticken, 2010). Many teachers are unable to penetrate the psychic activity of the special

needs students and end up forming certain unfavorable attitudes about the learners.

Misperception of MLD and learning impairments, in general, has diminished achievement and hampered access to desirable life outcomes for SSN. Tolentino (2016) observes that teachers in the mathematics field perceive special needs students as being dumb or lazy. For example, a student with spatial learning issues is often branded as a 'struggler' in pattern identification or interpreting graphs. Additionally, the use of disparaging language by teachers subconsciously dampens their self-esteem and makes them believe that they are incapable of handling mathematical problems (Graham et al., 2007). Constructivist theories in mathematics education emphasize productive practice and investigative learning. The teacher provokes students to think, construct and extend knowledge, and as a result, the students can make discoveries (Wittmann, 2001). Even so, investigative learning when combined with productive practicing can satisfy the needs of learners in complex learning environments. Special needs students can perform better when teachers can use pictures or diagrams to represent procedures or mathematical concepts (Rosas & West, 2011). Therefore, student assessments should be developed ethically and professionally by competent teachers.

Even though the classification for MLD does not include autism, many students with the condition experience challenges, misperceptions, and discrimination in learning arithmetic. According to Bullen et al. (2022), students with autism are often placed in general instruction classrooms despite having significantly low IQ and working memory. They attribute the challenges to limited understanding and training on the appropriate interventions to assist students with autism to overcome their learning impairments (Bullen et al., 2022). Teachers can address the disparities between students in regular instructions and their peers with MLD and autism by implementing evidence-based interventions, such as Modified Schema-Based Instruction (MSBI), which is a problem-solving heuristic approach (Root et al., 2022; Yakubova et al., 2022). students with autism are similar to students with MLD because their achievement is usually low when teachers fail to complement directed pedagogy with student-centered learning (Griffiths et al., 2021; Schnepel & Aunio, 2021; Apanasionok et al., 2021). Lowly educated and unaccredited are unlikely to assess and address disabilities and impairments impeding the achievement of their students in mathematics.

Advanced education, training, knowledge, and skill acquisition programs improve the efficacy of teacher assessments of MLD in SSN. Frederickson and Cline (2009) report that an appropriate educational approach is needed to develop professionalism and socio-emotional support for teachers. As a result, the teachers gain psycho-pedagogical skills and ensures inclusive learning that satisfies the social, emotional, and organic needs of students with special needs when they advance their education and take up refresher course. Teachers are the main actors in social inclusion given that they understand the socio-cultural demands of the students (Kroesbergen & Luit, 2003). A study by Holdheide and coauthors (2010) confirmed that teacher training and preparation were essential to student achievement. Drawn from a sample of 1107 respondents, the authors showed that credible evaluation systems were necessary for the improvement of student learning. Even though teacher preparation programs are vital, evaluation systems should be valued, credible, and understood (Doabler et al., 2018). Boyd and Bargerhuff (2009) contend that collaboration between special educators and mathematics practitioners has the effect of creating inclusive classrooms. The authors suggest that inclusive classrooms encompass positive behavioral support, study and organizational skills, and assistive technology. When mathematics teachers become aware of the special needs of learners, it becomes easier to guide students to learn and perform well.

Student-centered interventions, such as individualized education programs (IEP), have become increasingly popular in mathematics instructions. Holm et al. (2020) contend that teachers should possess the ability to manage the psycho-emotional impacts of offering special education support (SEdS) because students often report feeling strong emotions, such as anxiety, boredom, hopelessness, and shame. Basic training and accreditation are unlikely to standardize the competencies possessed by teachers or their ability to assess the IEP and SEdS needs of their students comprehensively. Durmus and Ergen (2021) report that the rough evaluation forms used to determine eligibility for IEP are inadequate due to their tendency to oversimplify the needs of SSN. In this study, I analyzed how challenges, such as the inability to capture signals of inattention, such as anxiety, affected teachers' assessments of mathematic learning ability for SSN in KSA.

The global and KSA education sectors are affected by both existential challenges despite the progress made towards improving the quality and inclusivity of SE. One of the core changes in the 21st century, which has improved the experiences and achievement of SSN is the transition from segregated to inclusive systems (Hayes &

Bulat, 2017). SSN has benefitted from the desegregation of classrooms and advancements in pedagogy in the SE, which has become more humane and effective. According to Tan and co-authors (2022), segregated classrooms dehumanized special needs students because they were often offered low-rigor education and inapplicable skills, which failed to bridge disparities with students in general instruction classrooms. Insufficiently trained and certified teachers are likely to offer biased norm-referenced assessments by unprofessionally and unethically comparing gifted learners with their peers with significant MLD (Guerriero et al., 2020). This existential challenge has affected access to quality education and led to low achievement for students with MLD and autism.

In the 21st century, policymakers and private educational stakeholders have focused on higher education and accreditation as a solution to emerging challenges. Advancements in teacher education and training have gradually reduced the impacts and disparities associated with limited resources and MLD in SE (Hayes & Bulat, 2017). Desegregation has led to the development of customized teaching and accreditation programs for SSNs. Bagger et al. (2020) report that pedagogical approaches used to deliver mathematics instructions in SE are increasingly oriented "towards teachers and teaching competence, towards enhanced mathematical achievement, and towards every student's learning" (p. 41-2). The COVID-19 pandemic has increased the need for highly trained and certified teachers. According to Cameron et al. (2022), the transition to digital learning has affected how instructors offer support and assess students using conventional approaches, such as classroom observations. Therefore, teachers require advanced education, knowledge, skills, and certifications, which can improve the achievements of students with MLD in today's world.

METHODOLOGY

A quantitative survey research methodology was applied to the study. The quantitative approach, which helps researchers to explain phenomena through the relationships, patterns, similarities, and generalizations in discrete data, fits the premise and approach of this study (Gaciu, 2020). Specifically, I relied on data collected from a survey of 170 special education administrators drawn from three regions of Saudi Arabia to analyze how teacher education, skills, knowledge, and certification affect SSN, especially those with MLD. Surveys and questionnaires are widely used in education research stem because they facilitate the collection of targeted responses from participants through open and closed-ended lines of inquiry (Roni et al., 2020). The study used a purposive sampling method to recruit the participants. The web-based survey was completed using Microsoft.Net which is an online survey program (see appendix 1). A pilot test was carried out on district directors of special education to gauge the validity and readability of the questionnaires. The survey was purposely completed by administrators rather than other educational stakeholders because they understand the current status of district policy and its impacts on evaluation practices and instruments in SE.

Descriptive analysis methods were used to study the underlying characteristics of the sample. Data were reported on graphs and tables based on the responses. The non-parametric Spearman's rank correlation (SRC) was used to analyze the relationship between the attrition rate of special education, which is an ordinal variable, and the instruction methods used by special education teachers. SRC is popular in educational research because it shows the relative strengths of correlations between variables and phenomena (Roni et al., 2020; Gaciu, 2020).

Credibility and Reliability

The survey items reliably showed special education administrators' perceptions and practices. Specifically, the credibility and reliability of the study were determined through the application of the Cronbach's Alpha test, which shows the internal consistency of items on a scale (Roni et al., 2020; Gaciu, 2020). The Cronbach's alpha score of all items in the questionnaire was within the set threshold (> .7). Additionally, all respondents in the study gave informed consent by clicking a box, which showed they understood the extent, risks, and effects of participating in the study.

RESULTS

The data collected from the survey were analyzed using descriptive and inferential statistics. Frequency and demographic statistics from the data showed that the special education positions comprise qualified practitioners (55.88%), and uncertified personnel (38.24%), while a few institutions had such positions empty (5.88%). Most special education teachers (52.94%) use teacher-directed instruction as opposed to student-centered learning (47.06%). Table 1 summarizes the frequency statistics from the questionnaire.

Ineffective education programs (47.06%) were found to be a major cause of poor performance among students with special needs. This was followed by mathematical

Table 1. **Challenges of special education mathematics teacher**

S/No.	Challenges of special education math teacher	n	Percent
1.	Failure to capture signals of inattention	15	8.82%
2.	Negative language and poor perception	20	11.76%
3.	Outdated instructional materials	15	8.82%
4.	Ineffective teacher education programs	80	47.06%
5.	Mathematical jargons and language	40	23.53%

jargon and language (23.53%) and negative language and poor perception (11.76%) of SSN. Further inquiry into the impacts of these challenges revealed that teacher attrition was higher in SE (50.00%) compared to general education. The statistics indicate that the education, training, skills, knowledge, certification, and pedagogical approaches of SE teachers vary significantly in KSA.

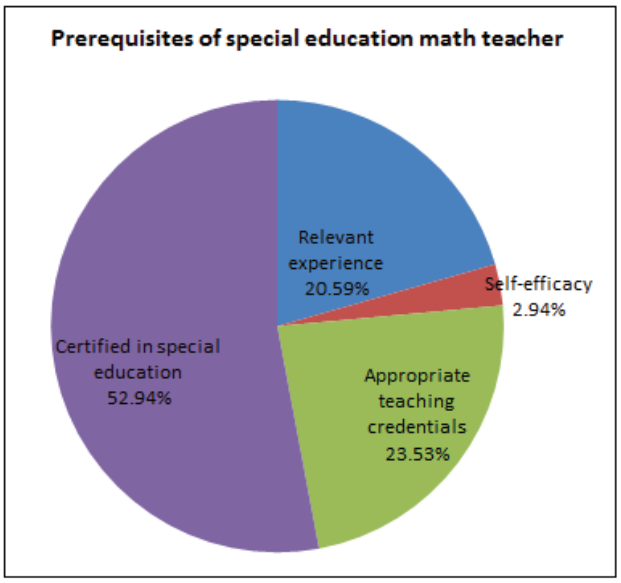

Fig. 1. Factors attributed to improved student achievement.

Analysis of the relationship between teacher competencies and the achievement of SSN in mathematics revealed that 52.94%, 23.53%, and 20.59% of participants consider certification in special education, appropriate teaching credentials, and relevant experience as the most critical attributes required by special education teachers respectively (figure 1). Furthermore, the respondents stated that their perceptions of the quality of training and teacher certification impact the academic achievement of SSNs (figure 2).

As shown in the graph above, most of the respondents (50.00%) noted that certified special education teachers can employ multiple instructional methodologies followed by those who think that certified special education teachers provide explicit instruction (26.47%). From the above results, instructors are equipped with abilities to employ multiple instructional methodologies and explicit instruction. They are also taught how to verbalize mathematical procedures (table 2). A positive correlation (r = .31) was found between the attrition rate of special education and the instruction method but the relationship was found not to be statistically significant (p = .078 against a threshold of p < .001).

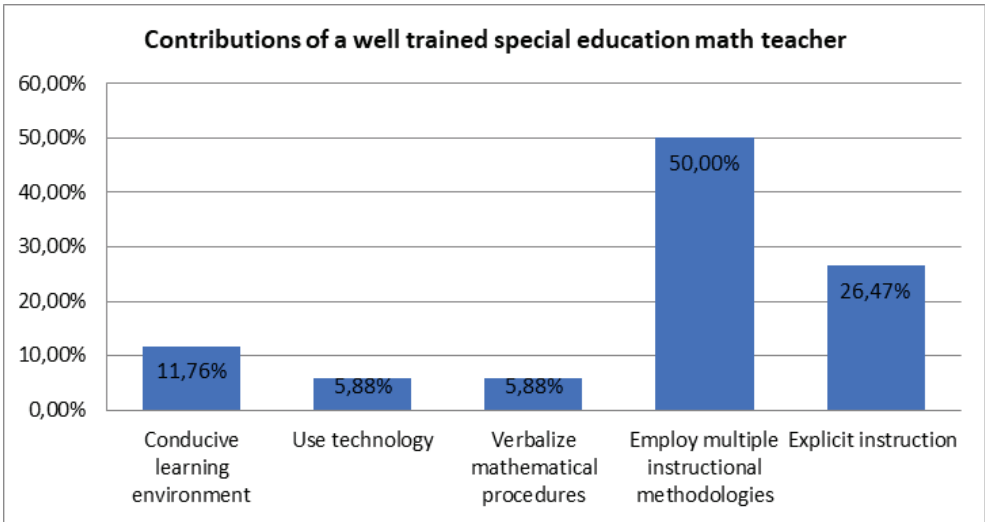

Fig. 2. Professional training outcomes.

Table 2. **Correlation between attrition rate of special education and instruction method**

		Attrition rate of special education
Instruction method	Spearman's rho	.31
	Sig. (2-tailed)	.078
	N	34

$p < 0.01$

DISCUSSION

The study has shown that a majority of the teaching positions for special education are occupied by qualified practitioners. However, a significant number of such positions are filled by uncertified teachers with limited knowledge and skills on how to handle students with special needs, such as students with autism. The results also show that most mathematics teachers in special education classrooms use teacher-directed instruction. Based on the results from correlation analysis, the attrition rate for special education is higher for student-centered learning. This is consistent with the observations of Boyd and Bargerhuff (2009) that most teachers use student-centered learning to tap into the background knowledge of students. However, the approach tends to hone procedural rather than conceptual skills. As a result, teacher training seems to emphasize teacher-directed instruction as it tends to focus on short-term memory to executive functions. This means that teacher's attention is vital based on special knowledge and skills to recognize children with disabilities. Nonetheless, the failure to capture signals of inattention is less pronounced than the ineffectiveness of teacher education programs.

The results show that ineffective teacher education programs are closely associated with poor perception and negative language used by special education math teachers. The results are consistent with Berch and Mazzocco (2007) who showed that students with special needs, such as students with autism are perceived poorly or addressed using negative language and as a result feel discriminated against. When poorly perceived, students with cognitive-processing challenges find it difficult to learn mathematics as they adopt and internalize certain labels branded on them. On the contrary, teacher education programs are sufficient to empower teachers with new mathematical skills and concepts (Johnson & Semmelroth, 2014). The mathematics teachers easily help the students to solve mathematical problems through a continuum of simple to complex forms. The programs also capitalize on effective instructional methodologies, which harness the skills of learners when they are young and malleable (Byrd & Alexander, 2020; Andenet, 2005). Using multiple examples and instructions, learners are exposed to arrays of mathematical problem types.

The study shows that certification is one area of concern in addressing achievement gaps for students with special needs. This agrees with the observation of Boe and Cook (2006) that there is a chronic and increasing shortage of certified teachers in special education. When a teacher is certified, their special needs students tend to experience higher achievement gains in reading and mathematics. Hence, relevant stakeholders should identify effective teaching and preparation approaches for improved teaching practices (Feng & Sass, 2009). Furthermore, showing competencies in teaching mathematics is supported by supplementary standards for special education teachers. In all, teacher preparation programs are fundamental in the training and development of special education math teachers.

CONCLUSION

The results of the study showed that some of the current special education positions in the sampled Saudi Arabia are filled with uncertified personnel. This means that they are deficient in specific skills and competencies required to produce positive student outcomes. The results also show that mathematics teachers in special education commonly use teacher-directed instruction rather than student-centered learning. The poor performance among students with special needs is aggravated by ineffective education programs that are riddled with negative language and poor perception of special students among teachers. Owing to frustrations, teacher attrition in special education is high compared to general education. The statistics indicate that the supply of special education teachers is of great concern. Even so, the study showed that a teacher with certification in special education is a prerequisite to better educational and behavioral outcomes among students with special needs. The study observes that certified teachers create a conducive learn-

ing environment, use technology, verbalize mathematical procedures, and employ multiple instructional methodologies. The teachers or instructors are equipped with abilities to employ multiple instructional methodologies and explicit instruction. They are also taught how to verbalize mathematical procedures.

RECOMMENDATIONS

The study shows that certification is one area of concern in addressing achievement gaps for students with special needs. Certified teachers understand the special needs of students and help them to experience higher achievement gains in reading and mathematics. Additionally, advanced training and accreditation enhance the ability of teachers to offer inclusive mathematics instruction in SE and overcome emerging challenges. The following recommendations are derived from the findings of this study and designed to improve achievement in mathematics for students with special needs (SSN), especially those with math learning disabilities (MLD):

- Special education institutions should identify effective teaching and preparation for improved teaching practices.
- Supplementary standards for special education teachers are needed to hone competencies in teaching mathematics.
- Teacher preparation programs should be revitalized to include value-added models to help identify effective teachers.
- Teachers should be encouraged to use the language of math, especially those with language confusion.
- Learning institutions with students with special needs should consider using student-centered learning to create more effective outcomes.

ACKNOWLEDGEMENT

None.

DISCLOSURE STATEMENT

No potential conflict of interest was reported by the authors.

FUNDING

None.

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Appendix 1. Online Survey Questionnaire

You understand and consent to the scope, impacts, and outcomes of this study

Yes ☐ No ☐

What is the certification position of your institution for special education teachers?

☐ Empty

☐ Filled with uncertified personnel

☐ Occupied by qualified special needs practitioners

Which instructional methods are commonly used by your special education teachers

☐ Student-centered learning

☐ Teacher-directed instruction

Which is the greatest challenge faced by the special education math teacher

☐ Failure to capture signals of inattention

☐ Negative language and poor perception

☐ Outdated instructional materials

☐ Ineffective teacher education programs

☐ Mathematical jargon and language

How is the attrition rate of special education teachers compared to general education?

☐ High

☐ Medium

☐ Low

What do you consider the most effective attribute of special education math teachers to instruct students with special needs?

☐ Relevant experience

☐ Self-efficacy

☐ Appropriate teaching credentials

☐ Certified in special education

How does a well-trained and certified teacher contribute to the achievement of academic and behavioral gains of students with special needs?

☐ Provides a conducive learning environment

☐ Uses technology

☐ Verbalizes mathematical procedures

☐ Employs multiple instructional methodologies

☐ Utilizes explicit instruction