



## Research Article

# Mathematics Teachers' Perceptions of Teaching Gifted and Talented Learners in General Education Classrooms in the UAE

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### Abstract

Gifted education has received attention all over the world, including the UAE, because of its significant contribution to economic investment. This quantitative study aimed to describe and analyze mathematics teachers' perceptions of teaching gifted learners in general education classrooms in the UAE. The survey consisted of 19 statements on a 5-point Likert scale, with a sample of 66 teachers. The analysis of the results concerned two factors: teacher competency, and perceptions of the effectiveness of gifted learner programs. The results showed generally positive attitudes toward gifted education, and more specifically teachers showed positive perceptions toward their competency to teach gifted students, while they mostly held negative perceptions regarding the effectiveness of gifted programs. In addition, teaching level (cycle 1, cycle 2, cycle 3) impacted teacher perceptions regarding their competency to teach gifted students and the applied gifted programs in their schools. However, a broader study not limited to Al Ain city teachers would provide results that are more informative.

### Keywords:

giftedness, teachers' perceptions, teacher training, self-efficacy beliefs, special education, professional development

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## Introduction

The importance of gifted education has increased in rapidly developing countries. Gifted and talented persons are important for economic investment and nurturing their country's human resources. Consequently, attention to the quality of gifted education has increased globally, including in the United Arab Emirates (henceforth, UAE), where gifted education programs have recently been introduced in schools. Many factors contribute to the success of such programs, but current international research suggests that teachers' perceptions and knowledge of gifted and talented students is a key factor (Clark, 2008). This factor is crucial, given the great influence that teachers can have on a gifted student's education. In the UAE, however, little is known about the success of the government initiative regarding gifted education, and it seems that there is a lack of research not only on teacher perceptions and knowledge of gifted students, but also on these points in the subject of mathematics, specifically.

The UAE is making great strides in education reform, the intent of which is to ensure that all students, including gifted students, maximize their potential (Donerlson, 2008). Many gifted students are at risk of underachieving in the absence of an appropriate curriculum to challenge and capitalize on their abilities (Al-Oweidi, 2019). However, it is not simply a teacher's ability in a subject area which influences student learning, as other factors also come into play, such as teachers' perceptions; these views clearly influence classroom interaction, teaching and, subsequently, learning (Troxclair, 2013). Despite the importance of meeting the needs of gifted and talented students, regular classroom teachers often lack appropriate training in this regard (NAGC, 2015). For this reason, it is helpful to conduct empirical and descriptive studies on gifted students' education as it relates to teacher attitudes and knowledge in the UAE, as these can contribute to the success of its gifted programs. The current study thus describes the perceptions of math teachers toward gifted and talented students, producing a descriptive analysis of teacher perceptions; this in turn permits the creation of a solid framework for the examination of the authenticity of the learning for the gifted and talented. Furthermore, teacher competency and the efficiency of gifted programs will be explored.

The importance of the study stems from the fact that gaining insight into teacher perceptions is useful for determining the action required to improve gifted education. For example, these results will influence training needs and professional development for math teachers in the UAE, and potentially change how these gifted programs are improved in future. The study also has the potential to enrich the literature on math teacher perceptions and knowledge regarding gifted education outside the UAE.

## Literature Review

### The Key Role of the Teacher in Gifted Student Education

Opinions differ on the definition of giftedness. According to Freeman (2005), there are more than one hundred definitions, including many abilities based on developments in cognitive science and psychological research (Galitis, 2009). Theories in education and psychology have clearly shown that the development of gifted students can be affected by teacher attitudes and knowledge (Clark, 2008). Davis and Rimm (2004) asserted that the first question to be asked when developing a gifted education program should be, "What is our attitude toward gifted pupils?" (p.55). Accordingly, assessing the attitudes of regular education teachers and gifted programs is considered important for improving the quality of gifted education (Kunt & Tortop, 2017). In this study, the focus is on two main perceptions: teacher competency in teaching gifted and talented students, and perceptions toward gifted and talented education programs.

### Teacher Competency

Most teachers of gifted students in regular classes are content-based and specialized; few are gifted teachers. Pfeiffer (2003) compared regular and gifted teachers' knowledge regarding gifted education, and his results revealed differences in educational practices for gifted students due to a lack of teacher knowledge, training, and awareness of gifted students' needs. Similarly, Tomlinson (1995) found that gifted students receive little attention from regular teachers due to large teacher workload and lack of knowledge about differentiation (1995). In another study which compared trained and untrained teachers of gifted students, the former were found to be more responsive to the cognitive needs of the gifted, more engaged in pedagogical strategies that encouraged high-level thinking, more supportive of independent learning, and more creative in their use of ideas (Hansen & Feldhusen, 1994).

The National Association for Gifted Children (NAGC) and the Council for Exceptional Children (CEC) (2008) in the USA published ten standards (NAGC-CEC) for teacher preparation that employ a cohesive implementation strategy to define teacher knowledge of gifted students and gifted education. Both gifted and regular teachers need to understand these standards, as the most gifted students receive special instruction together in heterogeneous classrooms using the same curriculum structure and class environment (Chipego, 2004). In the same vein, VanTassel-Baska and Johnsen (2007) asserted the need to define the essential knowledge and skills required to teach gifted and talented students effectively, to aid the preparation of teacher training programs.

### Teacher Attitudes towards Gifted Education

One influential factor on teacher classroom behavior is perceptions (Bain et al., 2007), as teachers with positive attitudes tend to create a supportive environment to meet the needs of gifted students (Whitmore, 1986; Morris, 1987). Lens and Rand

(2002) also noted that the academic achievement of gifted students requires teacher support. Nevertheless, although gifted students can be affected by a teacher's negative attitude, potentially losing their motivation to excel (Curtis, 2005), Jacobs (1972) asserts that teachers tend to encourage attitudes in their students that are like their own; that is, if a teacher's attitude is favorable/unfavorable to gifted students, a subtle positive/negative transfer can respectively occur. In addition, teacher attitudes toward gifted students also have a direct effect on educational programs for gifted students and, as Davis and Rimm (2004) mentioned, teacher attitude is significant when developing gifted programs. However, Bain et al. (2007) contend that little is known about teacher perceptions toward gifted students and gifted education.

Allodi and Rydelius (2008) investigated 243 pre-service teacher attitudes toward gifted students using the "Opinions about the Gifted and their Education Questionnaire" developed by Gagné and Nadeau. Results revealed generally positive attitudes toward the needs of gifted children. Similar results were indicated by Watts (2006) with the same questionnaire. Watts (2006) randomly surveyed 25 teachers in urban New Zealand, and found very positive attitudes regarding the needs of, and support for, gifted learners. It was also found that the teachers believed a specific provision should be developed to meet the needs of gifted students. Based on previous literature, it is apparent that an in-depth study is needed regarding how mathematics teachers perceive gifted learners according to different teaching levels. Thus, our study bridges this gap by focusing on the following research questions:

- What are the perceptions of math teachers toward gifted and talented students' education in the UAE?
- Are there any statistical differences in the mean of teacher perceptions regarding their teaching levels (cycle 1, cycle 2, cycle 3)?
- What is the impact of the teachers' level (cycle 1, cycle 2, cycle 3) on their perceptions toward gifted education (i.e. their competency to teach gifted students, and the effectiveness of the gifted programs in their schools)?

## Method

### Research Design

The study used the quantitative approach to measure mathematics teachers' perceptions to teaching gifted learners in general education classrooms in the UAE. The data were collected using a bespoke survey consisting of 19 statements on a 5-point Likert scale. This survey model was used because it has the capacity to generate a large amount of data on perceptions, attitudes, and opinions from hundreds of respondents with few resource issues.

## Participants

The sample consisted of 66 Al Ain mathematics teachers in the UAE, 42 (63.7%) of whom taught gifted students, and 24 (36.3%) did not. In addition, 43 (64.2%) were males, and 23 (34.8%) females. The participants belonged to three cycles: 16 from cycle 1, 18 from cycle 2, and 32 from cycle 3. Regarding educational level, all participants had at least a bachelor's degree ( $n=47$ , 71.2%), and 19 (28.8%) had a master's degree. Regarding teaching experience, 53 teachers (80.3%) had more than ten years' experience, while the remaining 13 (19.7%) had 5–10 years.

## Study Instrument

The survey in this study was developed after a thorough review of the existing literature on teachers' perceptions of teaching gifted and talented students. Following a pilot with an exploratory sample of 16 teachers (who did not participate in the main study), modifications of some items were made. To ensure the validity of the survey, six faculty members specializing in gifted education and mathematics education were asked to check the relevance of the instrument to the study. Additionally, the survey was given to eight specialists, namely mathematics teachers and supervisors, for review and comments. Based on collected feedback, further modifications were performed, such as item rewording. Additionally, using Cronbach's Alpha, the reliability of the instrument was found to be 0.93, indicating high reliability. The final draft consisted of:

- Demographic information about the respondents: gender, years of teaching experience, level of education (bachelor, master, other), and whether the teacher was teaching gifted students;
- Teachers' perceptions as measured using two scales: (1) competency to teach gifted and talented students scale (nine items); (2) teaching gifted and talented students (ten items). The survey used a 5-point Likert-type scale for every item, to indicate agreement or disagreement with the statement, from 1=strongly disagree and 5=strongly agree (cf. Altakhaineh & Alnamer, 2018);
- An open-ended question about facilitators and challenges in teaching gifted and talented students in participant schools (cf. Holloway & Wheeler, 2010), to allow participants to express any other ideas not covered by the items. The teachers reflected on their present reality in school to give the researchers more insight about their perceptions (Ismail & Jarrah, 2019).

## Procedure

The survey was administered to the mathematics teachers using two methods: paper-and-pencil and online using Survey Monkey. Participation was voluntary, and no payments or other concessions were made.

**Data Analysis**

For the data collection and analysis, mean scores were used rather than total scores, a choice supported by Gagné (1991). In accordance with Gagné (1991), mean scores were categorized as follows: a mean score ranging from 4–5 points was classified as highly positive; 3.24–3.9 was positive; 2.75–3.25 was ambivalent; and 2–2.74 was classed as negative. Lastly, a mean score of less than two was considered highly negative.

**Results**

The views of the mathematics teachers in this study were contradictory. Participants held positive views toward their competency to teach gifted learners, but generally held negative perceptions toward the application of gifted programs in schools. The mean scores and range for each of the 19 items from the survey are listed in Table 1 below.

**Table 1.**

*Assessing Perceptions of Math Teachers Toward Gifted (n =66)*

<i>Items Grouped According to Scales</i>	<i>Range</i>	<i>m</i>	<i>Rating</i>
<b><i>Scale One: Teachers' perceptions toward their competency to teach gifted and talented students</i></b>			
1- I have a broad, general knowledge of the nature and needs of the gifted and talented students	2-5	3.60	P
2- I am familiar with the identification process of the gifted	1-5	4.04	HP
3- I can individualize learning and teaching for gifted and talented students	1-5	3.77	P
4- I can develop specific materials to be used with gifted and talented students	2-5	3.75	P
5- I can support any new teacher regarding gifted and talented students	1-5	3.60	P
6- I can modify the curriculum to make it inclusive for students who are gifted and talented	1-5	3.78	P
7- I am able to use different teaching techniques for gifted and talented students	2-5	4.16	HP
8- I need more training to be able to teach gifted and talented students	2-5	4.09	HP
9- I am qualified to teach gifted and talented students	2-5	3.80	P
<b><i>Scale Two: Teachers' perceptions about the effectiveness of the applied programs for gifted and talented students in general classrooms</i></b>			
1- My school is applying a program that meets the needs of gifted and talented students	1-5	3.01	A
2- My school provides professional development	2-5	3.31	P

to support me in teaching gifted and talented students			
3- Having a gifted student in my classroom makes me feel very nervous	1-5	2.65	N
4- Teaching gifted and talented students in regular classes is a waste of their time	1-5	3.39	P
5- I am satisfied about gifted program activities in my school for gifted students	1-5	3.03	A
6- I should possess advanced understanding to accelerate gifted students beyond the typical curriculum areas	1-5	4.04	HP
7- I have enough resources to teach gifted and talented students	1-5	2.68	N
8- My school administrators support the development of gifted learners as much as they care about other learners	1-5	3.36	P
9- I have enough time to prepare for teaching gifted and talented students	1-4	2.48	N
10- Classroom management skills are important for teaching gifted and talented students	2-5	4.34	HP

Notes. HP=High positive (mean score: 4–5); P=positive (mean score: 3.9–3.24); A=ambivalent (mean score: 3.25–2.75); N=negative (mean score: 2.74–2); HN=high negative (mean score: less than 2)

One-way multivariate analysis of variance (one-way MANOVA) was used to compare the means of the teachers' competency perceptions concerning teaching gifted students, and their perceptions toward gifted programs in their schools in regard to their teaching level (cycle 1, cycle 2, cycle 3). The descriptive statistics are shown in Table 2 as follows.

**Table 2.**

*Descriptive Statistics of Teachers' Perceptions in Regard to Teaching Level*

		Teaching Level	Mean	Std. Deviation	N
Perceptions toward teacher competency		Cycle 1	3.7037	.49524	6
		Cycle 2	3.4583	.73328	8
		Cycle 3	3.9295	.42837	52
		Total	3.8519	.49665	66
Perceptions toward gifted		Cycle 1	3.3667	.51640	6
		Cycle 2	2.8125	.23566	8
		Cycle 3	3.2827	.40619	52
		Total	3.2333	.42583	66

Table 3 demonstrates that there was a statistically significant difference in teachers' perceptions of their competency and the gifted programs, based on the teachers' level of teaching.  $F(4, 124) = 3.80, p < .05$ ; Wilk's  $\Lambda = 0.794$ , partial  $\eta^2 = .11$ .

Therefore, we can conclude that teacher perceptions are significantly dependent on their teaching cycle level.

**Table 3.**

*Multivariate Tests<sup>a</sup> of Teaching Level on Teachers' Perceptions*

Effect		Value	Hypothesis df	Error df	Sig.	Partial Squared	Noncent. Parameter	Observed Power <sup>d</sup>
Teaching level	Pillai's Trace	.210	3.70	4.000	.007	.105	14.821	.874
	Wilks' Lambda	.794	3.79	4.000	.006	.109	15.162	.882
	Hotelling's Trace	.254	3.87	4.000	.005	.113	15.486	.889
	Roy's Largest Root	.229	7.22	2.000	.001	.187	14.451	.924
			5 <sup>c</sup>		0	1		

Table 4 shows that the level of teaching had a statistically significant effect on both teacher perceptions toward their competency ( $F(2, 63) = 3.70; p < .05$ ; partial  $\eta^2 = .105$ ), and toward gifted programs applied in schools ( $F(2, 63) = 5.13; p < .05$ ; partial  $\eta^2 = .140$ ).

**Table 4.**

*Tests of Between-Subjects Effects*

Source	Dependent Variable	Type III Sum of Squares	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power <sup>c</sup>
Teaching level	Perceptions toward teacher competency	1.684	2.842	3.697	.030	.105	7.394	.659
	Perceptions toward gifted	1.650	2.825	5.128	.009	.140	10.256	.806

The Post Hoc in Table 5 below shows that mean perceptions of teacher competency were statistically significantly different between cycle 2 ( $M = 3.46$ ) and cycle 3 teachers ( $3.93, p < .05$ ), indicating that the latter held more positive perspectives. However, the perceptions of both these cycles lie in the positive area ( $3.24-3.90$ ), unlike between cycle 1 and cycle 2 teachers ( $p = .610$ ), and cycle 1 and



cycle 3 ( $p=.519$ ). Perceptions for the effectiveness of programs for the gifted were statistically significantly different between cycle 1 ( $M=3.37$ ) and cycle 2 teachers ( $M=2.81$ ) ( $p<.05$ ), and between cycle 2 ( $M=2.81$ ) and cycle 3 ( $M=3.28$ ) ( $p<.05$ ), but not between cycle 1 and cycle 3 teachers ( $p=.878$ ). This indicates that cycle 1 and 3 teachers held positive perceptions, while cycle 2 teachers held ambivalent perceptions.

**Table 5.**

*Multiple Comparisons Between Teaching Levels (Cycle 1, Cycle 2, and Cycle 3)*

Tukey HSD

Dependent Variable	(I) Teaching Level	(J) Teaching Level	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Perceptions toward teacher competency	Cycle 1	Cycle 2	.2454	.2577	.6	-.3733	.8640
		Cycle 3	-.2258	.2057	.5	-.7197	.2681
	Cycle 2	Cycle 1	-.2454	.2577	.6	-.8640	.3733
		Cycle 3	-.4712*	.1812	.0	-.9062	-.0361
	Cycle 3	Cycle 1	.2258	.2057	.5	-.2681	.7197
		Cycle 2	.4712*	.1812	.0	.0361	.9062
Perceptions toward gifted	Cycle 1	Cycle 2	.5542*	.2166	.0	.0342	1.0741
		Cycle 3	.0840	.1729	.8	-.3312	.4991
	Cycle 2	Cycle 1	-.5542*	.2166	.0	-	-.0342
		Cycle 3	-.4702*	.1523	.0	-.8358	-.1045
	Cycle 3	Cycle 1	-.0840	.1729	.8	-.4991	.3312
		Cycle 2	.4702*	.1523	.0	.1045	.8358

Based on observed means

The error term is Mean Square Error = .161.

\*. The mean difference is significant at the .05 level.

## Discussion

In light of the important role of teachers in identifying and nurturing gifted students, this study aimed to investigate the perceptions of mathematics teachers regarding their competency to teach gifted students, and the effectiveness of gifted programs

applied in schools. Teachers in this study conveyed positive perspectives. The findings of this study are similar to the general findings of previous studies (Allodi & Rydelius, 2008; Watts, 2006). Additionally, this study's participants generally indicated positive perspectives on the teacher competency scale, while their perceptions toward applied gifted programs in schools were negative. At first glance, one can see that teachers were satisfied with their competency to teach gifted students, but were not so with the efficiency of applied gifted programs.

Contradictory teacher perceptions were clearly illustrated by the findings. For example, teachers in this study had highly positive perceptions of the following items: "I am familiar with the gifted identification process" ( $M=4.01$ ), and "I am able to use different teaching techniques for gifted and talented students" ( $M=4.1$ ). However, the same teachers reported that, "I need more training to be able to teach gifted and talented students" ( $M=4.09$ ). The highly positive mean of this item indicated contradictory views to other items, because if participants showed highly positive or positive perceptions of their competency, then it is surprising that they support the perception that they needed training.

Additionally, problematic perceptions were illustrated for the item "Teaching gifted and talented students in regular classes is a waste of their time" ( $M=3.39$ ), indicating a rejection of gifted students in regular classes and a direct questioning of the effectiveness of the applied gifted programs. This is also supported by the teachers' negative perceptions, such as: "Having a gifted student in my classroom makes me feel very nervous" ( $M=2.65$ ); "I have enough resources to teach gifted and talented students" ( $M=2.68$ ); and, "I have enough time to prepare for teaching gifted and talented students" ( $M=2.48$ ). Moreover, participants reported ambivalent perceptions for the following items regarding gifted program effectiveness: "My school is applying a program that meets the needs of gifted and talented students" ( $M= 3.01$ ) and "I'm satisfied about gifted program activities in my school for gifted students." ( $M=3.03$ ). Overall, this indicates a lack of support for the programs in the participant schools.

More specifically, the results showed that mean perceptions of teacher competency were significantly different only between cycle 2 and cycle 3; cycle 3 teachers showed more positive perceptions. Perceptions about the effectiveness of the gifted programs were statistically significantly different between cycle 1 and cycle 2, and cycle 2 and cycle 3. This indicates that cycle 1 and cycle 3 teachers hold positive perceptions, while cycle 2 teachers hold ambivalent perceptions. Examining the teacher qualifications, it can be seen that cycle 2 participants all held master degrees, which could explain the reason why effectiveness and accountability were perceived differently.

This finding concurs with Troxclair (2013), who stated that although feelings and behaviors are personal to individuals, they can be affected by the knowledge and information gained through experience. Therefore, we recommend providing

teachers with knowledge and professional development, which can become part of their cognitive belief system, and help prepare them to use their training in classes. This will simultaneously influence their perceptions and qualify them appropriately.

### Conclusion and Recommendations

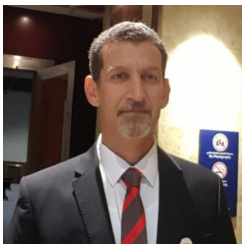
This quantitative study aimed to describe and analyze teacher perceptions toward teaching gifted learners in general education classrooms in the UAE. The study was conducted among 66 mathematics teachers using a five-point Likert scale questionnaire with 19 statements. Collected data about teachers' perceptions was analyzed based on teachers' competency and perceptions about the effectiveness of the applied programs for gifted learners. The results showed general positive attitudes toward gifted education. Specifically, the results show that although teachers reported positive perceptions toward their competency to teach gifted students, they reported negative perceptions regarding the effectiveness of the gifted programs applied in their schools.

Drawing on these results, the study recommends that mathematics teachers be provided with professional development that becomes part of their cognitive belief system and prepares them to use their training in classes. This would influence their perceptions and qualify them at the same time. Finally, future research exploring innovative teaching strategies tailored toward gifted and talented students in mathematics classrooms is needed.

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