

Article

Comprehensive Talent Profile of Students in the United Arab Emirates: A Baseline Nationwide Giftedness Identification Study

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Abstract

Gifted education is gaining traction in many non-Western contexts, including the United Arab Emirates (UAE), which has developed many policies to develop giftedness. However, the identification of giftedness relies heavily on instruments developed in Western contexts, which have the potential to derail efforts toward promoting gifted education in the UAE. This study aimed to present data on 999 grade 4 to 12 students who completed the UAE's national gifted identification test, known as the Hamdan Gifted test. Guided by the Cattell–Horn–Carroll theory, this study reports data on ability tests (verbal ability, nonverbal ability and preknowledge of mathematics and science) completed by students across the UAE between 2018 and 2023. The results revealed that 53% of the participants demonstrated superior ability in science, whereas 19% reported superior ability in mathematics. The percentage of students who demonstrated superior ability in other domains was as follows: verbal ability (52%; word crossing), verbal ability (14; true/false) and nonverbal ability (29%). The study concludes with recommendations for teacher development to enhance the teaching of mathematics to gifted students in schools in the UAE and beyond.

Keywords: giftedness; talent development; culture; assessment; United Arab Emirates

1. Introduction

Globally, there is a consensus that gifted education is essential for promoting national development (Alodat, 2025). Giftedness and talent are polytomous concepts that have been defined differently by educators (Stack et al., 2016). In some situations, giftedness and talent are used interchangeably (Kaufman & Sternberg, 2008). In some situations, talent is operationalized as a domain of giftedness (e.g., Callahan et al., 1995; Fox, 1981; Nijs et al., 2014). However, the study reported here was guided by Gagné's (2009) conception of giftedness and talent. Giftedness was defined as a natural ability in more than one domain, whereas talent was defined as the ability to perfect a given skill in at least one field of human endeavor (Gagné, 2009; Gallardo-Gallardo, 2018; Kaufman & Sternberg, 2008). Thus, ongoing research is trying to develop a comprehensive understanding of gifted education and the best way to advance the teaching and learning of gifted and talented students (Betts & Kercher, 2023; McKoy & Merry, 2023; Rowley, 2008).



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It is estimated that individuals identified as gifted and talented are among 10% of their peers (Košir et al., 2016). Nevertheless, contemporary discussions in the field of gifted education have moved away from the narrow conception of giftedness and talent to talent development. According to some scholars (See Gagné, 2009; Piirto, 2021), an individual's possible gifts or talents would remain as potential if there are no programs to advance their skills. Natural abilities are believed to be raw materials that require further development to advance the talents of the individual. According to Amushila and Bussin (2021), an individual cannot claim that he or she is talented if he or she does not possess natural abilities. Within a given educational context, there should be a deliberate plan to develop the talents exhibited by both giftedness and talent to ensure that individuals in society are maximizing their potential. Going forward, it is important for educators to have a system in place to identify gifted and talented students and place them in appropriate talent development programs.

One of the most widely used tests to identify students who are gifted is the IQ test, such as the Stanford Binet and Weschler tests (Asensio et al., 2023; Erden et al., 2022; Shuttleworth-Edwards, 2016). IQ tests measure individuals' cognitive abilities in the areas of verbal ability, processing speed, verbal skills, and perceptual and working memory (Madrid-Rísquez et al., 2025; Pezzuti et al., 2022). There is no doubt that the IQ test has some benefits, such as the ability to differentiate between learners and its ability to predict, to produce objective outcomes, to be useful in identifying twice exceptional learners and to produce results of strength and weakness among students (Trail, 2022). However, the use of IQ tests is not without criticism. According to Breit et al. (2024), the IQ test mainly measures giftedness within the context of cognitive ability only. This narrowly excludes students who are gifted in domains such as creativity (Breit et al., 2024).

A major criticism of the IQ test is its inability to measure giftedness among students from cultural backgrounds (Holden & Tanenbaum, 2023; Sattler, 2008; Shuttleworth-Edwards, 2016). IQ tests were originally developed in English (Laher & Cockcroft, 2017). Compared with their counterparts whose first language is not English, native speakers of English have advanced scores. In countries such as the U.S., it has been argued that children from white backgrounds are usually overrepresented in gifted homes compared with those from cultural backgrounds such as those of black and Latin backgrounds (Berg, 2024). Moreover, in many cultural backgrounds, giftedness goes beyond one's cognitive ability. There are situations where individuals who can solve problems, manage their homes and have entrepreneurial skills are deemed to be gifted (Shavinina, 2009). However, these exceptional abilities are not covered in the IQ test. There is potential for many gifted students to be excluded from gifted programs (Shuttleworth-Edwards, 2016).

While there is obvious bias associated with the IQ tests, many non-Western countries continue to translate IQ tests into their first language and implement them accordingly (Shuttleworth-Edwards, 2016). Many non-Western countries have acknowledged the importance of gifted education for advancing national development (AlGhawi, 2017). Consistently, it has been argued that gifted students are able to develop innovative measures to address national concerns or priority areas of development (Wai & Lovett, 2021). There is national interest in the early identification of students who could contribute to national development (AlGhawi, 2017). However, in Arab countries such as Saudi Arabia and the UAE, IQ tests are frequently used by educators and psychologists to identify students who possess high abilities.

Giftedness is socially constructed; thus, it is essential that countries develop culturally relevant assessment tests that can be used to identify gifted and talented students. Consequently, in the UAE, the national IQ test, which was developed as part of the Hamdan bin Rashid Al Maktoum Foundation for Medical and Educational Sciences, developed

a gifted tool kit that could be used to screen and identify giftedness. The first stage of the development of the toolkit involved the development of a screening tool called the Hamdan Intelligence Scale, which could be completed by students. Students respond to 28 figures. Students are required to look at the first two figures and then follow their pattern in completing the remaining figures. This portion of the test helps to differentiate between students on the basis of their abilities in three areas: verbal, nonverbal and knowledge of mathematics and science. The results of the current study are important because they can help teacher educators understand the multiple types of intelligence possessed by students within a given context. Educators can develop in-depth insight into the strengths and weaknesses of students on the basis of the contextual gifted identification framework. The goal of this study was to develop insight into the learning profiles of students on the basis of the UAE gifted identification test.

1.1. Theoretical Framework

The current study was guided by the Cattell–Horn–Carroll (CHC) theory, which was conceptualized on the basis of the seminal works of Raymond Cattell, John Horn and John Carroll (Alfonso et al., 2005; Horn, 1991; McGrew, 1997; Schneider & McGrew, 2012). Specifically, CHC theory combines Horn–Cattell fluid theory and crystallization theory as well as Carroll’s three-stratum theory. The theory focuses on how various abilities are arranged. According to CHC theory, intelligence is multifaceted and organized on the basis of strata of diverse cognitive abilities. The strata are also differentiated by varying degrees of referent generality, which refers to the degree of mental ability to which a given construct relates and the extent to which it relates. The first stratum (III) is the psychometric property of a given measure. The second stratum (II) is made up of eight or more types of cognitive ability, which encompass fluid reasoning, comprehension, and working memory tests. The third stratum encapsulates at least 80 narrow tests, such as spatial, phonetics and identification of sound patterns.

Although most ability tests are developed on the basis of CHC theory, the actual test measures at most five of the cognitive ability tests within stratum II. A notable example is the Wechsler test IV, which was developed on the basis of CHC theory. However, it measures the following five domains: fluid reasoning, working memory, comprehension, visual spatial ability and speed processing. The domains of the Wechsler test are believed to be appropriate because, in the implementation of a cognitive test, it is essential for psychologists or educators to implement additional tests measuring at least one or more abilities in the second stratum. Schools in the UAE widely use Western IQ tests such as Wechsler, a contextual instrument that can help identify students on the basis of realities in society.

Following this, the Hamdan bin Rashid Al Maktoum Foundation for Medical and Educational Sciences developed the UAE’s national IQ tests. The tests were developed by experts who are involved in promoting the development of gifted education in the Arab world. In line with the broad conception of giftedness, the HGT is composed of three broad categories: achievement, ability and resources. However, in this study, the outcomes of the students’ ability tests were analyzed. The students’ ability test is composed of three domains: verbal ability, nonverbal ability and preknowledge in mathematics and science.

1.2. Factors Impacting the Identification of Gifted Students

Studies exploring the factors that impact the identification of gifted students in the UAE are lacking. Elsewhere, some studies have explored the factors influencing the identification of gifted students (Beumann et al., 2025; Brown et al., 2005; Elhoweris, 2008; García-Perales et al., 2024; Grissom et al., 2017; Hamilton et al., 2018; Lee et al., 2023; Mc-

Coach et al., 2001; Panov, 2002; Parekh et al., 2018; Ricciardi et al., 2020; Sarouphim & Maker, 2010; Segev & Cahan, 2014; Siegle et al., 2010). The literature shows that a number of factors influence the identification of gifted students (Elhoweris, 2008; García-Perales et al., 2024; Grissom et al., 2017; Hamilton et al., 2018; Parekh et al., 2018; Ricciardi et al., 2020; Sarouphim & Maker, 2010; Segev & Cahan, 2014; Siegle et al., 2010). For instance, teachers' sociodemographic characteristics and the type of school have been found to influence the identification of gifted students. In Spain, a study was conducted by García-Perales et al. (2024) among 457 teacher-nominated possible gifted students in selected primary and secondary schools. The number of teachers was also 359. This study sought to identify the characteristics of teachers that influence the identification of gifted students. Female teachers and teachers from private schools were found to be more generous in their ratings of students' giftedness, even after student IQ was controlled.

The results concerning the influence of students' gender on the identification of gifted students are mixed. For instance, a study by Sarouphim and Maker (2010) in Ohio, USA, revealed no significant differences in gender with respect to the identification of gifted students. These findings contradict those of a meta-analysis performed by Petersen (2013), which revealed that boys were more likely to be identified as gifted than girls were. Additionally, compared with preadolescent girls, preadolescent boys were slightly more likely to be identified as gifted. In Canada, it was reported that male students whose parents had high occupational statuses had higher odds of being identified as gifted (See Parekh et al., 2018). Moreover, little has been done on the influence of age on the identification of gifted students. However, the available studies reveal contradictory findings. A notable study is that of Segev and Cahan (2014). This quantitative study was conducted among Israeli third graders of legal age who were enrolled in a gifted program. The study revealed that older students were 3.5 times more likely to be accepted for the gifted program than younger students. These findings contradict those of Siegle et al. (2010), who reported that teachers were more likely to identify younger students than older students.

Socioeconomic factors influence the identification of gifted students (Elhoweris, 2008; Grissom et al., 2017; Hamilton et al., 2018). Teachers are biased in regard to the identification of gifted students. This was reported in a quantitative study by Elhoweris (2008) among 207 American elementary school teachers. The results of this study revealed that compared with teachers with lower socioeconomic backgrounds, teachers with higher socioeconomic backgrounds preferred to select students with higher socioeconomic backgrounds for gifted programs. Another study in America revealed that students from poor economic backgrounds are less likely to be identified for gifted services, even after their prior math and reading achievements are considered. The study also revealed that poor schools in districts had lower giftedness identification rates (Hamilton et al., 2018). Additionally, students with high socioeconomic status are more likely to receive gifted services than students with low socioeconomic status (Grissom et al., 2017; Hamilton et al., 2018).

1.3. Contextualization

The UAE is an Arab country located in western Asia. The country is made up of seven states (locally referred to as emirates): Abu Dhabi, Ajman, Dubai, Fujairah, Ras Al Khaimah, Sharjah and Umm Al Quwain (Ulrichsen, 2016). The UAE is an advanced high-income society with oil and gas as the mainstay of the national economy. However, contemporary national leadership has invested in diversifying the economy, with significant investment made in the service industry.

The government of the UAE is interested in developing a sustainable society where everyone can contribute to national development. Consequently, many educational policies

have been developed to ensure national development. Within such discourse, gifted education is gaining traction in the UAE. The government has demonstrated commitment and supported organizations that are interested in the development of gifted education. One such organization is the Hamdan bin Rashid Al Maktoum Foundation for Medical and Educational Science, which is a major player in the promotion of gifted education in the UAE. One of the core goals of this organization is to identify gifted students and place them in appropriate gifted programs. Organizations have diverse programs, such as talent discovery programs, intended to support gifted students in working on groundbreaking projects. However, before students can join such programs, they are supposed to complete a test to determine whether they have a gift. Specifically, they developed the Hamdan Gifted Test (HGT), which is used to identify and place students in gifted programs tailored to suit their needs. The current study assessed students' performance on the ability test, which is composed of four domains: verbal ability, nonverbal ability, and preknowledge in mathematics and science. The following research questions guided the current study:

1. What is the ability level of students (verbal ability, nonverbal ability, and preknowledge in mathematics and science) who completed HGT in the UAE?
2. Which student-related variable (e.g., gender) influences the ability level of students (verbal ability, nonverbal ability, and preknowledge in mathematics and science) who completed the HGT in the UAE?

2. Materials and Methods

2.1. Study Participants

The participants of this study were grade 4 to 12 students who expressed interest in undertaking the gifted assessments. The HTS was developed for grade 4–12 students; thus, open invitations were given to all the students across the country. For a student to perform the assessment, either their parents or school would submit a formal nomination application (<https://ha.ae/en/programs/hamdan-centre-for-giftedness-and-innovation>) (accessed on 29 September 2025). Following this, the Hamdan Foundation would consider the application and then invite the student to complete the HGT.

In this study, data generated from students who completed the test between 2018 and 2023 were included. Overall, a total of 999 students completed the ability tests. Table 1 summarizes the demographic profiles of the students who participated in this study.

Table 1. Demographic characteristics of the participants.

	Frequency (N = 999)	Percentage
Gender		
Male	317	32%
Female	682	68%
Language of test		
Arabic	582	58%
English	417	42%
School type		
Public school	590	59%
Private school	409	41%
Location of children		
Abu Dhabi	239	24%
Ajman	47	5%
Dubai	254	25%

Table 1. *Cont.*

	Frequency (N = 999)	Percentage
Fujairah	88	9%
Ras Al Khaimah	48	5%
Sharjah	219	22%
Umm Al Quwain	104	10%
Grades		
Grade 4	158	16%
Grade 5	101	10%
Grade 6	85	9%
Grade 7	98	10%
Grade 8	138	14%
Grade 9	139	14%
Grade 10	184	18%
Grade 11	78	8%
Grade 12	18	2%

2.2. Instrument

HGT was developed to help identify and place students across the UAE in appropriate programs. The students' ability test is composed of three domains: verbal ability, nonverbal ability and preknowledge in mathematics and science. Verbal ability measures vocabulary, grammar and reading comprehension, whereas nonverbal ability measures students' ability to use, interpret and analyze visual information. Preknowledge of mathematics and science measures students' prior knowledge of mathematics and science. Each of the domains is made up of 10 questions.

The performance of the students was graded out of 100%. For the purpose of this study, the performance of the students on the test was interpreted as follows: borderline (0–49), below average (50–69), average (71–75), high average (76–89), high ability (90–96) and superior ability (at least 97).

2.3. Procedure

The study and its protocols were approved by the Hamdan bin Rashid Al Maktoum Foundation for Medical and Educational Sciences. Following this, information statements about the tests were shared with schools and advertised on various social media platforms. Schools and parents who deemed their children to be gifted were encouraged to complete the nomination form. Following this, formal invitations were given to the students to complete the test online. The students were asked to complete the test in their preferred language, that is, Arabic or English. In the information statement shared, it was noted that the identifiable information of the student would be shared when the data were analyzed. Moreover, the data would be made accessible to people who are affiliated with the Hamdan bin Rashid Al Maktoum Foundation for Medical and Educational Sciences.

2.4. Data Analysis

The data were analyzed using SPSS version 29. Following the completion of the tests, the system-generated data were exported to Microsoft Excel for cleaning before further importation to SPSS for analysis. Following this, the data were not normally distributed and thus appropriate for nonparametric analysis.

For research Question 1, frequency counts and estimated percentages were used to understand the performance of students across the various categories. The Friedman test was subsequently computed to assess the differences between test scores. Moreover,

for research question 2, a chi-square test of independence was conducted to explore the association between demographic variables and the test outcome.

3. Results

3.1. Level of Students' Ability

The test was divided into four domains: verbal ability, nonverbal ability, and pre-knowledge in mathematics and science (see Tables 2–6 and Tables A1–A6 in Appendix A).

Table 2. Students' performance on verbal ability (word crossing).

	Frequency (999)	Percentage
Borderline	98	10%
Below Average	61	6%
Average	47	5%
High average	121	12%
High Ability	153	15%
Superior ability	519	52%

Table 3. Students' performance on verbal ability (true/false).

	Frequency	Percentage
High Ability	590	59%
Superior ability	409	41%

Table 4. Students' performance on nonverbal ability.

	Frequency (999)	Percentage
Borderline	107	11%
Below Average	86	9%
Average	73	7%
High average	164	16%
High Ability	283	28%
Superior ability	286	29%

Table 5. Students' performance in mathematics.

	Frequency (999)	Percentage
Borderline	324	32%
Below Average	129	13%
Average	77	8%
High average	126	13%
High Ability	149	15%
Superior ability	194	19%

Table 6. Performance of students in science.

	Frequency (999)	Percentage
Borderline	81	8%
Below Average	71	7%
Average	48	5%
High average	89	9%
High Ability	185	19%
Superior ability	525	53%

3.2. Verbal and Nonverbal Ability

First, verbal ability is divided into two main parts: word crossing and true/false ability (see Tables 2 and 3, respectively). In relation to word crossing, 52% were in the superior ability category, whereas 6% were below average. Moreover, in relation to true/false ability, the grades were distributed into two categories: high ability (59%) and superior ability (41%).

With respect to nonverbal ability, compared with 7% who had average grades, 29% achieved superior ability scores. Moreover, 28% of the participants had high ability grades, and 11% had borderline grades. Table 4 summarizes students' achievement in nonverbal ability domains.

3.3. Preknowledge and Mathematics and Science

Tables 5 and 6 summarize the attainment of students' knowledge of mathematics and science. In relation to mathematics, 32% of the participants had a borderline grade, whereas 8% had an average grade. Moreover, 19% had superior ability grades, whereas 15% achieved high ability grades (see Table 5).

With respect to science, 53% of the respondents reported attaining superior ability grades, whereas 7% reported being below the average grade. Additionally, 19% had high ability, whereas 8% had borderline ability (see Table 6 for more details).

3.4. Differences Between Test Scores

The results of the Friedman test indicated a statistically significant difference in ability across the four domains, $\chi^2(4, 999) = 749.55, p = 0.001$. Inspection of the median scores revealed scores for verbal (cross words) and science knowledge ($Md = 6.00$), as well as verbal ability (true/false) and nonverbal ability ($Md = 5.00$). The lowest median score was reported for mathematics knowledge ($Md = 3.00$).

3.5. Distribution of Results Across Participants

Chi-square tests for independence were computed to explore the association between the demographics and the verbal ability of the students (cross words).

3.6. Verbal Ability (Cross Words)

First, the results revealed an association between gender and verbal ability (cross words), $\chi^2(5, n = 999) = 19.20, p = 0.002, \phi = 0.13$. Moreover, there was an association between the location of the participants' school and verbal ability (cross words), $\chi^2(30, n = 999) = 140.78, p = 0.001, \phi = 0.38$. Furthermore, there was an association between student grade and verbal ability, $\chi^2(40, n = 999) = 207.44, p = 0.001, \phi = 0.46$ (see Table 7).

Table 7. Distribution of verbal ability (cross words) across performance.

	χ^2	Borderline	Below Average	Average	High Average	High Ability	Superior Ability	Total
Gender								
Male		38 (12%)	27 (9%)	18 (6%)	50 (16%)	38 (12%)	146 (46%)	317
Female		60 (9%)	34 (5%)	29 (4%)	71 (10%)	115 (17%)	373 (55%)	682
Phi	19.20 ** 0.13							
Language of test								
Arabic		64 (11%)	34 (6%)	27 (5%)	62 (11%)	94 (16%)	301 (52%)	582
English		34 (8%)	27 (6%)	20 (5%)	59 (14%)	59 (14%)	218 (52%)	417
Phi	5.28 0.07							

Table 7. Cont.

	χ^2	Borderline	Below Average	Average	High Average	High Ability	Superior Ability	Total
School type								
Public school		64 (11%)	30 (5%)	32 (5%)	73 (12%)	99 (17%)	292 (49%)	590
Private school		34 (8%)	31 (8%)	15 (4%)	48 (12%)	54 (13%)	227 (56%)	409
Phi	9.41 0.10							
Location of children								
Abu Dhabi		43 (18%)	24 (10%)	16 (7%)	22 (9%)	41 (17%)	93 (39%)	239
Ajman		1 (2%)	0 (0%)	1 (2%)	5 (11%)	4 (9%)	36 (77%)	47
Dubai		18 (7%)	16 (6%)	9 (3%)	42 (17%)	47 (19%)	122 (48%)	254
Fujairah		8 (9%)	0 (0%)	1 (1%)	3 (3%)	8 (9%)	68 (77%)	88
Ras Al Khaimah		9 (19%)	7 (15%)	6 (13%)	12 (25%)	9 (19%)	5 (10%)	48
Sharjah		13 (6%)	12 (5%)	10 (5%)	30 (14%)	25 (11%)	129 (59%)	219
Umm Al Quwain		6 (6%)	2 (2%)	4 (4%)	7 (7%)	19 (18%)	66 (63%)	104
Phi	140.78 ** 0.38							
Grades								
Grade 4		26 (16%)	17 (11%)	6 (4%)	19 (12%)	9 (6%)	81 (51%)	158
Grade 5		16 (16%)	11 (11%)	8 (8%)	19 (19%)	14 (14%)	33 (33%)	101
Grade 6		17 (20%)	7 (8%)	11 (13%)	8 (9%)	29 (34%)	13 (15%)	85
Grade 7		10 (10%)	4 (4%)	7 (7%)	14 (14%)	11 (11%)	52 (53%)	98
Grade 8		12 (9%)	10 (7%)	5 (4%)	22 (16%)	20 (14%)	69 (50%)	138
Grade 9		6 (4%)	2 (1%)	1 (1%)	13 (9%)	23 (17%)	94 (68%)	139
Grade 10		4 (2%)	2 (1%)	2 (1%)	19 (10%)	20 (11%)	137 (74%)	184
Grade 11		5 (6%)	8 (10%)	6 (8%)	7 (9%)	18 (23%)	34 (44%)	78
Grade 12		2 (11%)	0 (0%)	1 (6%)	0 (0%)	9 (50%)	6 (33%)	18
Phi	207.44 ** 0.46							

Note: ** $p \leq 0.01$.

3.7. Verbal Ability (True/False)

Table 8 summarizes the association between the demographic profile and the verbal ability of students (true/false). Here, there was an association between school location and verbal ability (true/false), $\chi^2(6, n = 999) = 15.08, p = 0.02, \phi = 0.12$. Moreover, an association was found between students' grades and verbal ability (true/false), $\chi^2(8, n = 999) = 21.92, p = 0.01, \phi = 0.15$.

Table 8. Distribution of verbal ability (true/false) across performance.

	χ^2	High Ability	Superior Ability	Total
Gender				
Male		181 (57%)	136 (43%)	317
Female		409 (60%)	273 (40%)	682
Phi	0.63 0.03			
Language of test				
Arabic		351 (60%)	231 (40%)	582
English		239 (57%)	178 (43%)	417
Phi	0.78 0.03			
School type				
Public school		359 (61%)	231 (39%)	590
Private school		231 (56%)	178 (44%)	409
Phi	1.73 0.04			

Table 8. *Cont.*

	χ^2	High Ability	Superior Ability	Total
Location of children				
Abu Dhabi		157 (66%)	82 (34%)	239
Ajman		29 (62%)	18 (38%)	47
Dubai		139 (55%)	115 (45%)	254
Fujairah		61 (69%)	27 (31%)	88
Ras Al Khaimah		22 (46%)	26 (54%)	48
Sharjah		121 (55%)	98 (45%)	219
Umm Al Quwain		61 (59%)	43 (41%)	104
	15.08 *			
Phi	0.12			
Grades				
Grade 4		79 (50%)	79 (50%)	158
Grade 5		71 (70%)	30 (30%)	101
Grade 6		47 (55%)	38 (45%)	85
Grade 7		65 (66%)	33 (34%)	98
Grade 8		79 (57%)	59 (43%)	138
Grade 9		91 (65%)	48 (35%)	139
Grade 10		95 (52%)	89 (48%)	184
Grade 11		52 (67%)	26 (33%)	78
Grade 12		11 (61%)	7 (39%)	18
	21.92 **			
Phi	0.15			

Note: * $p \leq 0.05$; ** $p \leq 0.01$.

3.8. Nonverbal Ability

All the demographic variables (gender, $\chi (5, n = 999) = 13.48, p = 0.02$, phi = 0.12; language of test, $\chi (5, n = 999) = 38.12, p = 0.001$, phi = 0.20; school type, $\chi (5, n = 999) = 19.40, p = 0.002$, phi = 0.14; school location, $\chi (30, n = 999) = 64.41, p = 0.001$, phi = 0.25; and grade level of students, $\chi (40, n = 999) = 187.94, p = 0.001$, phi = 0.43) were associated with nonverbal ability achievement (see Table 9 for more details).

Table 9. Distribution of nonverbal ability across performance.

	χ^2	Borderline	Below Average	Average	High Average	High Ability	Superior Ability	Total
Gender								
Male		35 (11%)	26 (8%)	13 (4%)	48 (15%)	85 (27%)	110 (35%)	317
Female		72 (11%)	60 (9%)	60 (9%)	116 (17%)	198 (29%)	176 (26%)	682
	13.48 *							
Phi	0.12							
Language of test								
Arabic		74 (13%)	63 (11%)	50 (9%)	103 (18%)	163 (28%)	129 (22%)	582
English		33 (8%)	23 (6%)	23 (6%)	61 (15%)	120 (29%)	157 (38%)	417
	38.12 **							
Phi	0.20							
School type								
Public school		71(12%)	55 (9%)	43 (7%)	106 (18%)	176 (30%)	139 (24%)	590
Private school		36 (9%)	31 (8%)	30 (7%)	58 (14%)	107 (26%)	147 (36%)	409
	19.40 **							
Phi	0.14							
Location of children								
Abu Dhabi		40 (17%)	28 (12%)	19 (8%)	46 (19%)	60 (25%)	46 (19%)	239
Ajman		6 (13%)	5 (11%)	3 (6%)	8 (17%)	13 (28%)	12 (26%)	47
Dubai		15 (6%)	19 (7%)	19 (7%)	41 (16%)	77 (30%)	83 (33%)	254
Fujairah		8 (9%)	10 (11%)	6 (7%)	12 (14%)	29 (33%)	23 (26%)	88
Ras Al Khaimah		9 (19%)	5 (10%)	2 (4%)	11 (23%)	15 (31%)	6 (13%)	48
Sharjah		19 (9%)	7 (3%)	15 (7%)	28 (13%)	60 (27%)	90 (41%)	219
Umm Al Quwain		10 (10%)	12 (12%)	9 (9%)	18 (17%)	29 (28%)	26 (25%)	104
	64.41 **							
Phi	0.25							

Table 9. Cont.

	χ^2	Borderline	Below Average	Average	High Average	High Ability	Superior Ability	Total
Grades								
Grade 4		29 (18%)	25 (16%)	15 (9%)	18 (11%)	33 (21%)	38 (24%)	158
Grade 5		10 (10%)	8 (8%)	3 (3%)	35 (35%)	21 (21%)	24 (24%)	101
Grade 6		17 (20%)	7 (8%)	9 (11%)	18 (21%)	24 (28%)	10 (12%)	85
Grade 7		8 (8%)	4 (4%)	12 (12%)	33 (34%)	17 (17%)	24 (24%)	98
Grade 8		16 (12%)	10 (7%)	11 (8%)	12 (9%)	51 (37%)	38 (28%)	138
Grade 9		7 (5%)	9 (6%)	8 (6%)	15 (11%)	53 (38%)	47 (34%)	139
Grade 10		14 (8%)	6 (3%)	6 (3%)	19 (10%)	61 (33%)	78 (42%)	184
Grade 11		6 (8%)	17 (22%)	6 (8%)	7 (9%)	16 (21%)	26 (33%)	78
Grade 12		0 (0%)	0 (0%)	3 (17%)	7 (39%)	7 (39%)	1 (6%)	18
Phi	187.94 * 0.43							

Note: * $p \leq 0.05$, ** $p \leq 0.01$.

3.9. Mathematics Knowledge

Four of the five demographic variables (gender, $\chi^2 (5, n = 999) = 17.63, p = 0.02$, phi = 0.13; school type, $\chi^2 (5, n = 999) = 21.38, p = 0.001$, phi = 0.15; school location, $\chi^2 (30, n = 999) = 109.04, p = 0.001$, phi = 0.33; and grade level of students, $\chi^2 (40, n = 999) = 101.83, p = 0.001$, phi = 0.32) were associated with the mathematics ability of students (see Table 10 for more details).

Table 10. Distribution of mathematics ability.

	χ^2	Borderline	Below Average	Average	High Average	High Ability	Superior Ability	Total
Gender								
Male		77 (24%)	45 (14%)	26 (8%)	42 (13%)	48 (15%)	79 (25%)	317
Female		247 (36%)	84 (12%)	51 (7%)	84 (12%)	101 (15%)	115 (17%)	682
Phi	17.63 ** 0.13							
Language of test								
Arabic		198 (34%)	78 (13%)	44 (8%)	68 (12%)	90 (15%)	104 (18%)	582
English		126 (30%)	51 (12%)	33 (8%)	58 (14%)	59 (14%)	90 (22%)	417
Phi	4.34 0.07							
School type								
Public school		217 (37%)	75 (13%)	39 (7%)	73 (12%)	93 (16%)	93 (16%)	590
Private school		107 (26%)	54 (13%)	38 (9%)	53 (13%)	56 (14%)	101 (25%)	409
Phi	21.38 ** 0.15							
Location of children								
Abu Dhabi		111 (46%)	33 (14%)	22 (9%)	31 (13%)	25 (10%)	17 (7%)	239
Ajman		12 (26%)	5 (11%)	1 (2%)	4 (9%)	7 (15%)	18 (38%)	47
Dubai		51 (20%)	32 (13%)	25 (10%)	31 (12%)	48 (19%)	67 (26%)	254
Fujairah		16 (18%)	7 (8%)	6 (7%)	11 (13%)	15 (17%)	33 (38%)	88
Ras Al Khaimah		21 (44%)	5 (10%)	4 (8%)	8 (17%)	6 (13%)	4 (8%)	48
Sharjah		82 (37%)	35 (16%)	10 (5%)	28 (13%)	30 (14%)	34 (16%)	219
Umm Al Quwain		31 (30%)	12 (12%)	9 (9%)	13 (13%)	18 (17%)	21 (20%)	104
Phi	109.04 ** 0.33							
Grades								
Grade 4		36 (23%)	24 (15%)	13 (8%)	24 (15%)	26 (16%)	35 (22%)	158
Grade 5		20 (20%)	11 (11%)	8 (8%)	12 (12%)	19 (19%)	31 (31%)	101
Grade 6		33 (39%)	6 (7%)	6 (7%)	9 (11%)	8 (9%)	23 (27%)	85
Grade 7		36 (37%)	12 (12%)	5 (5%)	7 (7%)	13 (13%)	25 (26%)	98
Grade 8		47 (34%)	15 (11%)	9 (7%)	21 (15%)	15 (11%)	31 (22%)	138
Grade 9		67 (48%)	19 (14%)	11 (8%)	14 (10%)	19 (14%)	9 (6%)	139
Grade 10		73 (40%)	26 (14%)	17 (9%)	23 (13%)	24 (13%)	21 (11%)	184
Grade 11		11 (14%)	10 (13%)	8 (10%)	14 (18%)	19 (24%)	16 (21%)	78
Grade 12		1 (6%)	6 (33%)	0 (0%)	2 (11%)	6 (33%)	3 (17%)	18
Phi	101.83 ** 0.32							

Note: ** $p \leq 0.01$.

3.10. Science Knowledge

Three out of the five demographic variables (gender, $\chi^2 (5, n = 999) = 12.00, p = 0.04$, phi = 0.11; school location, $\chi^2 (30, n = 999) = 139.68, p = 0.001$, phi = 0.37; and grade level of students, $\chi^2 (40, n = 999) = 233.94, p = 0.001$, phi = 0.48) were associated with the science ability of students (see Table 11 for more details).

Table 11. Distribution of science ability.

	χ^2	Borderline	Below Average	Average	High Average	High Ability	Superior Ability	Total
Gender								
Male		36 (11%)	26 (8%)	14 (4%)	35 (11%)	51 (16%)	155 (49%)	317
Female		45 (7%)	45 (7%)	34 (5%)	54 (8%)	134 (20%)	370 (54%)	682
Phi	12.00 *							
	0.11							
Language of test								
Arabic		50 (9%)	47 (8%)	29 (5%)	52 (9%)	108 (19%)	296 (51%)	582
English		31(7%)	24 (6%)	19 (5%)	37 (9%)	77 (18%)	229 (55%)	417
Phi	3.10							
	0.06							
School type								
Public school		51 (9%)	46 (8%)	33 (6%)	55 (9%)	112 (19%)	293 (50%)	590
Private school		30 (7%)	25 (6%)	15 (4%)	34 (8%)	73 (18%)	232 (57%)	409
Phi	6.08							
	0.08							
Location of children								
Abu Dhabi		40 (17%)	22 (9%)	16 (7%)	17 (7%)	54 (23%)	90 (38%)	239
Ajman		0 (0%)	1 (2%)	0 (0%)	5 (11%)	7 (15%)	34 (72%)	47
Dubai		15 (6%)	19 (7%)	13 (5%)	28 (11%)	49 (19%)	130 (51%)	254
Fujairah		1 (1%)	2 (2%)	0 (0%)	4 (5%)	13 (15%)	68 (77%)	88
Ras Al Khaimah		9 (19%)	9 (19%)	4 (8%)	5 (10%)	16 (33%)	5 (10%)	48
Sharjah		16 (7%)	13 (6%)	12 (5%)	23 (11%)	30 (14%)	125 (57%)	219
Umm Al Quwain		0 (0%)	5 (5%)	3 (3%)	7 (7%)	16 (15%)	73 (70%)	104
Phi	139.68 **							
	0.37							
Grades								
Grade 4		22 (14%)	11 (7%)	9 (6%)	15 (9%)	19 (12%)	82 (52%)	158
Grade 5		13 (13%)	14 (14%)	9 (9%)	11 (11%)	25 (25%)	29 (29%)	101
Grade 6		17 (20%)	11 (13%)	5 (6%)	23 (27%)	17 (20%)	12 (14%)	85
Grade 7		5 (5%)	8 (8%)	2 (2%)	16 (16%)	20 (20%)	47 (47%)	98
Grade 8		19 (14%)	12 (9%)	11 (8%)	8 (6%)	24 (17%)	64 (46%)	138
Grade 9		0 (0)	3 (2%)	3 (2%)	7 (5%)	25 (18%)	101 (73%)	139
Grade 10		2 (1%)	5 (3%)	5 (3%)	2 (1%)	26 (14%)	144 (78%)	184
Grade 11		3 (4%)	6 (8%)	2 (3%)	7 (9%)	24 (31%)	36 (46%)	78
Grade 12		0 (0%)	1 (6%)	2 (11%)	0 (0%)	5 (28%)	10 (56%)	18
Phi	233.94 **							
	0.48							

Note: * $p \leq 0.05$; ** $p \leq 0.01$.

4. Discussion

The first research question involved assessing the ability profile of students who completed the national IQ in the UAE. The results confirmed the central thesis of CHC theory, which guided the current study. According to proponents of CHC theory, giftedness varies, and several factors can differentiate gifted students from others. In this study, more than 50% of the students demonstrated superior preknowledge in science. This is a welcoming development, as science is at the heart of gifted education (AlGhawi, 2017; MacFarlane & Dailey, 2021; Onal, 2021; Sumida, 2017). In the context of the UAE, there is significant national investment aimed at promoting STEM education (Education Business, 2017). Consequently, students in the UAE seem to have grappled with the core knowledge of science, which could be vital to the country's efforts to promote innovation in national development (Areepattamannil et al., 2023). These findings have shown that governmental

initiatives may prove fruitful, and thus, there is a need for consolidation to ensure that more students grasp a core understanding of science in schools in the UAE.

One area of concern was students' attainment in mathematics. For instance, while 19% attained superior ability grades, 32% attained borderline grades. In the UAE, students' achievement in mathematics has been reported to be low (Fraser & Hasan, 2019). There are two reasons that could explain these findings. First, mathematics is unpopular among students in the UAE (Johnston et al., 2023) and globally (Chand et al., 2021). In view of this, students have formed a negative opinion of learning mathematics. One possible way to change attitudes is the development of awareness campaigns and innovative means, such as gamification, to elicit students' interest in mathematics (Fuentes-Riffo et al., 2023). Second, reasoning is linked to teacher quality. Teachers have consistently been blamed for poor methodology and the inability to use appropriate pedagogical teaching strategies in mathematics classrooms (Johnson et al., 2014; Suleiman & Hammed, 2019). Unfortunately, in the UAE and similar countries, mathematics teachers are trained overseas (Gallagher, 2019). This makes it very difficult to evaluate the robustness of their training and acquisition of pedagogical teaching skills (Gallagher, 2019). Efforts toward promoting gifted education should go hand in hand with training teachers locally to teach subjects such as mathematics in the UAE.

Another interesting observation was students' attainment of verbal and nonverbal abilities. While 52% demonstrated superior ability in word crossing, 41% achieved a grade of superior ability in true/false. Additionally, 29% were known to have attained a superior ability grade in terms of nonverbal ability. However, the results revealed variability in the levels of students' attainment in terms of verbal and nonverbal skills. While verbal ability demonstrates students' ability to comprehend and use factual words and enhances abstract thinking, nonverbal communication is useful for helping students understand emotions and develop relationships (Bambaerero & Shokrpour, 2017). In this study, students seem to have a grasp of verbal skills, and there is more room for improvement in terms of nonverbal ability. In the literature, it has been widely reported that gifted students struggle with behavior problems and maintaining relationships with others in society (Eren et al., 2018). These findings highlight the urgent need to develop students' nonverbal skills as part of the advocacy for gifted education in the UAE.

The second research question is intended to explore the association between background variables and the ability profile of gifted students. First, variability between gifted students was observed in terms of gender and students' outcomes. Differences in gender were observed between students in terms of verbal ability (word cross), nonverbal ability, mathematics and science. In particular, with respect to verbal ability, a high percentage of females achieved higher grades than their male counterparts did. Moreover, the percentage of males attaining borderline and below-average grades was greater than that of females. In previous studies, females have been found to perform better in verbal activities such as grammar, reasoning and vocabulary (Lange & Zaretsky, 2021; Payne & Lynn, 2011; Wucherer & Reiterer, 2018). In the context of the UAE, gender stereotypes could explain the patterns identified in this study. For example, it is believed that reading subjects that are perceived to be easy are for females, whereas difficult areas are for males (Espinoza & Strasser, 2020; Muntoni et al., 2021; Muntoni & Retelsdorf, 2019). These cultural stereotypes seemed to have influenced the participants identified in this study. More engagement with males in verbal activities is necessary to enhance performance.

Conversely, compared with their female counterparts, a large percentage of males demonstrated superior nonverbal skills. Similar observations were made on mathematics and science achievement, with more males attaining higher grades than their female peers did. These findings are slightly consistent with those of previous studies that reported a

high likelihood of males being identified as gifted compared with females (Parekh et al., 2018; Petersen, 2013). The cultural context explains the trend identified in this study. In terms of culture, males are raised to be confident and work toward excelling to cater to the family (Clingan, 2025). Compared with females, males are more dominant in domains such as mathematics and science (Eccles & Wang, 2016; Halpern et al., 2007; Stewart-Williams & Halsey, 2021). It is understandable that targeted training in areas such as science and nonverbal skills could be ideal for female students.

Differences were also noted between students regarding school location. Specifically, there was an association between school location and the following ability domains: verbal ability, nonverbal skills, mathematics and science. These findings slightly confirm the findings of previous studies reporting the role of geographical location in the identification of gifted students (Stambaugh, 2017). In this study, it was apparent that students located in relatively low-population areas, such as Ajman, Fujairah and Sharjah, were dominant in terms of attaining superior ability grades. This finding is interesting because, compared with those in relatively small communities, students in urban and well-resourced areas have been consistently found to dominate gifted identification (Olszewski-Kubilius & Thomson, 2010; Van Tassel-Baska, 2010). The reasons for the trend identified in this study are unknown. It is, therefore, beyond the scope of this study to offer a more in-depth interpretation of these findings. However, future studies could engage gifted students in diverse communities to develop more insight into the support systems available to support talent development.

The grade levels of the students were associated with their attainment on the national IQ test. There was an association between the grades of the students and the following domains of the test: verbal skills, nonverbal skills, mathematics and science. The education system of the UAE is divided into cycles: one (grades 1–4), two (grades 5–9) and three (grades 10–12). Notably, many students in grade 4 were attaining higher grades in all the domains of the test, sometimes outperforming their counterparts in other cycles. For instance, under preknowledge of mathematics, 22% of students in grade four attained a superior grade. The percentage of grade four students relative to their population was higher than that in the third cycle. These findings support the importance of the early identification of gifted students. It has been argued that early identification of gifted students is essential to ensure appropriate nurturance and maximization of potential (Huang, 2008; Kelemen, 2020). There is no doubt that identifying gifted students in early grades could enable them to be placed in appropriate gifted programs.

Limitations of the Study

This study has several limitations that should be acknowledged. First, only the results of ability tests completed by students were analyzed. Future studies could focus on domains such as academic tests developed to identify students' academic achievement. Additionally, the test was completed by students at varying times between 2018 and 2023. The current study did not compare students' ability on the basis of the year within which the test was taken. Moreover, the test was performed at only one point in time. There is no data on whether students' achievement could change over time. Future studies could use a longitudinal design to determine whether students' achievement could change over a specific time period.

5. Conclusions

The overarching aim of this study was to develop a profile of students who completed the UAE's national IQ test, which was developed on the basis of realities in the country. The test was developed on the basis of biases and limitations associated with Western instruments such as Wechsler tests, which have been translated and used to identify gifted students' cultural contexts. The students who participated in this study were high

achievers who were nominated by their schools or parents to complete the national IQ test. Varying ability profiles were noted among the students who participated in this study. First, students' ability was greater in science than in mathematics. Moreover, achievement in verbal ability was high compared with nonverbal ability. Furthermore, demographic variables such as gender, school location and grades were associated with ability grades.

This is a baseline study whose findings could be considered in future policy and practices. In particular, the current study has shown useful trends that could be considered in future policy and practices. In particular, the study revealed relatively low levels of superior attainment in mathematics. Policymakers must prioritize the training of mathematics teachers locally to contribute to gifted education. In-service training on pedagogy and content knowledge could be provided to teachers to enable them to provide quality mathematics teaching to students in classrooms. Moreover, training in nonverbal ability could be provided to students in classrooms. In addition to academic training, the nonverbal ability of students can be enhanced. This could be in the form of role plays and encouragement of students to utilize nonverbal ability to demonstrate emotions. Furthermore, targeted training could be provided to male and female students. Specifically, male students could benefit from training in verbal ability, whereas female students could benefit from training in nonverbal communication, mathematics and science ability. This could be achieved through regular workshops to engage students in these areas. Additionally, early assessment of giftedness is highly encouraged. Nationwide implementation of national IQ tests in cycle schools is essential to help note students who possess superior abilities and subsequent placement in appropriate gifted programs.

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Abbreviations

The following abbreviations are used in this manuscript:

CHC	Cattell–Horn–Carroll
HGT	Hamdan Gifted Test
IQ	Intelligence Quotients
SPSS	Statistical Package for Social Science
UAE	United Arab Emirates

Appendix A

Table A1. Distribution of mathematics attainment on verbal ability (word crossing).

	Verbal Ability (Word Crossing)					
	Borderline	Below Average	Average	High Average	High Ability	Superior Ability
Mathematics						
Borderline	52 (53%)	26 (43%)	16 (34%)	44 (36%)	42 (27%)	144 (28%)
Below average	17 (17%)	12 (20%)	7 (15%)	12 (10%)	19 (12%)	62 (12%)
Average	4 (4%)	10 (16%)	2 (4%)	16 (13%)	19 (12%)	26 (5%)
High average	9 (9%)	7 (11%)	7 (15%)	12 (10%)	23 (15%)	68 (13%)
High ability	11 (11%)	4 (7%)	5 (11%)	17 (14%)	27 (18%)	85 (16%)
Superior Ability	5 (5%)	2 (3)	10 (21%)	20 (17%)	23 (15%)	134 (26%)
Total	98	61	47	121	153	519

Table A2. Distribution of mathematics attainment on verbal ability (true/false).

	Verbal Ability (True/False)	
	High Ability	Superior Ability
Mathematics		
Borderline	200 (34%)	124 (30%)
Below average	81 (14%)	48 (12%)
Average	53 (9%)	24 (6%)
High average	68 (12%)	58 (14%)
High ability	88 (15%)	61 (15%)
Superior Ability	100 (17%)	94 (23%)
Total	590	409

Table A3. Distribution of mathematics attainment on nonverbal ability.

	Verbal Ability (Word Crossing)					
	Borderline	Below Average	Average	High Average	High Ability	Superior Ability
Science						
Borderline	52 (49%)	31 (36%)	27 (37%)	69 (42%)	76 (27%)	69 (24%)
Below average	16 (15%)	15 (17%)	7 (10%)	27 (16%)	38 (13%)	26 (9%)
Average	7 (7%)	8 (9%)	7 (10%)	11 (7%)	23 (8%)	21 (7%)
High average	15 (14%)	5 (6%)	7 (10%)	17 (10%)	42 (15%)	40 (14%)
High ability	9 (8%)	14 (16%)	13 (18%)	20 (12%)	45 (16%)	48 (17%)
Superior Ability	8 (7%)	13 (15%)	12 (16%)	20 (12%)	59 (21%)	82 (29%)
Total	107	86	73	164	283	286

Table A4. Distribution of the effect of science attainment on verbal ability (word crossing)..

	Verbal Ability (Word Crossing)					
	Borderline	Below Average	Average	High Average	High Ability	Superior Ability
Science						
Borderline	37 (38%)	23 (38%)	6 (13%)	6 (5%)	7 (5%)	2 (0%)
Below average	17 (17%)	19 (31%)	10 (21%)	19 (16%)	4 (3%)	2 (0%)
Average	5 (5%)	9 (15%)	8 (17%)	16 (13%)	6 (4%)	4 (1%)
High average	11(11%)	4 (7%)	11 (23%)	25 (21%)	25 (16%)	13 (3%)
High ability	14 (14)	5 (8%)	7 (15)	38 (31%)	58 (38%)	63 (12%)
Superior Ability	14 (14)	1 (2%)	5 (11%)	17 (14%)	53 (35%)	435 (84%)
Total	98	61	47	121	153	519

Table A5. Distribution of the effect of science attainment on verbal ability (True/False).

	Verbal Ability (True/False)	
	High Ability	Superior Ability
Science		
Borderline	53 (9%)	28 (7%)
Below average	45 (8%)	26 (6%)
Average	28 (5%)	20 (5%)

Table A5. *Cont.*

	Verbal Ability (True/False)	
	High Ability	Superior Ability
High average	50 (8%)	39 (10%)
High ability	117 (20%)	68 (17%)
Superior Ability	297 (50%)	228 (56%)
Total	590	409

Table A6. Distribution of the effect of science attainment on nonverbal ability.

	Nonverbal Ability					
	Borderline	Below Average	Average	High Average	High Ability	Superior Ability
Science						
Borderline	28 (26%)	13 (15%)	5 (7%)	15 (9%)	16 (6%)	4 (1%)
Below average	14 (13%)	10 (12%)	7 (10%)	22 (13%)	10 (4%)	8 (3%)
Average	8 (7%)	2 (2%)	10 (14%)	12 (7%)	6 (2%)	10 (3%)
High average	15 (14%)	9 (10%)	7 (10%)	19 (12%)	24 (8%)	15 (5%)
High ability	20 (19%)	19 (22%)	16 (22%)	29 (18%)	52 (18%)	49 (17%)
Superior Ability	22 (21%)	33 (38%)	28 (38%)	67 (41%)	175 (62%)	200 (70%)
Total	107	86	73	164	283	286

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