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Can the Leadership Capabilities of Gifted Students be Measured? Constructing a Scale According to Rasch Model

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	Abstract
<p>Article History</p> <p>Article Submission 28 September 2022</p> <p>Revised Submission 29 October 2022</p> <p>Article Accepted 10 November 2022</p>	<p>The development of leadership skills and aspects of successful planning is of great importance to all students, especially gifted students. The current study aimed to identify the psychometric properties of the leadership scale among talented students. The descriptive-analytical method was used. The leadership scale was applied in the pilot stage on (189) male and female students from Saudi universities, as well as on (730) male and female students for rationing purposes. The results demonstrated the validity and reliability of the scale among a sample of Saudi university students. The application results also included the criteria for evaluating the leadership skills scale findings.</p> <p>Keywords: Leadership; Gifted students; Leadership skills scale; Saudi universities</p>

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Introduction

The topic of leadership is of great interest in various fields, and its importance increases when it is associated with gifted students. The gifted, the talented, and the creative are a natural wealth for their societies. It is necessary to take care of and help them reach their maximum potential because they are the guarantee for the advancement of society and its future. Leadership skills are also an essential component of success at various professional and academic levels; it is one of the most important soft skills that employers pay special attention to and look for. Leadership skills include several personal traits and communicative abilities that each one of us must learn and master to achieve the success and development that we aspire for (Yang & Kim, 2010).

Leadership is one of the manifestations of giftedness, and researchers often mention it when they talk about talent as one of the characteristics of gifted students. Leadership development among youth is also currently receiving great interest among educators around the world. Given that with advanced technologies, countries can be more connected and increasingly dependent on each other in the global economy. As a result, countries more than ever want to produce leaders who are not only aware of national problems but are also willing to address them and are interested in making the world a better place for future generations (Lee & Olszewski, 2016).

In general, there is a cognitive component and an emotional component in leadership. There seem to be many abilities that make up the social aspect of leadership. Leadership talent includes mental ability, moral development, thinking skills, interpersonal social behaviors, and the ability to motivate others (Feldhusen & Moon, 1992).

Some studies that dealt with a sample of students with high leadership potentials showed a range of personal and emotional factors, the most important of which are: emotional maturity, conscientiousness, persistence, orientation towards moral values, social responsibility, camaraderie, low level of strictness, the tendency to volunteer work, and high level of leadership. Low in anxiety, ability to retain leadership role in-group situations, and ability to control their group behavior. A sound system of social and moral values (Yammarino, 2013).

Youth leadership is described as the ability to envision a goal or necessary change, take the initiative or action to achieve the goal, take responsibility for the consequences, build a relationship, and communicate well with others (Edelman et al., 2004). Other studies have also shown that gifted students show greater aspirations to become leaders, and their ultimate life goals and beliefs about leadership as part of their talents are highly correlated with their leadership aspirations. Seon-young et al. (2020) suggested how prominent dimensions of cultural difference influenced some of the specific outcomes observed for gifted students from South Korea versus the American cultural context.

It is known that leadership skills can be developed, and deliberate endeavors should be made to develop young leaders of the future, and to develop the leadership potential of gifted students, as their leadership skills can be developed. They can also be trained in leadership skills and theories to be future leaders, leading to a real contribution to development plans (Bean, 2010).

Some studies have sought to determine the extent to which idealistic traits, lifelong learning skills, and demographic characteristics that are believed to influence the leadership qualities of gifted and talented students can predict these traits. The results showed that leadership is important in adolescent development, can enhance leadership qualities and skills, and be a catalyst for the advancement of adulthood. It can be suggested that students who wish to acquire leadership qualities are supported to access various opportunities in the school environment, are provided with the opportunity to lead a group, and are encouraged to possess lifelong learning skills (Miray Dağyar et al., 2022).

Hence, constructing and rationing scales of leadership traits for gifted students is a necessity, which is what this study seeks by rationing the leadership scale of gifted students in Saudi universities, which may help empower young leaders from various students in general and gifted students in particular.

Why should there be a scale of leadership skills? Several studies have recommended the importance of providing leaders with multiple skills and the necessary knowledge to achieve management success (DeMatthews, Kotok & Serafini, 2020; Fan, Zhang, Gallup, Bocanegra, & Wu, 2019; Thompson, 2017; Thomas et al., 2019). This includes the human skills that are related to the leader's successful dealing with others. It is considered a necessity for leaders to deal with

subordinates and others. In addition, the intellectual or cognitive skills related to the leader's mental abilities in leading the organization, which appear in his ability to think objectively about what work requires, reveal and see the relationships between variables, and feeling of problems, are very important leadership skills. Finally, technical skills are through the leader's knowledge and experience in the field of work and appear through the leader's method of handling tasks related to the institution (Sulaiman, 2015; Al-Issa, 2018; Kandil, 2010), and studies emphasized the need for a balance between these skills.

McLaughlin, Smith, & Wilkinson (2012) and Luckner & Movahedazarhouligh (2019) confirmed that there are challenges in communicating with different categories. Some studies have emphasized the importance of developing leaders' communication skills (Council for Exceptional Children, 2015; Thompson, 2017; Udin, Handayani, Yuniawan, & Rahardja, 2019; Fan, Zhang, Gallup, Bocanegra, & Wu, 2019; Bruns, LaRocco, Sharp & Sopko, 2017) as well as the study by Udin, Handayani, Yuniawan & Rahardja (2019) demonstrated the relationship of communication skills among leaders to leadership styles and their impact on the management of their organizations.

The study by Luckner & Movahedazarhouligh (2019) also found that among the challenges facing leaders are the presence of formal and informal conflicts and the importance of working to resolve them. The study by Bruns, LaRocco, Sharp & Sopko (2017) concluded that one of the competencies of effective leaders is that they work to build consensus between the opinions and ideas of persons related to an institution or organization and resolve the conflicts in it. The study by Thompson (2017) confirmed that one of the most important skills of leaders is to work on solving problems. In addition, the study by VanTassel-Baska & Stambaugh (2013) confirmed that one of the roles of the leader is to work on distributing burdens and authority fairly.

The study by Council for Exceptional Children (2015); Thompson (2017); Udin, Handayani, Yuniawan, & Rahardja (2019); Fan, Zhang, Gallup, Bocanegra, & Wu (2019); Bruns, LaRocco, Sharp & Sopko (2017); DeMatthews, Kotok & Serafini (2020); Murphy (2018); Milligan, Neal, & Singleton (2014); and Bays & Crockett (2007) have confirmed on the importance of developing collaborative team-building skills, Effective relationships, and shared responsibilities by educational leaders in special education and gifted education, and their professional adequacy.

Several studies, such as Abunasser and Al-joguman (2012); VanTassel-Baska & Stambaugh (2013); Robinson, Shore & Enersen (2021), emphasized the importance of leaders working to provide material and moral support and motivate employees of educational institutions in the education of the gifted. The study by Thompson (2017); Bruns, LaRocco, Sharp & Sopko (2017); Fan, Zhang, Gallup, Bocanegra, & Wu (2019); DeMatthews, Kotok & Serafini (2020); Milligan, Neal, & Singleton (2014); and Bays & Crockett (2007) found that one of the competencies of effective leaders is their ability to encourage employees of the organization and others to reach their capabilities to a very high level. At the level of intellectual skills, the study of Bays & Crockett (2007); and Fan, Zhang, Gallup, Bocanegra, & Wu (2019), based on CEC standards, concluded that it is also among the competencies of leaders that the leader performs some tasks that require high planning skills. Such as building a budget for the institution and developing strategic plans that provide opportunities for cooperation. Fantasia-Basca and Stambog (2013) emphasized that one of the tasks of the leader is to set development plans that respond to the goals of education in general and for gifted students in particular, to raise the level of their education. The study by Bruns, LaRocco, Sharp & Sopko (2017); Fan, Zhang, Gallup, Bocanegra, & Wu (2019), and Robinson, Shore & Enersen (2021) found that among the competencies of leaders is their ability to manage change in the organization through the application of professional development processes. The study by Bruns, LaRocco, Sharp & Sopko (2017); Fan, Zhang, Gallup, Bocanegra, & Wu (2019); Thompson (2017); Milligan, Neal, & Singleton (2014); and VanTassel-Baska & Stambaugh (2013) concluded that Leaders must possess the competence to make decisions in a participatory manner with relevant persons.

The study by Bruns, LaRocco, Sharp & Sopko (2017); Fan, Zhang, Gallup, Bocanegra, & Wu (2019), and DeMatthews, Kotok & Serafini (2020) have found that among the competencies leaders should have the ability to use data in the organization Effectively by collecting, analyzing and sharing data. The study of Fan, Zhang, Gallup, Bocanegra, & Wu (2019) and Thompson (2017) study confirmed that among the competencies of leaders is their ability to control some administrative processes in terms of time. The study by DeMatthews, Kotok & Serafini (2020); Milligan, Neal, & Singleton (2014); Bays & Crockett (2007); and VanTassel-Baska & Stambaugh (2013) emphasized that one of the competencies of leaders is the ability to develop work according to quality controls.

The above shows the importance of students - future leaders - possessing the skills of a leader in various fields supported by studies. We will not forget that leadership charisma plays an active role in the level of some skills and transferring them to a more effective level. This emphasizes that leadership skills, even if they are trained, instinctive leadership abilities make a difference in the level of those skills among leaders, which justifies an important issue, which is the importance of early identification of those with leadership abilities and providing good care for these skills. This is reflected in the future on the level of leadership in general and its effectiveness in educational institutions in general and institutions of special education and education of the gifted in particular.

Leadership is defined as the ability to motivate and arouse the interest of a group of individuals and to release their energies toward achieving the desired goals effectively. It is the ability that distinguishes the leader from others by directing others in a way that can win their obedience, respect, and loyalty, to talented and gifted students. Many traits distinguish them from others, including self-confidence, perseverance, facing difficulties, failed attempts, the ability to communicate, and interaction in times of crisis, in addition to intelligence and high abilities (Jacob, 2020). Leadership is a social influence relationship between two or more people brought together by a certain group, and each depends on the other to achieve specific and common goals, and this is what students live in university life, which is a reason to reveal their leadership abilities. The current study aims to build and standardize the leadership scale for gifted students at the university level by applying it to the ages of 18-25 years of university students and higher education institutions. This is in response to the necessary needs of gifted students due to the scarcity of specific standards for this category at the Arab and regional levels, which allows providing data about the characteristics of this category and their capabilities to improve opportunities for nurturing leadership talents and to identify preparation and enrichment programs for them and verify their suitability. Specifically, the study attempts to answer the following main question:

Can the leadership capabilities of gifted students be measured? Through the following sub-questions:

1. What are the indicators of validity and reliability for the leadership skills scale?
2. What are the criteria for interpreting the score on the leadership skills scale?

Methodology

This study used a quantitative descriptive survey approach, which is one of the forms of organized scientific analysis and interpretation to describe a specific phenomenon or problem by collecting, classifying, and analyzing standardized data. The study was conducted during the 2021/2022 academic year at Saudi universities. Saudi universities were purposively selected for the possibility of providing a sample of them. The first stage of constructing the scale included a pilot sample of about 189 male and female students from Saudi Universities. Then the study sample included 294 male and 436 female students from various scientific and humanities faculties, and different academic years, ranging in age from 19-23 years.

The Development of Scale Steps

1. The process of defining the dimensions of the scale is the main focal point. In this step, the definition of the concept of leadership, its skills, and its dimensions is determined by making use of the educational literature. The following dimensions were determined to represent the dimensions of the leadership scale: first; Emotional Leadership Skills (ELS), which comprised sub-sub construct; self-understanding (SU), Problem Solving (PS), Critical thinking (CT), and Differentiated Experiences (DE). Second, Basic leadership skills (BLS), which comprised four sub-constructs: Planning (P), Organization (Ob), communication (C), and Decision Making (DM). Third, Creative leadership skills (CLS), are comprised of sub-constructs: Motivation (S), Team Building (B), Conflict Management (CM), and Strategic Thinking (ST).

2. When developing and formulating the items, the researchers considered that the items cover the main and sub-dimensions of leadership skills. The theoretical framework was relied upon when writing and formulating the items of the scale.

3. A five-point Likert scale was used. The range is calculated where $5-1 = 4$. The length of a

category was calculated by dividing the range by the number of categories, then $4/3 = 1.33$. Thus, increasing this value to the lower bound for the category and then multiplying each term by the total number of the scale. Accordingly, the degree of possession of leadership skills depends on the actual limits as follows: Low skill (1-2.33), medium skill (2.34-3.67), and High skill (3.68 and above).

4. Verifying the validity of the scale. (11) Experts from Arabs Universities examined the scale items. Based on their opinions, the researchers modified and reformulated some scale items; also, some items were omitted as shown in Table 1

5. Ensuring validity and reliability based on the Rasch model. A pilot study was conducted on a sample of students (about 189 undergraduate students) from Saudi Universities. Then formatting the final scale.

6. Applying the final scale on the sample study, which comprised 730 students.

7. Ensuring validity and reliability.

Table 1. Number of items omitted in the leadership skills scale based on experts

NO.	Dimensions	Sub dimensions	Number of items in the initial copy	Number of items omitted	Number of modified items
1	Emotional Leadership Skills	self-understanding	11	1	3
		Problem Solving	8	0	3
		Critical thinking	7	0	2
		Differentiated Experiences	9	2	2
2	Basic leadership skills	Planning	10	4	3
		Organization	7	0	1
		communication	13	5	4
		Decision Making	11	4	3
3	Creative leadership skills	Stimulus (Motivation)	8	2	2
		Team Building	11	4	4
		Conflict Management	10	4	3
		Strategic Thinking	10	3	4
Total			115	29	34

Results

The pilot study was conducted on a sample of 189 students related to Saudi universities. Rasch model analysis was used to test the validity and reliability of the scale by using Winsteps software version 3.68.2.

The assumptions of the Rasch model were verified as follows; the validity of the scale was measured using values of MNSQ for infit, which should lie between 0.4 and 1.5, item polarity analysis (PTMEA), whose value should lie between 0.2 and 1, standardized fit statistic (Zstd) value, that should range between -2 and 2. Calibration scaling analysis, and the dimensionality, where the raw variance explained by measures should be more than 40% and unexplained variance in 1st contrast less than 15. The reliability of the instrument was measured using person and item reliability (Mofreh et al., 2017; Boone, 2016; Erwin and Najib, 2015). Twenty-six items were omitted due to their MNSQ value of infit and outfit greater than 1.5, Zstd value, and PTMEA, as shown in table 2.

Table 2. Item Fit Analysis for leadership skills scale (Initial)

Count	Measure	Model S.E	Infit		outfit		Pt-measure		Exact OBS%	Match EXP%	items
			MNSQ	ZSTD	MNSQ	ZSTD	CORR	EXP			
189	.14	.16	2.03	3.6	5.32	7.5	.02	50	44.0	49.9	SU10
189	.75	.16	2.36	5.3	7.89	9.9	.02	65	30.0	42.5	SU8
189	.57	.21	1.50	1.7	3.56	3.1	.09	37	62.0	66.6	SU7
189	.08	.15	2.21	4.8	3.92	6.4	.10	58	22.0	41.5	B1
189	.30	.20	1.48	2.0	2.54	3.9	.13	45	48.0	55.7	SU2

189	.02	.17	1.49	1.9	2.44	4.1	.22	52	56.0	49.4	DE3
189	.12	.18	1.40	1.8	2.39	4.1	.24	52	56.0	54.6	SU4
189	.07	.23	1.57	2.1	1.33	1.2	.24	45	46.0	55.4	O4
189	.43	.23	1.41	2.0	1.75	2.9	.24	48	62.0	55.1	P3
189	1.31	.24	1.59	2.2	1.48	2.4	.26	52	52.0	58.4	CT4
189	.21	.16	1.25	2.3	2.39	2.9	.27	49	36.0	48.4	O2
189	.41	.20	1.27	.9	1.51	1.1	.28	38	52.0	65.8	DM4
189	.72	.20	1.48	1.2	1.55	.7	.32	41	52.0	55.6	PS5
189	.44	.18	1.18	2.6	1.53	1.4	.32	52	34.0	47.4	B3
189	.11	.27	1.61	.9	1.16	.8	.33	46	66.0	67.8	DE1
189	.27	.24	1.54	.6	1.21	.7	.34	41	64.0	58.6	C6
189	.26	.16	1.24	2.3	1.72	2.5	.34	55	36.0	45.9	CM5
189	.13	.17	1.78	1.0	1.30	.8	.34	46	40.0	50.8	C8
189	.45	.17	1.37	2.0	2.15	3.0	.35	54	34.0	44.9	CT2
189	.39	.19	1.06	1.7	1.69	.7	.36	48	48.0	51.6	ST2
189	.14	.25	1.09	.4	1.96	.0	.36	38	72.0	64.0	S4
189	.73	.19	1.31	.4	2.29	.4	.38	38	56.0	62.9	PS3
189	.17	.17	1.24	1.3	1.95	2.6	.38	50	56.0	49.9	C2
189	.21	.22	1.34	1.4	1.53	1.1	.39	51	58	53.6	DM6
189	.35	.17	1.20	1.8	1.28	.7	.39	50	46	45.9	ST6
189	.14	.18	1.09	.5	1.26	.8	.39	47	52.0	49.7	ST7
189	.11	.19	.89	.6	1.26	.8	.39	46	52.0	52.1	C3
189	.02	.23	.96	.1	1.30	.9	.39	42	34.0	55.8	CT1
189	.34	.16	1.14	.8	1.29	3.4	.41	50	66.0	51.2	CT7
189	.40	.20	1.02	.2	1.31	1.3	.43	52	64.0	52.1	SU1
189	01	.19	1.22	1.3	1.48	1.3	.44	46	36.0	51.0	S6
189	.18	.19	1.13	.6	1.17	.6	.44	52	40.0	46.6	SU3
189	.21	.17	.98	.0	1.48	1.8	.45	52	34.0	47.4	DE6
189	.45	.24	1.03	.2	.85	.4	.45	42	52.0	67.8	P2
189	.28	.21	1.11	.7	.99	.1	.46	46	50.0	58.6	S5
189	.36	.19	1.03	.2	1.10	.4	.46	51	50.0	45.9	ST5
189	.40	.18	.94	.3	.92	.1	.46	43	62.0	50.8	B6
189	.73	.25	.87	.6	.81	.6	.46	40	56.0	44.9	ST1
189	.36	.19	.85	.5	1.04	.2	.47	44	62.0	55.7	C7
189	.04	.23	.95	.2	.67	.9	.47	38	72.0	49.4	S3
189	.09	.28	.88	.5	.77	.7	.47	40	68.0	54.6	C1
189	.05	.22	.80	1.1	.80	.5	.48	45	66.0	55.4	DE4
189	.15	.18	1.10	.6	1.46	1.2	.48	42	62.0	55.1	S1
189	.15	.24	.95	.2	.93	.2	.48	49	50.0	58.4	CM4
189	.60	.18	.87	.4	.82	.6	.49	43	56.0	48.4	SU9
189	.39	.21	1.08	.5	.91	.2	.49	47	62.0	65.8	DE2
189	.28	.18	1.10	.6	1.14	.7	.49	52	56.0	55.7	PS7
189	.18	.17	1.11	.6	1.11	.4	.49	45	50.0	49.4	P6
189	.07	.15	1.17	.8	.99	.1	.50	48	52.0	54.6	O7
189	.19	.18	.96	.1	.92	.1	.50	52	52.0	55.4	DM1
189	.15	.19	.92	.3	.84	.4	.50	49	34.0	55.1	O1
189	.22	.21	.89	.6	.80	.5	.50	38	66.0	58.4	B2
189	.13	.19	.71	1.2	.75	.7	.52	41	64.0	48.4	P1
189	.36	.15	.63	1.6	.52	1.3	.52	52	36.0	65.8	S2
189	.25	.20	.88	.4	.83	.2	.52	46	40.0	55.7	P4
189	.17	.18	.69	1.1	.69	1.0	.52	41	34.0	49.7	ST3
189	.13	.20	1.04	.3	.83	.4	.53	55	52.0	52.1	CM3
189	.22	.16	.62	1.5	.93	.3	.54	46	52.0	55.8	PS2
189	.33	.18	.81	.6	.42	1.7	.54	42	34.0	51.2	DM3
189	.17	.20	.81	.8	.57	1.5	.55	46	58.0	52.1	DM5
189	.25	.15	1.15	.8	.72	.9	.55	44	38.0	51.0	B7
189	.06	.16	1.13	.7	.89	.0	.55	45	44.0	46.6	CM6
189	.11	.20	1.00	.1	1.10	.5	.55	51	70.0	47.4	CM2

189	.40	.20	1.04	.3	.91	.4	.55	43	62.0	67.8	CT6
189	.24	.19	.78	1.1	.94	.2	.56	45	48.0	58.6	PS4
189	.38	.19	.68	1.6	.61	1.0	.56	45	28.0	49.7	B5
189	.88	.17	.55	1.8	.62	1.1	.56	56	40.0	52.1	DM7
189	.21	.22	.92	.5	.40	1.5	.56	57	58.0	51.0	O5
189	.14	.18	.81	.9	.88	.5	.57	53	48.0	66.6	B4
189	.36	.18	.84	.8	.63	1.1	.57	56	52.0	41.5	O3
189	.43	.25	.72	1.6	.70	1.1	.57	52	52.0	55.7	SU5
189	.88	.15	1.11	.6	.64	1.2	.57	45	34.0	49.4	ST4
189	.40	.22	.88	.7	1.13	.6	.58	48	66.0	54.6	B6
189	.21	.21	.65	1.4	.86	.6	.58	52	.64.0	55.4	DM2
189	.30	.17	.80	1.1	.53	1.6	.59	49	36.0	55.1	PS1
189	.15	.21	.79	1.4	.70	1.1	.59	38	40.0	58.4	DE5
189	.36	.20	.80	.9	.68	1.2	.59	41	34.0	48.4	C4
189	.91	.15	.89	.5	.69	1.3	.60	52	52.0	65.8	CM1
189	.23	.22	.98	.0	.85	.6	.60	46	34.0	55.6	C5
189	.04	.21	.74	1.2	.95	.2	.60	52	40.0	51.0	P5
189	.12	.18	.64	1.9	.63	1.5	.61	46	58.0	46.6	O6
189	.16	.14	.83	.8	.58	1.6	.61	50	46.0	41.5	PS6
189	.35	.15	1.03	.2	.69	.9	.61	40	52.0	55.7	DE7
189	.21	.17	.79	1.2	.97	.0	.61	61	52.0	49.4	CT5
189	.01	.19	.88	.6	.70	1.2	.62	52	34.0	54.6	CT3

After deleting the misfit items of the scale, the findings of RM analysis showed that all items of the scale showed a positive value greater than .20. These results indicated that all items moved in parallel functions to measure the constructs formed. These findings indicated very good items signifying that all the items were appropriate for both further statistical analysis and inferences.

The reliability of the internal consistency of the scale was estimated using the Cronbach alpha, where it was 0.98, and this is considered an acceptable indicator for the progress of the scale-building procedures. A summary of the category structure on scale gradation and the size structure of the intersection, the schedules for grading scales, and calibration analysis of the scale as shown in Table 3. This table shows the most frequent answer is the scale of participants ranking 4, which is 286 (42%), the scale 5 of 270 (40%), then the scale of 3 of 108 (16%), following the scale of 2 of 6 (1%). The last grading scale was scale 1 of 4 (1%). The column of observed averages shows the pattern of respondents moving from negative to positive (-.70 to 2.34). This indicates a normal pattern based on the Rasch model.

Table 3. Calibration scaling analysis of leadership skills scale

Category Label	Observed Count %	Observed Average	Sample Expect	Infit MNSQ	Outfit MNSQ	Structure Calibration	Category Measure
1	4 1	-.07	-.27	1.16	1.34	Non	(-2.78)
2	6 1	.90	.07	1.69	3.02	-.14	-1.74
3	108 16	1.08	.52	1.43	2.81	-2.23	-.80
4	286 42	1.12	1.17	.92	1.74	.22	.86
5	270 40	2.34	2.46	1.16	1.10	2.15	2.97

However, the reliability analysis was tested and conducted with 86 items for the leadership skills scale among 50 gifted and talented students. The criteria for accepting reliability in Rasch Model is exceeding 0.50 (Linacre, 2007; Bond and Fox, 2007). In addition, acceptable separation should be more than 2 (Fisher, 2007). Data analysis of the reliability using the Rasch Model showed in table 4. The person reliability was very high at a value of 0.94, the person separation was 4.02, the item reliability was 0.69, and the item separation was 1.69, which was unacceptable.

Table 4. Person and Item separation and reliability for leadership skills scale

	Score	Count	Measure	Error	Infit		Outfit	
					MNSQ	ZSTD	MNSQ	ZSTD
Mean	452.4	189.0	2.37	0.46	1.09	-.5	1.04	0.01
S.D	54.0	0.0	2.18	0.15	.69	3.4	0.30	3.2
Real rmse	0.26							
Adj. sd	1.06							
Separation	4.02							
Person reliability	0.94							
Mean	205.7	86.0	0.0	0.28	1.00	0.0	1.07	0.1
S.D	13.6	0.0	0.50	0.02	0.28	1.2	0.66	1.6
Real rmse	0.20							
Adj. sd	0.32							
Separation	1.69							
Item reliability	0.71							

To answer the first question: What are the indicators of validity and reliability for the leadership skills scale? The construct validity of the scale was verified using two different methods.

First: construct validity according to the Rasch model. To verify the validity and reliability of the final leadership skills scale, the following criteria were done:

The validity of the scale was measured using MNSQ values for infit, and the results showed that the scale had an appropriate degree of validity. Scale validity scores according to MNSQ values fall within the safe limits, which should lie between 0.4 and 1.5. It is consistent with the item polarity analysis according to (PTMEA) values, whose value should be between 0.2 and 1. It has a suitable standardized fit statistic (Zstd) value, which should be between -2 and 2 as shown in table 5.

Table 5. Item Fit Analysis for leadership skills scale (Final copy)

Count	Measure	Model S. E	Infit		outfit		Pt-measure		Exact OBS%	Match EXP%	items
			MNSQ	ZSTD	MNSQ	ZSTD	CORR	EXP			
730	.09	.05	1.40	1.3	1.45	1.9	.48	.59	51.0	52.5	SU5
730	.68	.06	1.16	.6	1.43	1.5	.48	.54	57.9	9.3	SU2
730	.04	.05	1.32	-1.2	1.36	1.9	.50	.57	57.6	53.0	B1
730	.37	.06	1.24	1.4	1.42	1.7	.50	.58	58.8	58.4	SU1
730	.34	.05	1.51	1.8	1.41	1.6	.54	.64	49.6	50.3	CM3
730	.15	.05	1.28	-1.8	1.41	1.3	.55	.61	52.8	51.5	CM5
730	.23	.05	1.19	-.2	1.47	1.7	.56	.60	55.2	50.1	DM3
730	.59	.05	1.49	-.1	1.49	1.8	.57	.65	53.4	48.4	CM2
730	.05	.05	1.08	1.1	1.43	1.7	.57	.60	52.8	52.4	SU3
730	.42	.06	.89	-1.7	.92	-.8	.58	.56	58.2	55.3	CT1
730	.05	.05	1.22	-.5	1.30	-1.2	.58	.63	49.0	51.3	CT2
730	.01	.05	.97	1.5	.99	1.3	.58	.57	54.9	52.3	S1
730	.06	.05	.92	-.6	.97	1.7	.58	.57	63.5	52.5	OB4
730	.33	.05	1.33	1.4	1.43	-1.2	.59	.66	60.5	53.3	PS5
730	.10	.05	1.03	-1.1	.92	1.3	.59	.59	57.9	52.2	B3
730	.37	.05	.93	1.5	.89	1.7	.59	.57	51.0	53.6	C1
730	.19	.06	1.09	-1.9	1.26	-1.5	.59	.62	67.4	54.6	DE3
730	.32	.06	1.23	-.1	1.42	-1.0	.59	.65	62.3	54.9	SU4
730	.20	.05	.84	-1.4	.77	-.2	.60	.65	58.4	52.5	DM4
730	.08	.05	.98	-1.0	.91	1.7	.60	.59	51.0	4.3	CM4
730	.44	.05	.99	-1.0	.98	-1.4	.60	.59	57.9	53.0	OB1
730	.01	.05	1.06	-1.7	1.14	-.4	.60	.54	57.6	58.4	P1
730	.56	.05	.86	-1.5	.79	1.9	.60	.57	58.8	50.3	S4

730	.44	.05	.97	-.3	.97	.1	.61	.58	49.6	51.5	DE1
730	.59	.05	1.34	-1.9	1.44	1.9	.61	.64	52.8	50.1	PS3
730	.02	.05	.96	-1.8	1.01	-1.9	.61	.61	55.2	48.4	DE5
730	.30	.05	1.14	-1.6	1.28	1.7	.61	.60	53.4	52.4	CT5
730	.19	.05	.93	-1.2	.84	-1.6	.61	.65	52.8	55.3	P2
730	.42	.06	1.09	1.1	1.13	-.6	.62	.60	58.2	51.3	OB3
730	.52	.06	.85	-.6	.86	-1.9	.62	.56	49.0	52.3	S5
730	.05	.06	.99	.7	.95	.8	.62	.63	54.9	52.5	B5
730	.36	.05	.81	-1.7	.69	-1.8	.62	.57	63.5	53.3	S2
730	.09	.05	.94	-1.4	1.06	-1.2	.62	.57	60.5	52.2	PS2
730	.06	.05	.94	-1.9	.88	-1.7	.63	.66	57.9	53.6	PS1
730	.20	.05	.91	-1.2	.91	-.4	.63	.59	51.0	54.6	DE4
730	.30	.05	.83	-1.0	.77	.7	.63	.57	67.4	54.9	S3
730	.16	.05	.88	-1.3	.97	-1.5	.63	.62	62.3	55.3	P4
730	.01	.06	.88	-1.2	1.05	-1.9	.63	.65	58.4	51.3	P3
730	.03	.05	.81	1.4	.73	-1.0	.63	.65	63.5	52.3	ST1
730	.10	.05	1.06	-1.1	.86	-1.3	.63	.59	60.5	52.5	DM5
730	.17	.05	.97	1.5	.74	-1.1	.63	.59	57.9	53.3	B4
730	.11	.05	1.04	-1.9	.90	-1.6	.63	.57	51.0	52.2	C3
730	.16	.05	.85	-.1	.84	.5	.64	.66	67.4	53.6	DE2
730	.09	.05	.87	-1.4	.72	-.8	.64	.59	62.3	54.6	B2
730	.46	.05	.81	-1.0	1.03	-.2	.64	.57	58.4	54.9	P5
730	.35	.05	.94	-1.0	.94	1.7	.64	.62	51.0	52.5	DM2
730	.06	.06	.87	-1.7	.77	-1.4	.64	.65	57.9	54.3	CT3
730	.12	.06	.84	-1.5	.91	-.4	.64	.65	57.6	53.0	OB5
730	.07	.05	.79	-.3	.98	1.9	.64	.59	58.8	58.4	ST4
730	.12	.05	.83	-1.9	1.14	.1	.65	.59	49.6	50.3	ST2
730	.14	.05	.96	-1.8	.79	1.9	.65	.54	52.8	51.5	PS4
730	.28	.05	.82	-1.6	.97	-1.9	.65	.57	55.2	50.1	ST3
730	.00	.05	.82	-1.2	1.44	1.7	.65	.58	53.4	48.4	C4
730	.42	.05	.80	1.1	1.01	-1.6	.66	.64	52.8	52.4	C2
730	.20	.05	.83	-.6	1.28	-.6	.66	.61	58.2	55.3	CM1
730	.16	.06	.83	.7	.84	-1.9	.66	.60	49.0	51.3	CT4
730	.06	.05	.97	-1.7	1.13	.8	.66	.65	54.9	52.3	OB2
730	.04	.05	.84	-1.4	.77	-1.8	.67	.60	63.5	52.5	C5
730	.01	.05	.82	-1.9	.74	-1.2	.68	.56	60.5	53.3	DM1
730	.18	.05	.83	-1.2	.81	1.7	.69	.63	57.9	52.2	ST5

To verify the reliability, the reliability of the scale was measured using the person reliability, which means the degree of reliability of the individuals responding to the scale. Item reliability of the scale was also calculated, which intended to mean the reliability of the item of the scale. The results of the study revealed that the scale has an appropriate degree of reliability for the items and persons on the scale, as shown in Table 6.

Table 6. Person and Item separation and reliability for leadership skills scale.

	Score	Count	Measure	Error	Infit		Outfit	
					MNSQ	ZSTD	MNSQ	ZSTD
Mean	242.5	60.0	1.96	0.34	1.09	-0.4	1.08	0.5
S.D	39.8	0.0	2.02	0.45	0.70	3.6	0.69	3.5
Real rmse	0.26							
Adj. sd	1.93							
Separation	3.45							
Person reliability	0.92							
Mean	2951.0	730.0	.00	.05	1.00	0.2	1.08	0.5
S.D	97.7	0.0	.50	.02	0.28	1.2	0.66	3.9
Real rmse	0.06							
Adj. sd	0.27							
Separation	3.94							

Item reliability	0.96
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To verify the assumption of one-dimensionality of the scale items, two methods were used, one-dimensionality according to the Rasch model and using indicators that depended on the analysis's principal components. Moreover, to ensure the content and construct validity, they should be determined the dimensionality. To achieve one dimension and one direction, it should be the raw variance explained by measures of more than 40% and unexplained variance in 1st contrast of less than 15 (Mofreh et al., 2018; Mofreh et al., 2017). Therefore, dimensionality data results are appropriate to the Rasch model, as shown in Table 7.

Table 7. Item dimensionality of the leadership skills scale

	Empirical		Modeled
Total raw variance in observations	104.9	100%	100%
Raw variance explained by measures	44.9	42.8%	43.0%
Raw variance explained by persons	22.1	21.1%	21.2%
Raw Variance explained by items	22.8	21.7%	21.8
Raw unexplained variance (total)	60.0	57.2%	100%
Unexplained variance in 1st contrast	3.8	3.6%	6.3%
Unexplained variance in 2nd contrast	3.1	2.9%	5.2%
Unexplained variance in 3rd contrast	2.8	2.6%	4.6%
Unexplained variance in 4th contrast	2.5	2.4%	4.2%
Unexplained variance in 5th contrast	2.3	2.2%	3.8%

Second: indicators that depended on the analysis's principal components.

An oblique rotation was carried out using the (Promax) method for the extracted factors whose Eigen value is greater than one. Table 8 below shows the results using the Promax method.

Table 8. Eigen value explained variance, and cumulative explained variance

Component	Initial Eigenvalues		
	Total	% Of Variance	Cumulative %
1	28.755	47.924	47.924
2	2.115	3.526	51.450
3	1.707	2.845	54.295
4	1.601	2.668	56.964
5	1.397	2.329	59.292
6	1.307	2.178	61.470
7	1.262	2.103	63.573
8	1.067	1.779	65.352
9	1.023	1.704	67.057

Table 1 shows the presence of 9 factors with an Eigenvalue greater than 1. The eigenvalue of the first dimension reached (28,755) and it is a high value compared to other values. The ratio of the first Eigenvalue to the second Eigenvalue is about (13.6) which is greater than 2. This is an indication of one-dimensionality. The explanatory variance ratio for the first factor (47.924) it's greater than 20%. This is an indication of one-dimensionality. Figure 1 below shows the relationship between the Eigenvalue and the ranks of the factors.

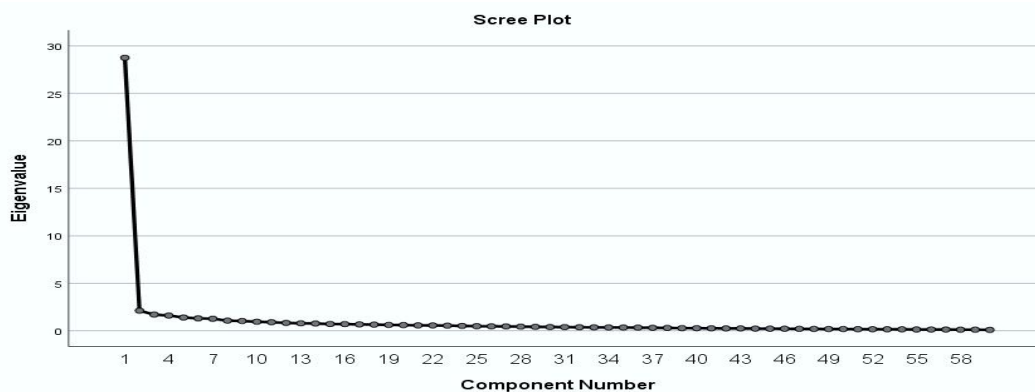
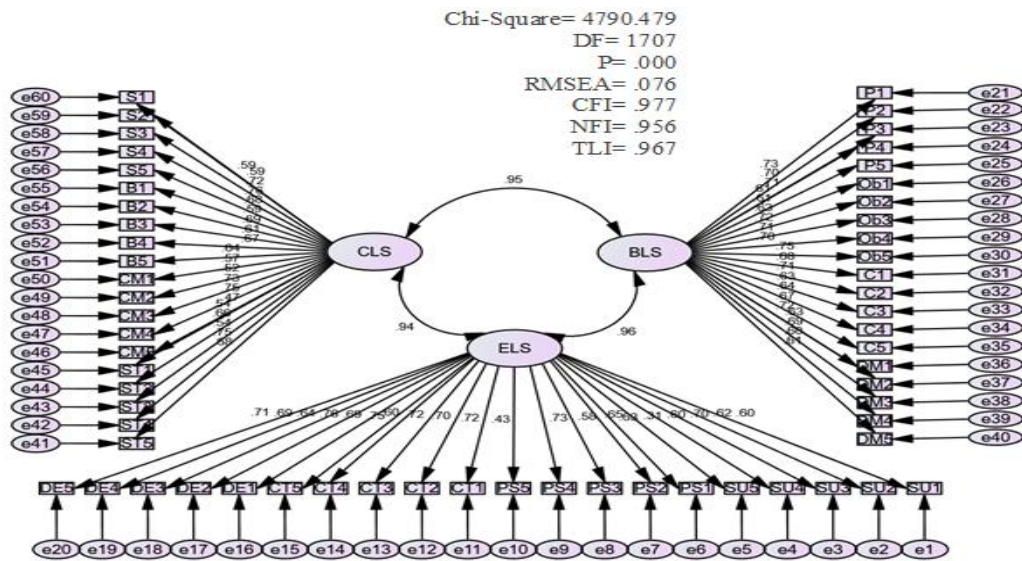


Figure 1. The relationship between the order of roots and Eigenvalue

Figure 1 shows a high first Eigenvalue compared to other factors values. This indicates unidimensional verification. It also notes the significant difference in the value of the first Eigenvalue and the second Eigenvalue.

To verify factorial construct validity, the scale was applied in its final copy to the study sample to conduct a confirmatory factor analysis of the scale items within their dimensions, where the adopted model was drawn for the relationship of the scale items consisting of (60) items and distributed over three dimensions as shown in Figure 2 below.



confirmatory factor analysis of the model adopted for the relationship of the scale items to its dimensions

Figure 2 shows the degree of loading of each item in its dimension. The results showed that a high degree of loading was achieved for each item in its dimension. The results also showed the existence of a strong correlation between the dimensions of the scale. The results of the correlation coefficient between the five dimensions of the scale confirmed the existence of a strong and positive correlation between these dimensions. Indicators of the internal construct validity extracted show the values of the indicators of the validity of the internal construction of

the scale items, as shown in Appendix H, to confirm the results of the confirmatory factor analysis of the model adopted for the relationship of the scale items to their dimensions. Bendix H also showed that the model matches the relationship of the scale items to the data. It also confirmed that all the indicators match the criteria used in this study, which indicates the stability of the model for the relationship of the scale items.

To answer the second question, what are the criteria for interpreting the score on the leadership skills scale?

It is necessary to reveal the difference in the degree on the scale according to gender. The means and standard deviations of the study sample estimates were calculated on the items of the scale according to gender, as shown in table 9 below.

Table 9. The means and standard deviations of the sample estimates on the items of the scale based on gender, gifted and academic Branch

	Mean	N	Std. Deviation
Male	3.9826	262	.70086
Female	4.0514	468	.64740
Total	4.0267	730	.66742
Gifted	4.0032	273	.66846
Non-gifted	4.0408	457	.66713
Total	4.0267	730	.66742
Scientific	4.0164	563	.67023
Literary	4.0616	167	.65863
Total	4.0267	730	.66742

Table 10 shows that there are apparent differences between the means of the study sample's estimates on the scale items. To determine the statistical significance of these differences, a two-way analysis of variance was applied as shown in table 10 below.

Table 10. Results of two-way analysis of variance of differences between the means of responses of sample

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	1.039a	3	.346	.777	.507
Intercept	10207.529	1	10207.529	22894.233	.000
Gender	.796	1	.796	1.785	.182
Gifted	.243	1	.243	.546	.460
Gender * Gifted	.028	1	.028	.063	.802
Error	323.691	726	.446		
Total	12161.453	730			
Corrected Total	324.731	729			

Table 10 shows the value of the statistical significance of the gender and gifted are (.182) and (.460), respectively, where the significant level was greater than 0.05, which indicates that there were no statistically significant differences on the scale based on gender and gifted. In addition, the value of the statistical significance of the interaction between gender and gifted is (.802), where the significant level was greater than 0.05, which indicates that there were no statistically significant differences on the scale based on the interaction between gender and gifted (Table 11).

Table 11. Results of two-way analysis of variance of differences between the means of responses of sample

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	1.247a	3	.416	.933	.424
Intercept	7602.538	1	7602.538	17062.488	.000
Gender	.972	1	.972	2.181	.140

Collage	.118	1	.118	.266	.606
Gender * Collage	.201	1	.201	.451	.502
Error	323.484	726	.446		
Total	12161.453	730			
Corrected Total	324.731	729			

Based on the previous results, the percentile ranks calculated for each raw score of the sample estimates on the scale items as shown in table 12 below.

Table 12. The percentile ranks for each raw score of the sample estimates on the scale items

raw score	percentile ranks	raw score	percentile ranks	raw score	percentile ranks	raw score	percentile ranks
28	4	216	30	410	56	582	80
60	8	228	31	419	57	595	81
67	9	234	32	422	58	599	82
71	10	242	33	431	59	609	83
81	11	249	34	436	60	611	84
86	12	255	35	449	61	623	85
94	13	265	36	452	62	626	86
100	14	271	37	463	63	638	87
108	15	281	38	467	64	640	88
116	16	286	39	478	65	651	89
122	17	294	40	480	66	655	90
131	18	300	41	491	67	666	91
140	19	310	42	497	68	669	92
146	20	315	43	505	69	678	93
152	21	321	44	508	70	684	94
158	22	329	45	522	71	695	95
160	22	337	46	525	72	700	96
168	23	340	47	536	73	712	97
174	24	364	50	538	74	714	98
182	25	374	51	551	75	724	99
190	26	377	52	554	76	730	100
198	27	387	53	566	77		
204	28	391	54	568	78		
212	29	405	55	578	79		

Table 12 shows the sample estimates on whole scale items, which ranged between 28 with a 0.04 percentile rank and 730 with a 100-percentile rank.

Discussion

The gifted student constitutes a great value to society and of unlimited benefit, and this is what is attributed to educational scholars for recommending that the gifted be given great care to push their abilities to the highest limit, especially their leadership ability. Gifted students are known for their leadership qualities. Leadership skills and traits are among the most important phenomena of social interaction among gifted and talented students and one of the most important phenomena in the field of human relations, as leaders influence and direct the activity of the student group, the extent of its production, and the prevailing spirit among its members. Leadership has a social role characterized by the ability and power to influence. Leadership behavior is the behavior of gifted students to help them achieve group goals, move the group towards these goals, and improve social interaction among students.

This scale presents the leadership traits, which are the relatively stable and purposeful part of the student's personalization, which refers to the continuous and habitual behavior approach that characterizes the individual and through which influences the behavior of others by performing various roles and tasks to achieve the goals and tasks set, and it represents the fixed

part of the personality which relate to the usual pattern during the performance of roles, responsibilities, and skills. Its importance is because Leadership is a vital and essential trait, the force that directs energies, supports the positive behavior of students, and gives them the ability to keep pace with changes. The leadership traits of students are often related to the degree of social adaptation and the ability to give, and effect change. Manning (2005) mentioned in an article that gifted students possess high leadership capabilities and that educational services must be provided outside the scope of what schools provide to develop these capabilities. In addition, it is possible to enhance the leadership skills of gifted students through practice. This is necessarily related to the identification of the leadership traits of the gifted.

The results of this study provide evidence that gifted students possess high levels of leadership traits, which makes it necessary to develop special plans to develop leadership skills for gifted students of both males and females. This measurement came to cover basic aspects of the gifted or talented student's personality, and it addressed three main dimensions represented: Emotional skills, basic leadership skills, and creative leadership skills. Each dimension also implicitly includes sub-dimensions, the items of which represent implications for students' leadership skills and necessarily reflect the importance of revealing these traits, leading to the identification of rehabilitation programs that contribute to building and developing students' leadership skills and enhancing the practice of leadership tasks.

To answer the first question; the procedures included in the Rasch model were applied to the pilot study, which included finding the means of the internal and external matching statistics and keeping only the items that are close to the 1 and whose deviation is close to zero. And the weighted means showed consistency between the individuals' responses and the overall scale scores and measured the concordance through the method of item distribution as shown in figure 1. All these procedures led to reducing the items of the scale by deleting (26) items, and the scale became ready to be applied to the study sample. These measures are sufficient and supportive of the validity and reliability of the scale.

The second application of the scale included the same procedures. In addition, the construction of the scale was validated using two different methods, the Rasch model, and using indicators that depended on the main components of the analysis as well as determining the dimension as shown in Appendix E, and the values related to the person separation and reliability for leadership skills scale indicates that the scale has an acceptable degree of reliability. Figure 1 also shows a high initial eigenvalue compared to the values of the other factors indicating unidimensional validation, with the great difference in the value of the first eigenvalue and the second eigenvalue in another indication of the appropriateness of the scale. The correlation of each dimension of the scale with its items was verified, as shown in Figure 1. The results showed that a high degree of loading was achieved for each item in its dimensions. The results also showed a strong correlation between the dimensions of the scale. The results of the correlation coefficient between the three dimensions of the scale confirmed the existence of a strong and positive correlation between these dimensions.

Appendix H shows the values of the internal construct validity indicators for the items of the scale. It also showed that the model matches the relationship of the scale items to the data. It also confirmed that all indicators match the criteria used in this study, which indicates the stability and reliability of the model for the relationship of the scale items.

The previous procedures are sufficient as indicators of the validity and reliability of the leadership skills scale. This means that the skills included under its three main dimensions: emotional skills (self-understanding, problem-solving, critical thinking, and differentiated experiences), basic leadership skills (planning, organization, communication, decision-making), creative leadership skills (motivation, team building, conflict management Strategic thinking) are comprehensive skills capable of predicting leadership among gifted and talented students, and they can be used to reveal the leadership abilities of the age group that has been tested, and this, in turn, contributes to enhancing leadership opportunities for gifted students in universities and societies. By enhancing leadership opportunities, talents have been enhanced. Ideal traits, lifelong learning skills, and demographic characteristics that are believed to influence the leadership qualities of gifted and talented students can enhance talent capabilities, and this

makes it a suitable enrichment curriculum for students who are expected of them.

To determine the criteria for interpreting the result on the leadership skills scale, the difference in the score on the scale according to gender, the characteristics of the student (gifted, non-gifted), and according to the college (scientific, humanity) as shown in Table 2. The results showed that there are no statistically significant differences between the means of estimations of the study sample on the scale items for all those variables. In addition, the result of the percentile ranks for each raw degree of the sample estimates on the items of the entire scale ranged between 28 with a percentage rank of 0.04 and 730 with a rank of 100 percent as shown in Table 15. This means that the criteria for interpreting the skills scale are appropriate and represent values that can be relied upon and built upon. These values also give confidence in the integrity and comprehensiveness of the curriculum and its explanatory ability to the leadership abilities of gifted students in that age group (19-23) years. These results can be built upon, and the scale can be used to identify and reveal the leadership abilities of gifted students in universities and higher education institutions. According to the previous data, this scale can be used in many aspects related to leadership training programs, honor programs at universities, programs for preparing young leaders, as well as enrichment programs for gifted students around the world. The values and the methodology used in the rationing gave confidence in the scale and paved the way for its high efficiency.

The results of the study showed agreement with some of the leadership qualities of gifted students in different fields of study, which are similar to the results of many previous studies related to the leadership qualities of gifted students of the age group addressed in the current study, including: (Gilliam, et. al., 1996; Friedman et al. 1984; Chan, 2000; Sternberg, 2005; Lee and Pfeiffer, 2006). However, it includes a unique classification that can be developed through further future studies, and the results of this study can also be built on in framing leadership traits for talented students in other age groups and can be built upon for academically superior students at the university level, many of the common features especially if the environment is similar.

Conclusion and future directions

Leadership is an important feature, and leadership skills are essential skills in building and developing talents. The results of the study showed that leadership capabilities could be identified and revealed, paving the way for the detection of future leaders in universities, and thus their development, and supplying them to be future leaders. The results of this scale can be globalized for the same age group, and it can also be built on and integrated with other leadership skills, especially soft skills and those shown by the results of field experiments for studies concerned with preparing future leaders. Based on the results of the study on the possibility of measuring the leadership skills of gifted and talented students, the study recommends using the current scale to determine the leadership skills of students of the age group (19-23). The detection process is expected to be accurate according to the exact results and procedures that the scale passed. Future studies can also expand into new dimensions through which it can be judged on students' possession of leadership skills and the use of other sub-fields according to developments in the field of leadership. Although the scale was built and technical in an Arab setting, it can be expanded for use in many other university environments in Middle Eastern and Asian countries due to the similarity of the environment. This means that the standard can have a global character if it is developed in more than one country. Leadership is global in thought and achievement despite its local origin.

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