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THE EDUCATIONAL APPLICATIONS OF GREEN EDUCATION IN THE UNITED ARAB EMIRATES (A GLOBAL MODEL TOWARD SUSTAINABLE DEVELOPMENT AND LEADERSHIP IN EDUCATION)

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ABSTRACT

The study will explore the reality of the application of the educational applications of green education in the educational institutions in the United Arab Emirates and the consequences of the mentioned application to the realization of the objectives of sustainable development and leadership in education. Moreover, it aims to demonstrate the innovative nature of the UAE in implementing green education in its institutions, among other aspects, by answering the research questions. The current research takes the descriptive-analytical approach and uses two questionnaires as data-gathering tools. A sample consisting of about 432 teachers of different specialties was given the first questionnaire whereby the researcher was trying to measure the current usage of the educational application of green education in the UAE to meet the sustainable development goals and leadership of education. A stratified random sample of 150 experts and administrators; 30 experts and 120 administrators, was used to administer the second questionnaire with the role of educational applications of green education in the attainment of sustainable development goals and educational leadership in the UAE.

KEYWORDS: Green Education; Educational Applications; Educational Leadership; Sustainable Development.

1. INTRODUCTION

Green education can be regarded as one of the most salient modern tendencies in education thought to strengthen the tenets of sustainable learning and cope with the increasing environmental and climatic issues. This is through incorporation of the principles of sustainable development in the educational system either at the level of curricula and instruction or within the management of the educational institutions with the focus on pedagogical practices and practical applications that impart on the students the knowledge and behaviors required to defend the environment and improve their capacity to contribute at the level of attaining the sustainable development goals.

In this regard, developed countries have accorded much importance to the integration of the concept of green education in their policies and learning systems. United Arab Emirates is at the center of such countries with its implementation of a comprehensive green education strategy, which is based on four primary pillars: introducing environmental education concepts into the school curriculum to promote environmental awareness; transforming the school environment towards green-ness in order to become a successful example of sustainability; developing the skills of educators and students in order to enable them to address environmental issues; organizing extracurricular activities so that to promote the practical application and innovation in the given field.

These pillars have been put into practice under a number of innovative initiatives initiated by the state, with the most significant being the Sustainable Schools Initiative, Green Schools, and the Green Education Center, which acts as the centerpiece of the educational initiatives in the United Arab Emirates and serves as a digital platform in enhancing the international partners who are interested in the green education. The Center was built around four coherent pillars green curricula, green schools, green capacity building and green communities which constituted a comprehensive framework of institutionalizing the sustainability concepts and turning them into a real world.

The significance of green education and its practical role in shaping the educational process and improving the quality of learning has been highlighted by many educational researches and studies. The United Arab Emirates is one of the first nations which actively accept and practice the idea of green education to fulfill its three dimensions of sustainability including the environmental, social and economical ones, and solidify its role as the first nation of sustainable education at the Arab and international levels. Among these studies are:

1. **Sandra Baroudi & H. Abi Haida (2025)**, that sought to examine sustainability practices in secondary education in the UAE, determine their conformity with national policies related to sustainability, and evaluate their implementation in schools and determine the barriers and suggest realistic solutions that can improve the process of introducing sustainability into the learning process.
2. **Akinsemolu & Onyeaka (2025)**, which sought to explain the contribution of green education to sustainable development agenda by examining the world literature about sustainable education with a recommendation that the principles of sustainability should be integrated in curricula and education activities to ensure it becomes a core component of creating a sustainable green economy.
3. **Faiza Ahmed Mujahid (2025)**, that sought to introduce a proposed educational vision to foster a culture of green education, and it took the advantage of international and Arab experiences in the application of green education in schools and other education institutions, and emphasize the position of the UAE as an advanced applied model in the same area.
4. **Taleh bin Abdullah Al-Asmari (2025)**, which dealt with green education in the Arab countries and sought to come up with a strategic framework to improve the sustainability given the best international and regional practices.
5. **Ali Ahmed Barakat (2024)**, the purpose of which was to identify the beneficial effect of parents in advancing green education practices among children in the Emirate of Sharjah, proving that the success of these practices is due to the Emirati society being aware of the significance of ethical and religious values, which, in fact, made it possible to initiate practices of green education in children.
6. **Shaimaa Abdel Hafiz & Gamal Mansour (2024)**, that sought to examine how green education can consolidate the values of sustainable development through assessment of curricula and educational programs to increase environmental awareness of learners and show how it is relevant in creating a

sustainable knowledge-based economy in accordance with the demands of the present environmental age.

7. **Lubna Hussein Al-Ajmi & Mona Matar Al-Zahrani (2024)**, that aimed to identify the degree of awareness of green education skills among female teachers through the teaching practices and coming up with a proposed framework that would help in boosting the environmental, social, and economic competencies, environmental protection, and rationalization of resource use in accordance with the sustainable green education provisions.

Based on the above, the study seeks to illuminate the present state of implementation of green education application in educational institutions in the United Arab Emirates, evaluate the challenges and opportunities involved in integrating it into the education process, and offer scientific contributions and suggestions that can help the country increase its efforts towards a sustainable development and leadership in the education sector, by answering the research questions.

1.1. Research Problem

Based on the above, the research problem will be outlining the current position of the application of green education in educational applications in the United Arab Emirates with the aim of attaining sustainable development goals and education leadership. This could be resolved responding to the following questions:

1. What is the present condition of educational applications of green education by the UAE in order to attain sustainable developmental targets and educational leadership?
2. How can learning uses of green education help meet sustainable development goals in the UAE?
3. How does the use of green education in education in the UAE lead to educational leadership?

1.2. Research Objectives:

This study aims to:

1. Study the existing application of green education to education.
2. Determine the obstacles to implementing green education in learning institutions and suggest the relevant mechanisms to defeat these challenges.
3. Research the connection between upholding green education practices and attainment of sustainable development objectives.
4. Examine the connection between green education educational applications and educational leadership achievement.

1.3. Significance of the Study

1. Increasing the environment awareness of students by means of practical activities and applications of green education that will be offered in the course of the current research.
2. Building the professional and pedagogical skills of educators and curriculum developers by giving them efficient approaches in implementing green education, along with investigating its effects on the attainment of the sustainable development objectives and the development of the educational leadership.
3. Promoting the implementation of the latest pedagogical methodologies at the educational institutions that will safeguard the environment, consequently, help to increase environmental awareness among the population.
4. Adding to the existing body of research on education regarding the modern-day suggestions on the educational use of the green education and its connection to sustainable development and educational leadership, offering scientific works that lead to the breaking of new grounds in future educational activities.

1.4. Scope of the Study:

1. The researchers are confined to the educational institutions within the United Arab Emirates that practice or attempt to practice green education.
2. The research incorporates professionals and educators, similarly to students as the main beneficiaries of the educational applications of green education.
3. The research aims at examining the educational uses of green education and how they are applied in practice, and also how they contribute to the process of attaining sustainable development goals and educational leadership.
4. The research method used in the study is the descriptive research method; the study will investigate the present reality of the applications of green education, gather statistical data with the help of the questionnaires and consider the specialized literature devoted to the topic of the research.

1.5. Study Terms

1.5.1. Green Education

Green education is considered to be a new way

of education, which orientates their policies and their programs to the sustainable development by using two principal lenses: the first lens is connected by the environmental programs, buildings, landscaping and services and the second lens by the educational process and curriculum development, activities, applications, and environmentally friendly practices (Marwa Abdel Jawad, 2024: 11).

It can also be described as a modern approach to learning with a goal of sustainable development and maintaining a pace with the emerging technology by way of interaction and harmonious living with the different environmental forces. (Fahd Al-Omari & Abeer Al-Harbi, 2023: 37).

In this paper, the roles of green education in education can be operationally defined as a collection of pedagogical practices and activities in enhancing the ideas of sustainable green education in the synthesis of sustainable ideas of sustainability in curricula, educational programs, activities, projects, and environmental projects with the view of realising the sustainable development targets and leadership in education.

2. THEORETICAL FRAMEWORK OF THE STUDY

2.1. Green Education: Its Concept, Principles, and Teaching Strategies

2.1.1. First: The Concept of Green Education

Green education has been discussed as one of the most notable modern educational tendencies, which have been rapidly growing into the limelight lately, especially due to the growing pace of climatic and environmental alterations, as well as the technological advancements like artificial intelligence. As a consequence of the significance of such education in solving environmental issues, educational organizations have undertaken the initiative to utilize artificial intelligence technologies and smart educational systems to improve the sustainable practices and behaviors and the decrease in the consumption of environmental resources, as part of the global trends on sustainable education and green development.

Green education does not only focus on the use of technologies, applications, strategies, and practices that enable the development of educational curricula; it applies to the environment and infrastructure as well, eco-friendly structures, landscaping, use of green sources of energy, and development of specializations that help propagate the culture of green environment (Faiza Mujahid, 2025: 234).

2.1.2. Second: Principles of Green Education:

According to (Taleh Al-Asmari, 2025: 126), (Green Education Center, 2025), (Nawal Al-Qahtani, 2024: 294–295), (Feryal Abu Sitta & Shaimaa Samir, 2024: 197), and (Shaza Imam, 2023: 407), green education is based on a set of principles that work together to achieve the goals of sustainable development. In the current study, these principles can be classified into four main axes, which are:

1. **Principles Related to Green Institutions:** These concentrate on environmental friendliness of educational institutions through the provision of sustainable green buildings, widely spreading the environmental educational practices among the students and community, and using the artificial intelligence tools and educational platforms to facilitate sustainable practices.
2. **Principles Related to the Green Curriculum:** The latter serve to create the content of curricula and academic courses and to innovate the comprehensive methods of teaching and evaluation that would comply with the demands of sustainable education. They also aim at connecting theoretical and practical actions that demonstrate green behavior both inside the education community as well as outside.
3. **Principles Related to Green Capacity Building:** These are supposed to equip and train teachers and students in sustainable education skills, increase their environmental awareness and allow them to use sustainable ways of teaching and learning in their educational practices. Another aspect that they promote is to disseminate the culture of green education in the educational community and to apply modern technologies in a manner that serves the environment and improves the quality of the education process.
4. **Principles Related to Green Communities:** These highlight the need to build global and local alliances to assist in sustainable education practices, motivate students and educators to create projects, programs, and extra-curricular activities to help in sustainable education, and developing the bond between schools and the surrounding community through their involvement in environmental activities.

2.1.3. Third: Green Education Strategies

There is a set of teaching strategies suitable for

green education, which can be classified as follows:

1. **Teaching Strategies Based on the Integration of E-Learning and Artificial Intelligence Tools:** These strategies allow the application of intelligent tools to apply green education and it contains some sub-strategies, including, but not limited to, the use of the blended learning, virtual and augmented reality, virtual simulations, and digital games.
2. **Teaching Strategies Based on Collaborative Work:** These are the most appropriate strategies to implement the principals of green education as they cultivate an attitude of cooperation and mutual responsibilities among the learners. Among the essential ones, one can single out the project-based learning, Jigsaw strategy, brainstorming, guided group discussion, and task analysis, to name a few.
3. **Teaching Strategies Based on Experimentation and Observation:** Such approaches are based on the involvement of students in the practical and close working process which presupposes the contacts with the environment and community and contributes to the effective study and profound comprehension of the ideas. The key ones are outdoor learning, service based learning, field trips, site visits and performance based learning.
4. **Teaching Strategies Based on Values and Attitudes:** These tactics should inculcate moral values and environmental sustainable practices among the learners to enable them to relate well with the environment and the society. Major ones are reflective learning, value-based learning, problem-solving, creative thinking, and ethical-guided learning among others.

2.1.4. Fourth: Educational Applications of Green Education in the United Arab Emirates

The UAE experience in green education reflects the high level of the interest of the country in achieving the realization of the concepts of sustainability into effective and realistic educational practice. The problem of environment and climatic issues are now included in the curriculum and learning activities and schools turned into model environments of sustainable learning. Much consideration has also been paid to educating and developing the skills of the educational personnel in the green education area. To illustrate some of these efforts and initiatives, it is possible to mention some of them:

1. **Green Educational Institutions:** These are measures that are set toward making the learning environment a living example of sustainability and green education. The most pronounced of them are:

a. **Green Education Center:** It is an environmental education special education center, the first of its kind, which was opened at the COP28 convention. It has the goal of encouraging schools to implement sustainability policies, prepare curricula, and green environmental capacities (Ministry of Education, 2025).

b. **Sustainable Schools:** It is a full-scale environmental project that the Environment Agency- Abu Dhabi launched together with Ministry of Education and Department of Education and Knowledge. It tries to engage students, teachers, parents, and administrators to the community and ensures that they become more sustainable by conducting the environmental audits, environmental clubs, and teacher training, and it is expected to minimize the environmental footprint and increase the positive influence of the school (Sustainable Schools, 2025).

c. **Sustainable Leadership Schools:** They are the innovative schools in the Sustainable Schools initiative who set and steer other schools towards meeting the target of environmental sustainability following their exemplary performances in minimizing the environmental impact. Such schools offer assistance, training and consultation to other schools associated with them in environmental auditing and are assessed with reference to the Green Stars system depending on their performance and collaboration in developing the capacities of other schools.

d. **Green Stars:** This is an expansion of the Sustainable Schools program where schools are rated twice based on the components of the initiative. The schools are given the color (red, orange, yellow, green) according to their performance, and then rated as 1-5 stars depending on the level of their commitment in sustainability, which could be raised every year. (Green Stars, 2025).

e. **Sustainable Universities:** The Environment Agency - Abu Dhabi launched this initiative to empower the young people in higher education (18-35 years old) to be the leaders in sustainability by conducting green university audits, sustainable work projects, and youth councils to create environmental awareness and establish sustainable communities (Sustainable Universities Initiative, 2025).

2.2. Green Curriculum

a. **The Big Green Lesson:** The UAE Ministry of

Education initiated this initiative as a part of the COP28 conference. It has got six lessons that spread out in four levels, covering all the educational stages on lower and upper primary up to preparatory and secondary levels. Such lessons are taught during academic classes or classroom sessions so that environment education integration takes place at every level of education.

b. **A Global Framework for Climate Education Development:** The UAE Ministry of Education introduced this framework in partnership with UNICEF to create climate education, which implies the participation of children and teachers in practical programs and activities to introduce green education (Ministry of Education, 2023).

2.3. Green Capacity Building

a. **Green E-Learning Platform:** This is an electronic educational resource first of its kind focusing on environmental issues in the Middle East, which was introduced by the Environment Agency -Abu Dhabi. The platform will help students and teachers to improve their environmental consciousness and equip them with skills and knowledge to tackle the problem of the environment (Green E-Learning Platform, 2025).

b. **Global Framework for Teacher Capacity Building:** Launched by the UAE Ministry of Education in collaboration with UNICEF, this framework aims to develop climate education and build teacher capacities. The UAE has successfully trained over 10,000 teachers and 1,300 educational administrators under the green capacity-building axis (Ministry of Education, 2023).

c. **Future Sustainability Leaders:** This is a global program that Abu Dhabi Future Energy Company introduced to equip the future leaders of sustainability so that the youth will be able to use their talents to guide their communities to the path of a sustainable future (Youth for Sustainability Platform, 2025).

d. **Teachers' Voice Initiative:** Introduced by the UAE Ministry of Education in cooperation with the Climate Education Office and Alf Education, this project is intended to raise awareness about the work of educational personnel in the context of environmental awareness and climate change mitigation, presenting their projects and experience in that direction.(Ministry of Education, 2023).

2.4. Green Communities

a. **Strategic Partnership between the Ministry of Education and UNICEF:** The vision of this partnership is to spread green education through offering environmental skills to children and youth, improving sustainability awareness, and training teachers and climate-neutral champions (Ministry of Education, 2023).

b. **Partnership between the Ministry of Education and the International Renewable Energy Agency (IRENA):** With this partnership, the topics of renewable energy and sustainable development can be included in the national education system, where students can be involved in sustainable development and green education (Ministry of Education, 2019).

c. **Youth Green Council Initiative:** This program was initiated by the Environment Agency -Abu Dhabi and seeks to provide training and empower youth, increase environmental awareness, encourage innovation and commitment among the community and create a network of youths who can facilitate sustainability objectives (Sustainable Universities, 2025).

d. **"Naturally Educated" Podcast:** This podcast is part of the Sustainable Universities initiative, which offers environmental content in the form of UAE environmental experts and seeks to raise awareness and take action on the environment (Environment Agency, 2025).

3. RESEARCH METHODOLOGY AND PROCEDURES

3.1. Population and Sample of the Study (Teachers)

As per the recent statistics of the Ministry of Education, there are 31,842 teachers in the United Arab Emirates. According to the tables provided by Morgan and Krejcie, 380 teachers are the minimum number of participants. The researchers chose stratified random sample of the original population of 432 teachers of either sex and with different specialties such that the sample was representative of the original population. This sample was surveyed using the questionnaire developed to evaluate the level of current application of green education educational applications in the UAE in the achievement of sustainable development goals and educational leadership and distributed based on the gender and specialization as illustrated in the table that follows:

Table 1: Distribution of the Teacher Sample According to Gender and Specialization

Variable		Frequency	Percentage
Percentage	Male	227	52.5
	Female	205	47.5
Specialization	Arabic	231	53.5
	Languages	94	21.75
	Science & Mathematics	107	24.75
Total		432	100

It is evident from Table (1) that the proportion of male participants in the sample is higher than that of female participants, with percentages of **52.5%** and **47.5%**, respectively.

It is also evident from Table (1) that the proportion of participants specializing in Arabic is higher than those specializing in Science & Mathematics and Languages, with percentages of **53.5%**, **24.75%**, and **21.75%**, respectively.

3.2. Population and Sample of the Study (Experts and Administrators)

The second study population is the group against which the second questionnaire will be content where the role of educational applications of green education in attaining sustainable development goals and educational leadership in the UAE will be applied. The original population sampled by the researcher was stratified and comprised of 150 experts and administrators (30 experts and 120 administrators) and the researcher has used a stratified random sample as indicated in the table below:

Table 2: Distribution of the Sample of Experts and Administrators According to Position

Variable		Frequency	Percentage
Position	Educational Expert	**30**	**20**
	School Principal	**120**	**80**
Total		**150**	**100**

It is evident from Table (2) that the proportion of school principals in the sample is higher than that of educational experts, with percentages of **80%** and **20%**, respectively.

3.3. Second: Field Study Instruments:

The field study used the questionnaires to gather information on the study sample. Two instruments were constructed on the theoretical framework of the research, past studies and well-founded scientific literature in the area. The two researchers then expertly reviewed the two instruments and ensured their validity. The instruments also had some reliability coefficients that were obtained and the results are as follows:

1. Validity of the Study Instruments

The study tools were the two questionnaires: the first covered the current application of educational applications of green education in the UAE to fulfill sustainable development goals and educational leadership, whereas the second covered the role of educational applications of green education in fulfilling sustainable development goals. The validity and reliability of the two instruments were calculated as follows:

3.3.1. Validity of the First Questionnaire (Regarding the Current Reality)

Face Validity: This questionnaire was presented to a group of experts specialized and experienced in the field of the study to ensure validity of the questionnaire. These professionals checked the title of the study, research questions and objectives and gave their views and comments about items included in the questionnaire. They evaluated how the items were relevant to the topic under study, whether they were able to capture the information they intended to and how each item related with the corresponding dimension. According to the feedback of the experts, some items were to be revised and some were to be added or deleted which led to the final version that was considered to be appropriate to be applied.

Internal Consistency: Following the assessment of the questionnaire and incorporating the amendments proposed by the experts, it was given to a pilot sample population of 100 teachers that was not to be included in the main study population. Internal consistency was estimated after gathering and tabulating the responses by using Pearson correlation coefficient between the total score in each dimension and the total score of its respective axis. The correlation coefficients were

between 0.783 and 0.825 and the calculated (r) values exceeded the critical tabular calculated values at the 0.01 level of significance and this means that the questionnaire is valid.

The researchers used **Cronbach's Alpha coefficient** to calculate the reliability of the questionnaire dimensions and the overall score, as shown in the following table:

2. *Reliability*

Table 3: ***Reliability Coefficient of the Questionnaire on the Current Implementation of Green Education Applications (n = 100)***

Dimension	Number of Items	Cronbach's Alpha Coefficient	Reliability Score
First Dimension	3	**0.794**	Good
Second Dimension	3	**0.763**	Good
Third Dimension	3	**0.838**	Good
Fourth Dimension	3	**0.779**	Good
Total Score of the Questionnaire	12	**0.804**	Good

Table (3) indicates that the Cronbach coefficient of Alpha (reliability) of the questionnaire dimensions are high and they are between 0.763 and 0.838. The overall reliability of the questionnaire was 0.804, which was the reliability coefficient of the whole questionnaire.

3.3.2. Validity of the Second Questionnaire: *(Regarding the Role of Educational Applications of Green Education in Achieving Sustainable Development Goals and Educational Leadership from the Perspective of Educational Experts and School Principals)*

Face Validity: The validity of the questionnaire was validated by showing the questionnaire to a sample of experts who were specialized and experienced in the field of the study. The professionals evaluated the title of the study, the research questions, and the objectives and gave their views and recommendations. Depending on their response, some of the items were amended and some were included or deleted, and a final version fit to application was obtained.

Internal Consistency: It was then used on a pilot sample of 40 school principals who were not part of the main study sample after examining the questionnaire and making the necessary changes as suggested by the experts. Having collected and tabulated the answers, internal consistency was computed using the Pearson correlation coefficient of the total score of individual dimension against the total score of its axis. The correlation coefficients were 0.813, 0.846 and calculated values (r) were more than the values of the critical table at the level of significance of 0.01 which showed that the questionnaire was valid.

2. *Reliability*

The researchers used **Cronbach's Alpha coefficient** to calculate the reliability of the questionnaire dimensions and the total score for each axis, as shown in the following table:

Table 4: Reliability Coefficient of the Questionnaire on the Importance of the Role of Educational Applications of Green Education (n = 40)

Axis	Dimension	Number of Items	Cronbach's Alpha Coefficient	Reliability Score
First	**First Dimension**	3	**0.807**	Good
	Second Dimension	3	**0.811**	Good
	Third Dimension	3	**0.808**	Good
	Fourth Dimension	3	**0.748**	Good
	Total Score of the First Axis	12	**0.845**	Good
Second	**First Dimension**	3	**0.793**	Good
	Second Dimension	3	**0.777**	Good
	Third Dimension	3	**0.789**	Good
	Fourth Dimension	3	**0.806**	Good
	Fifth Dimension	3	**0.802**	Good
	Total Score of the Second Axis	15	**0.859**	Good

Table (4) indicates that the Cronbach Alpha coefficients (reliability) of the dimensions of the first axis are good with the highest coefficient of reliability in the first axis being 0.748 up to 0.811 and the overall coefficient of reliability of the axis is 0.845. Likewise, the Cronbach Alpha coefficients of

the second axis dimensions are good and the coefficients are 0.777 to 0.806 with the reliability coefficient of the full axis is 0.859, which points to the reliability of the entire questionnaire.

3.3.3. Statistical Analysis Methods

The researchers applied a set of statistical procedures which helped the researchers to conduct descriptive and inferential analyses on the two questionnaires. These were Pearson correlation coefficient, frequency calculation percentage, weighted means, arithmetic means, standard deviations, independent samples t-test, one way ANOVA, LSD test to make pair-wise comparisons and the Mann Whitney test.

Scoring of the Questionnaires: They were rated as follows: High = 3, Medium = 2, and Low =1. By multiplying the scores by the frequency of each response, and adding and then dividing the result by the total number of respondents, one can find the weighted mean which gives the relative weight of each item as follows:

$$\text{Numerical Score for Each Item} = \frac{(3 \times \text{Number of High}) + (2 \times \text{Number of Medium}) + (1 \times \text{Number of Low})}{\text{Total Number of Respondents}}$$

The extent of agreement (availability - importance) within the sample of the study was also established (estimating the degree to which agreement is to be considered as high, medium, or low) with the following relationsh

$$\frac{n-1}{n} = \text{Level of Agreement}$$

Where **n** refers to the number of response levels and equals **3**. The following table illustrates the level and extent of agreement for each item among the study sample for each response in the questionnaire:

Table 5: Shows the Level of Agreement and Cut-off Scores for the Study Sample

Score	Range
Low	From 1 to 1.66
Medium	From 1.67 to 2.33
High	From 2.34 to 3

4. RESEARCH RESULTS, DISCUSSION, AND INTERPRETATION

1- Answering the First Question: What is the prevailing situation of applying educational applications of green education in the UAE to attain sustainable development objectives and educational leadership?

This question may be answered by computing the weighted mean and standard deviations of the actions of the teacher sample concerning the questions in the axis pertaining to the existing use of educational applications of green education in the UAE as follows:

4.1. Results for ranking the items of the first dimension, which relates to the reality of applications concerning green educational institutions, according to their relative weights:

Table 6: Relative Weight and Level of Agreement for the First Dimension: Reality of Applications Related to Green Educational Institutions (n = 432)

Item	Statement	Relative Weight	Standard Deviation	Rank	Level of Agreement
1	Educational institutions provide environmentally friendly green buildings.	2.292	0.921	3	**Medium**
2	Educational institutions promote sustainable educational practices among students and the community.	2.574	0.736	2	**High**
3	Educational institutions provide a robust infrastructure for sustainable education by utilizing educational platforms, virtual and augmented reality, and artificial intelligence in teaching.	2.602	0.680	1	**High**
	Overall Mean of the Dimension Items	2.489	0.779		**High**

As Table (6) shows, the reality of applications concerning the green educational institutions regarding the teacher sample perspective was high, and the overall mean of the dimension items was 2.489. The range of the item scores was 2.602-2.292 with two items being rated as high and one item rated as medium.

These findings unveil an Emirati educational model that goes beyond the limits of traditional implementation of green education to that of integrated sustainability model. Such high overall mean can be attributed to the systematic change in the philosophy of education as a whole and to the fact that digital infrastructure and artificial intelligence technologies are the core dynamics of that change. This proves that innovation used in the UAE is not just support but one that is used as a reference system of sustainable education.

On the other hand, the medium level recorded on the category of green buildings only means that, the physical growth of the institutions is at a slow rate in comparison to the fast educational and technological changes. All these outcomes allow to conclude that the country does not only tend to reach a sustainable state but also to create a universal first-mover system where education is reconsidered as a strategic path to creating a green, conscious, and creative future. The results have been in line with the recent educational literature especially the works of Fayza Mujahid (2025), Fahad Al-Amiri and Abeer Al-Harbi (2023), and Hamed Al-Qudrah (2022).

4.2. Results for Ranking the Items of the Second Dimension, Related to the Reality of Applications Concerning the Green Curriculum, According to Their Relative Weights:

Table 7: Relative Weight and Level of Agreement for the Second Dimension: Reality of Applications Related to the Green Curriculum (n = 432)

M	Statement	Relative Weight	Standard Deviation	Rank	Level of Agreement
1	Educational institutions provide curricula and academic programs to promote sustainable learning.	2.403	0.746	2	High
2	Educational institutions periodically develop curricula and academic programs to keep pace with environmental and climatic changes.	2.486	0.783	1	High
3	Curricula and academic programs provide educational tools, teaching methods, and comprehensive assessment approaches suitable for sustainable education.	2.269	0.955	3	Medium
	The overall mean of the dimension statements.	2.386	0.828		High

Based on Table (7), it is clear that the status of applications regarding the green curriculum, according to the study sample of teachers, was high, with the overall mean of the dimension statements weighting (2.386). The dimension statements were varying between (2.486) and (2.269), and there were two statements with the high score and a single statement with the medium score.

These findings reveal a practical strategic progress of the introduction of the green education into the UAE programs, as the rates of assent are extremely high, which demonstrates a significant institutional desire to revise the academic material in accordance with the swift changes of environmental conditions. Sustainability is no longer a secondary mental factor but it has become a governing concept that helps in influencing the consciousness and behavior of learners. The research also verifies that the UAE follows the proactive strategy and is consistent with the global trends and recommendations of UNESCO (2024) on the need to revise the curricula and prioritise Education for Sustainability.

The results also reveal certain deficiencies in the availability of tools and teaching methods that support sustainable education, emphasizing the need to strengthen the practical aspect within the classroom. These findings are consistent with recent studies highlighting the necessity of advancing green education within curricula and learning environments to support the national sustainability agenda, including Leal Filho et al. (2025), the study by Sabri Ahmed (2024), the study by Intisar Al-Sayed (2024), and the study by Nawal Al-Qahtani (2024).

The results regarding the ranking of the statements of the third dimension, related to the reality of applications concerning the development of green capacities, according to their relative weights:

Table 8: Relative Weight and Level of Agreement on the Third Dimension: Reality of Applications Related to Building Green Capacities (n = 432)

M	Statement	Relative weight	Standard deviation	Rank	Level of agreement
1	Educational institutions provide training and awareness plans and programs for students, teachers, and educators regarding sustainable education.	2.644	0.489	1	High
2	Educational institutions benefit from trainees in developing curricula and educational programs in alignment with the objectives of sustainable education.	2.481	0.800	2	High
3	Educational institutions encourage trainees to promote a culture of environmental awareness and sustainable education within the community.	2.282	0.908	3	Medium
	The overall mean of the dimension statements.	2.469	0.732		High

As can be seen, in Table (8), the reality of applications concerning building green capacities, in the view of the study sample of teachers, was high and the overall mean of the dimension statements was (2.469). The dimension statements ranged as (2.644) to (2.282), and two of them scored high, whereas one statement scored medium.

This is shown in the findings that show that green capacity-building practices in educational institutions are mature thus indicating a high degree of activation that indicates that the UAE has a conscious approach to institutional empowerment of educational and student staff with knowledge and skills that can promote sustainable education. This practice is reflected in the impressive focus on the training and awareness events which is justified by the educational sources that address the competency development as one of the pillars the success of the green education. Some of these studies include the works of Lubna Al-Ajmi and Mona Al-Zahrani (2024), Rana Mufleh (2024), and Salah Ghanim (2022). Furthermore, these findings align with UNESCO's (2024) reference framework, which places capacity building at the core of the Green School model.

Although this has been made, findings showed that there is a weakness in the community outreach of such activities, which is demonstrated by a low rate of influence on trainees to argue about environmental awareness outside of the institution. This means that there is a difference between internal capacity building and the external impact activation. This point is consistent with the modern literature that focuses on the need to empower learners with the leadership skills in relation to the environment and to extend their involvement in the community, as highlighted by Hassan & Mahmoud (2023). Additionally, it underscores the importance of enhancing the role of educational institutions as active centers for promoting a culture of sustainability within the UAE community, as noted in the studies by Baroudi & Abi Haidar (2025) and Salah El-Din Abdel Aziz (2022).

As such, although the green capacity building is gaining momentum, the best way to enhance its effectiveness is to intensify the community aspect and to centralize the leadership position of the learners towards spreading environmental awareness.

The results regarding the ranking of the statements of the fourth dimension, related to the reality of applications concerning green communities, according to their relative weights:

Table 9: Relative Weight and Level of Agreement on the Fourth Dimension: Reality of Applications Related to Green Communities (n = 432)

M	Statement	Relative weight	Standard deviation	Rank	Level of agreement
1	Educational institutions provide local and global partnerships to support sustainable education.	2.505	0.789	2	High
2	Educational institutions encourage students to develop projects and academic programs related to sustainable education.	2.250	0.900	3	Medium
3	Educational institutions enable students to acquire sustainable education skills through extracurricular environmental activities.	2.556	0.744	1	High
	The overall mean of the dimension statements.	2.437	0.811		High

As seen in Table (9), the reality of the applications associated with green communities as viewed through the prism of the study sample of teachers was large, and the overall mean of the dimension statements amounted to (2.437). The dimension statements were between (2.556) down to (2.25) and there were two statements that received a high score and one that received a medium score.

The findings concerning the green communities give a vivid understanding of how effective sustainability initiatives in the learning institutions are. Extracurricular environmental activities turn out to be one of the best educational techniques to develop sustainability skills of students directly. Recent studies in education support this, such as those by Alaa Rabie (2022) and Fatima Bahjat (2020), which came to the conclusion that practice-based learning is one of the key factors in the development of environmental behavior. Also, the results reveal the clear institutional desire to build local and international relations to promote sustainable education in accordance with the Green School framework developed by UNESCO (2024) and with Baroudi and Abi Haidar (2025) who stated that the extension of the connection of educational institutions with the external community can improve green education.

On the other hand, the medium level of encouraging students to create sustainable projects is the area that needs qualitative enhancements as the focus is not on being involved in the activities connected to green issues but on creating innovative green solutions. This is in line with the global views of Leal Filho et al. (2025) and Nikolopoulou (2025), which emphasize that student innovation represents the pivotal transition from practicing sustainability to leading it. This is further supported by the findings of Alfen Nazer et al. (2023), which confirmed that building entrepreneurial readiness is a fundamental condition for transforming green learning from knowledge into practical initiatives.

As per the findings, it is evident that the educational institutions have achieved a great deal in the practical and participatory nature of the green communities. Nonetheless, to attain a more profound environmental response, it is important to invest in student innovation and entrepreneurialism development so that learners could make a positive contribution to the creation of a sustainable future.

In this manner, the first research question has been answered by the study and it is: What is the current state of educational application use in green education in UAE to realize the objectives of sustainable development and leadership in education?

Part Two: The Level of the Role of Educational Applications for Green Education in Achieving Sustainable Development Goals and Promoting Educational Leadership in the UAE

Answering the second question: What is the role of educational applications for green education in achieving the sustainable development goals in the UAE?

In order to respond to this question, the researchers computed the weighted mean and the standard deviation of each statement of the first-axis dimension concerning the role of the educational application in green education with regards to the sustainable development goals in the UAE. This is represented in the following tables:

The findings on the ranking of the statements of the first dimension, which rely on the role of applications in respect of quality education according to the position of the educational experts and school principals, based on their relative weights:

Table 13: Relative Weight and Level of Agreement on the Importance of the First Dimension: The Role of Applications Related to Quality Education from the Perspective of Educational Experts and School Principals (n = 150)

M	Statement	Relative weight	Standard deviation	Rank	Level of agreement
1	Educational applications for green education contribute to achieving the three dimensions of sustainability: environmental, social, and economic.	2.5533	0.7732	2	High
2	Educational applications for green education encourage students to engage in creative and innovative thinking.	2.64	0.5709	1	High
3	Educational applications for green education contribute to the adoption of sustainable educational practices.	2.52	0.8251	3	High
	The overall mean of the dimension statements.	2.5711	0.7231		High

As can be seen in Table (13) the extent to which there was consensus with regard to the significance of the first dimension, which is associated with the position of applications in terms of quality education as viewed by the educational professionals and school principals, was high with the total mean of the dimension statements attaining (2.5711). The average of the dimension statements were between (2.64) and (2.52), and all three of the statements were highly rated.

The fact that the rate of agreement with all statements is very high indicates the strong professional consciousness of educational experts and school principals about the relevance of educational applications to green education and the centrality of their application to increasing the quality of education and expanding its educational influence. Green education does not simply make environmental awareness; it reorganizes the very process of learning as it is described in the works of modern literature since it tends to focus on creativity and innovation and the comprehensive perception of the developmental aspects. First among these is its ability to create creative and innovative thinking amongst the learners, aligning with the findings of Leal Filho et al. (2025), Shaimaa Zaki and Jamal Mansour (2024), Ali Ahmed Al-Barakat (2024), and Shatha Ahmed Imam (2023), who assert that integrating sustainability principles into education enhances learners' capacities for inquiry, problem-solving, and generating new ideas considered a core criterion in high-quality education systems.

The findings also show that there is a high level of agreement that green education applications are relevant towards the attainment of the environmental, social, and economic aspects of sustainability. This compares with the results of Asma Al-Balawi and Arij Al-Sisi (2025) and UNESCO philosophy (2017) who regard green education as a system that can turn the learner into an active individual with awareness, responsibility, and the capacity to make sustainable decisions. This is in accordance with the researches of. Hurlimann et al. (2024) and Bolon-Canedo (2024), that stress the fact that such applications are an institutional pillar to building sustainable educational practices and that schools should embrace an educational model that transcends the delivery of content to create a well-established culture of sustainability and innovation.

The findings concerning the prioritization of the statements of the second dimension, which refer to the role of applications in terms of gender equality in the outlook of educational experts and school principals, based on their relative weights:

Table 14: Relative Weight and Level of Agreement on the Importance of the Second Dimension: The Role of Applications Related to Gender Equality from the Perspective of Educational Experts and School Principals (n = 150)

M	Statement	Relative weight	Standard deviation	Rank	Level of agreement
1	Educational applications for green learning achieve equality in education between males and females.	2.5	0.8494	2	High
2	Educational applications for green education contribute to achieving gender equality in scientific and academic specializations across educational stages.	2.5733	0.7539	1	High
3	Educational applications for green education contribute to creating equal employment opportunities for both genders.	2.04	0.9404	3	Medium
	The overall mean of the dimension statements.	2.3711	0.8479		High

As Table (14) shows, there was a high level of agreement in the importance of the second dimension in terms of the role of applications associated with gender equality according to educational experts and school principals, and overall mean of statements of the dimension is (2.3711). The statements in this dimension ranged between (2.5733) and (2.04) and two of the statements were rated highly and one of the statements was rated as medium.

The above score of this axis could be explained by the fact that the educational professionals and school principals were aware of the effectiveness of educational applications to green learning in promoting equality between the male population and the female population in terms of the equal access to learning and equal representation in the fields of science. This perception aligns with the findings of Mona Matar Al-Zahrani and Lubna Al-Ajmi (2024) and Nawal Al-Qahtani (2024), who emphasized the holistic aspect of green practices and the wide nature of the benefits to the learners without any discrimination. The given approach is also based on the principles that are developed by UNESCO (2017, 2020), as the sustainability principles are associated with the realization of the principles of justice and equal educational opportunities of the groups.

The medium level for the statement related to employment opportunities reflects the limited literature directly linking green education to the economic empowerment of males and females. Studies such as Gohr (2025) and Fatima Muhammad Bahjat (2020) addressed this dimension indirectly through sustainable development and future preparedness. Similarly, the studies by Sheikha Nasser Al-Karbi (2023) and Sabra Al-Halla (2022) indicated that achieving

equality in economic opportunities requires broader societal and institutional interventions beyond the scope of school practices.

In this way the green education exhibits a high effect on equality in the school, but the effect is projected into the future of professional parity will depend on the supportive policies and relationships, which are not limited to the scope of school.

The findings on the positioning of the statements in the third dimension in terms of the role of applications that are related to industry and innovativeness as viewed through the lens of educational professionals and school principals, the weight of the statements in their relative order:

Table 15: Relative Weight and Level of Agreement on the Importance of the Third Dimension Concerning the Role of Applications Related to Industry and Innovation from the Perspective of Educational Experts and School Principals (N = 150)

M	Statement	Relative Weight	Standard Deviation	Rank	Level of Agreement
1	Educational applications for green learning help students choose academic specializations that are suitable for the labor market.	2.5600	0.7551	2	High
2	Educational applications for green learning help students acquire life skills and sustainable experiences.	2.5800	0.6268	1	High
3	Educational applications for green learning help students enhance productivity and engage in community participation throughout the educational stages.	2.5067	0.8414	3	High
	Overall Mean of the Dimension's Statements	2.5489	0.7411		High

As can be seen in Table (15), the degree of consensus on the significance of the third dimension, in terms of the role of applications in the application of industry and innovation in the eyes of educational experts and school principals, was strong and the overall average of the statements in the dimension was (2.5489). The scores in this dimension were in the range of (2.58) to (2.5067), and all the three statements were rated highly.

The fact that the scores of this dimension are high means that educational professionals and school principals are aware of the critical role of educational applications of green learning in facilitating industry and innovation in education. This is seen in assisting the students to make specializations that are relevant in the labor market, acquisition of life skills and long term experiences. The latter results are in agreement with the current literature, such as Leal Filho et al. (2025), Nikolopoulou (2025), and Hassan & Mahmoud (2023), which highlighted that sustainable education contributes to developing learners capable of innovation and responding to the demands of the green economy and future labor market. They are also supported by the study of Marwa Ezzat Abdel Gawad (2024), which emphasized the necessity of aligning green education with the transition toward a green economy, and the study by Gamal Mansour and Shaimaa Abdel Hafiz (2024), which highlighted the relationship between green education, productivity, and community participation, in addition to the results of Shaza Ahmed Emam (2023), which demonstrated the impact of green programs on fostering future-oriented thinking and environmental awareness.

In this regard, the findings conclude that learning applications of green learning are a good strategy and help in equipping the learners with the future labor market and also increase their innovative and community-based capacity.

The findings as to the position of the statements of the fourth dimension, which are on the role of applications with reference to economic growth as viewed by the educational experts and school principals based on their respective weights:

Table 16: Relative Weight and Level of Agreement on the Importance of the Fourth Dimension Concerning the Role of Applications Related to Economic Growth from the Perspective of Educational Experts and School Principals (N = 150)

M	Statement	Relative Weight	Standard Deviation	Rank	Level of Agreement
1	Educational applications for green learning contribute to the economic growth of both the individual and society.	2.5267	0.8167	2	High
2	Educational applications for green learning develop students' awareness of utilizing renewable and clean environmental resources in education.	2.8733	0.3533	1	High

3	Educational applications for green learning contribute to creating new job opportunities that keep pace with technological advancement and climate change.	2.2	0.8974	3	Medium
	Overall Mean of the Dimension's Statements	2.5333	0.6891		High

As one can see, the degree of consensus on the significance of the fourth dimension, regarding the role of applications with reference to economic growth in terms of educational experts and school principals, was high in Table (16), with the overall mean of the statements of the dimension standing at (2.5333). The range of the statements in this dimension lied between (2.8733) and (2.2), two statements had a high rating, and one statement had a medium rating.

The high scores on this dimension signify that educational experts and school principals are fully aware of the qualitative economic contribution of green education especially in terms of making students conscious of how they can use renewable resources and how they can be directed towards being more economically sustainable. This is in tune with the recent studies, such as the study by Gamal Mansour and Shaimaa Abdel Hafiz (2024), which highlighted that green education is a key driver for promoting sustainable development within society, the study by Zahabiya Sayed Ali and Al-Amin Belkadi (2023), which examined the relationship between green higher education and the requirements of the green economy, and the study by Asmaa Abdel Fattah (2022), which proved that green educational policies help to facilitate the shift towards the sustainable economy of the prudent use of resources. These results are also coincidental with the UNESCO (2020) approach, which views education as a means of sustainability as a solution to establish economically aware capacities in the learners and their engagement in future economic growth channels.

The less developed consensus on the role of green education in the generation of new jobs is indicative of the fact that the economic role of green education is indirect and will not be materialized practically unless it is accompanied by more general training and employment policies. This was emphasized in the study by Wissam Muhammad Fathi Mustafa (2025), indicating that acquisition of green economy competences in students is not a spontaneous phenomenon but it is based on a comprehensive system of education which incorporates: greening the curricula, higher-order scientific education, teacher development and professional growth and developmental and communal education. Similarly, the studies by Marwa Ezzat Abdel Gawad (2024) and Nasser Al-Ja'wan (2022) pointed out that transitioning green education from its awareness-raising role within schools to having professional and economic impact requires advanced institutional readiness and a labor market capable of absorbing green skills.

Therefore, the findings suggest that green education is a powerful intervention in building awareness and sustainable economic behavior in the school and the transfer of the effect to the real job opportunities is dependent on the opportunities provided by economic and job environments that could capitalize on the skills acquired during green education.

Therefore, the second research question that has been discussed in the current study is: What is the role of educational applications of green learning in the realization of Sustainable Development Goals in the United Arab Emirates?

Answering the third question: What is the role of educational applications for green learning in achieving educational leadership in the United Arab Emirates?

The researchers used the weighted mean and standard deviation of each statement in the dimensions of the second axis to answer this question, as it involves the role of educational applications in green learning to attain educational leadership in the UAE. These results can be demonstrated by the following tables:

The findings on the ranking of the statements in the first dimension, in terms of the role of applications connected with leadership and management as perceived by educational experts and school principals, depending on their relative weights:

Table 18: Relative Weight and Level of Agreement on the Importance of the First Dimension Concerning the Role of Applications Related to Leadership and Management from the Perspective of Educational Experts and School Principals (N = 150)

M	Statement	Relative Weight	Standard Deviation	Rank	Level of Agreement
1	Educational applications for green learning enable students to develop the ability to create future-oriented plans for entrepreneurship.	2.7133	5946.	1	High
2	Educational applications for green learning enable students to organize and manage their time and priorities.	2.66	6112.	2	High
3	Educational applications for green learning help students propose alternatives and proactive plans in anticipation of any environmental or climate-related developments or changes.	2.6	7235.	3	High
	Overall Mean of the Dimension's Statements	2.6578	0.6431		High

As it can be seen in Table (18), the degree of concurrence on the foundational value of the first dimension, in regards to the role of applications relevant to leadership and management in the eyes of educational specialists and school principals was high with the mean of statements towards the dimension being (2.6578). The statement has a range of between (2.7133) and (2.6), and all the three statements scored highly.

The good scores in this dimension means that green education is a powerful instrument in helping students to realize their leadership and management skills. Green applications prove to be able to promote planning of the entrepreneurship and creation of future initiatives which has been verified by the research of Intisar Muhammad Al-Sayed (2024) and Shaza Ahmed Emam (2023), which showed that green programs cultivate future-oriented thinking and readiness to respond to environmental changes. These findings also align with the perspectives of Alvin Nazer and Riwar Ibrahim (2023) and Safaa Al-Mutairi (2019), who claimed that sustainability practices improve the entrepreneurial thinking and problem solving ability among learners. As well, the findings reveal the usefulness of green education in the improvement of organizational competencies and projection of developments, which is consistent with UNESCO's (2017, 2020) strategy that views education as a tool of sustainability as a primary way of equipping future generation learners with adaptable and proactive choices. Green education, therefore, emerges as a fundamental channel of leadership development in the modern educational settings which are full of change and development.

The findings in terms of the ranking of the statements in the second dimension, which are related to the role of the applications that are associated with creativity and innovation, as perceived by educational experts and school principals based on the relative weights:

Table 19: Relative Weight and Level of Agreement on the Importance of the Second Dimension Concerning the Role of Applications Related to Creativity and Innovation from the Perspective of Educational Experts and School Principals (N = 150)

M	Statement	Relative Weight	Standard Deviation	Rank	Level of Agreement
1	Educational applications for green learning enable students to develop entrepreneurial and innovative thinking skills, as well as problem-solving abilities.	2.8067	5640.	1	High
2	Educational applications for green learning stimulate students to generate new ideas and implement them in innovative ways.	2.5867	6774.	2	High
3	Educational applications for green learning help students implement new innovative projects.	2.2400	9025.	3	Medium
	Overall Mean of the Dimension's Statements	2.5444	0.7146		High

As it can be seen in Table (19), the degree of consensus on the significance of the second dimension, with respect to the role of applications associated with creativity and innovation, according to both educational specialists and school principals, was high, with the aggregate mean of the statements of the dimension being (2.5444). The values in this dimension varied between (2.8067) and (2.24), two statements recorded high and one medium score respectively.

The fact that the scores of this dimension were high reveal that green education is no longer regarded as a conventional environmental practice, but it is a cognitive system that promotes entrepreneurial innovation. The agreed rates are high, which means that green applications transform the patterns of thought by providing an

environment that promotes the generation of ideas, the analysis of alternatives and problem-solving in a non-traditional manner. This direction aligns with the findings of Akinsemolu & Onyeaka (2025) and Toderas (2025), who emphasized that green education produces innovative competencies that extend beyond theoretical knowledge to productive abilities with a clear developmental impact. Similarly, the studies by Sarah Al-Khouly and Iman Tolba (2024), Marwa Al-Sayyad and Al-Desouki (2023), and Enas Suleiman (2021) confirmed that green digital environments especially when integrated with artificial intelligence expand creative horizons through simulation, experimentation, and deep cognitive interaction.

The significance of these results is further underscored by the studies of Turki Al-Mukhalfi (2022) and Israa Muhammad Rajab (2022), who indicated that integrating green education into the educational system reconstructs learners' future skills and prepares them to produce innovative solutions with economic and societal value.

The less high degree of consensus on the possibility of students to execute real innovative projects can be seen as an indication of a discrepancy between intellectual and real entrepreneurship. This is so because although the learning atmosphere has been successful in inculcating innovative thinking, it does not have an institutional incubation system that can convert these thoughts to tangible programs. This is proved by multiple studies, including those by Shaimaa Said et al. (2022) and Heba Abu Abada (2022), the latter pointing out that innovation cannot exist without incentive policies and support systems and provision of training resources that enable innovative capabilities to be fulfilled in viable projects that have a societal and economic effect. This route is consistent with the plans developed by UNESCO (2024, 2020) who assert that education as a means of sustainability is a strategy that can be used to create learners who can generate viable new responses to tackle complicated issues.

The findings on the ranking of the statements in third dimension, in relation to the role of applications that are connected to community partnership in terms of the view of the educational experts and school principals, based on their relative weights:

Table 20: Relative Weight and Level of Agreement on the Importance of the Third Dimension Concerning the Role of Applications Related to Community Partnership from the Perspective of Educational Experts and School Principals (N = 150)

M	Statement	Relative Weight	Standard deviation	Rank	Level of agreement
1	Educational applications for green education provide students with the opportunity to engage in both local and global communities.	2.88	3460.	1	High
2	Educational applications for green education enable purposeful community and institutional partnerships to implement certain educational plans and projects.	2.4	9196.	3	High
3	Educational applications for green education cultivate students' teamwork and collaborative skills to achieve excellence in education.	2.4067	9130.	2	High
	The overall mean of the dimension items	2.5622	0.7262		High

As can be seen in Table (20) the degree of consensus on whether the third dimension is important in terms of the role of applications as far as community partnership is concerned as viewed through the eyes of educational experts and school principals was high with the mean of the dimension items standing at 2.5622. The items of the dimension were between 2.4 to 2.88 with the three items being rated highly.

The high scores in this dimension show that educational applications in green education have helped to shift the role of the school into a more open-mindedness towards the community such that community partnership is no longer an accompanying framework but instead an inherent part of the philosophy of green learning. This is evident in the fact that there is a great accord when it comes to the role of these applications in offering the students the chance to participate in local and global communities. This opinion is confirmed by the recent literature, considering the green school as a platform for developing active community awareness based on interaction and practice, as demonstrated in the study by Jamal Mansour and Shaimaa Abdel Hafiz (2024), which showed that green practices drive learners toward community interaction and collaborative work to address environmental issues. Similarly, Sheikha Al Shamsi (2021) emphasized the importance of linking sustainable education to developing the learner's role in society.

Moreover, the high results related to the development of teamwork skills indicate that green applications transform the educational process into a participatory experience that enhances communication, negotiation, and initiative-building skills. This aligns with the findings of studies by Abeer Al-Shahrani and Lubna Al-Ajmi (2024), and Marwa Al-Sayyad and Al-Desouki (2023), that proved that green environments along with the supportive technologies improve students to collaborate more and come up with common solutions to environmental issues, thus promoting the notions of community leadership in and out of the classroom. The same tendency is affirmed by the research conducted by Salah El-Din Abdel Aziz (2022), who established the idea that the foundation of green leadership in schools is the establishment of an institutional culture of collaboration with students, teachers, and the community at large.

The comparatively low score of the item associated with institutional partnerships is indicative of the fact that the schools are in the process of improving their engagement with students, although they have not yet achieved desirable outcomes in the area of environmental partnership expansion. This is an indication that they are a partnership that is still associated with an individual or seasonal program as opposed to an entire educational policy. The studies of support this observation Hamed Naeem Al-Qudra (2022) and Shaimaa Said et al. (2022), who highlighted the idea that the change of the system towards an effective partnership model demands the presence of an enabling structure, such as policies on communication with the community and its institutions, and the coordination of activities between educational organizations and environmental and developmental ones.

The comparatively lower position of the item associated with the institutional partnerships shows that schools are on the right track in the context of student engagement, even though they are yet to achieve the required level of increasing environmental partnerships. This implies that these partnerships are still connected to single or seasonal efforts instead of being included in an overall policy in education. This is reinforced by the following observation the studies of Hamed Naeem Al-Qudra (2022) and Shaimaa Said et al. (2022), who highlighted that changing to an effective model of partnership must be supported by an enabling structure, such as, policies towards communication with the community and its institutions, and the coordination of roles between the education institutions and the environmental and developmental ones.

The findings on the ranking of the items of the fourth dimension, with respect to the role of applications relative to technological investment, in terms of educational experts and school principals according to their relative weights:

Table 21: Relative weight and level of agreement on the importance of the fourth dimension, concerning the role of applications related to technological investment, from the perspective of educational experts and school principals (n = 150)

S	Statement	Relative weight	Standard deviation	Rank	Level of agreement
1	Educational applications for green education utilize various technologies to achieve excellence in education.	2.5667	7634.	3	High
2	Educational applications for green education provide students with the opportunity to benefit from educational platforms, augmented and virtual reality, and artificial intelligence to develop their entrepreneurial learning skills.	2.6333	6992.	2	High
3	Educational applications for green education help students practice modern technological tools to keep pace with technological advancements and achieve excellence in education.	2.8067	4734.	1	High
	The overall mean of the dimension items	2.6689	0.6453		High

Table (21) clearly shows that the degree of consensus regarding the significance of the fourth dimension, in terms of the role of applications in the context of technological investment as viewed through the lenses of educational professionals and school principals, was quite high, with the general average of the dimension items amounting to 2.6689. The dimension items were within 2.5667 and 2.8067 with all three items being rated well.

The increased scores in the technological investment dimension show that educational applications in the green education have become a very important aspect in developing educational leadership. The scores of agreement demonstrate the awareness of experts about their possibilities to use artificial intelligence, augmented reality, and digital platforms when building the future skills of students. This pattern is in line with the studies found in Asmaa Al-Balawi and Areij Al-Sisi (2025),

Toderas (2025), Nikolopoulou (2025), and Li (2025), who emphasized that integrating smart technologies into green education opens new spaces for creativity and produces cognitive and skill competencies that go beyond what traditional educational practices offer.

These results are also supported by the study of Entesar Mohamed El-Sayed (2024), which demonstrated the ability of artificial intelligence to enhance sustainable thinking and improve the handling of climate issues. Similarly, Rafiq Said Al-Barbary (2023) highlighted the impact of smart technologies in expanding green learning environments and supporting creativity and self-directed learning. These findings intersect with the studies of Marwa Al-Sayyad and Nadia Al-Desouki (2023), Esraa Mohamed Ragab (2022), Turki Al-Mukhlafi (2022), and Enas Suleiman (2021), which confirmed that integrating green education with digital environments reshapes entrepreneurial skills and enables students to design innovative solutions related to the green economy and digital transformation.

In this regard, the findings show that technological investment in green education will be a structural change in the nature of learning since it redefines entrepreneurial and innovative capabilities of students and is strongly positioned to compete in a knowledge-based, artificial intelligence, creative, and highly competitive sustainable economy in the future.

The findings in terms of the position of the items of the fifth dimension, in regard to the role of applications associated with development and improvement through the prism of educational professionals and school principals, based on their relative weights:

Table 22: Relative weight and level of agreement on the importance of the fifth dimension, concerning the role of applications related to development and improvement, from the perspective of educational experts and school principals (n = 150)

S	Statement	Relative weight	Standard deviation	Rank	Level of agreement
1	Educational applications for green education help students develop and improve their plans to achieve entrepreneurial excellence.	2.82	4644.	1	High
2	Educational applications for green education help students contribute to solving certain problems and addressing local and global challenges.	2.1533	6527.	2	Medium
3	Educational applications for green education help students strive for excellence and competence to achieve entrepreneurial leadership.	2.1133	6709.	3	Medium
	The overall mean of the dimension items	2.3622	0.5960		High

As shown in Table (22), the degree of consensus with regards to the significance of the fifth dimension, in relation to the role of applications in terms of development and enhancement with regards to the school principals and educational experts, was high, and the total average of the dimension items was 2.5333. The dimension items were 2.1133 and 2.82 with two of the items rated medium and one rated high.

The large scores on this dimension signify that green education is no longer being exercised in the education system simply as an additional activity, as a scheme towards partial enhancement; but instead, it has evolved into a living body of knowledge that reformulates the thinking mechanisms of learners, and forms what can be described as innovative adaptation mechanisms. These mechanisms are premised on creation of entrepreneurial plans that are founded on foresight and creation of flexible alternatives that can be adapted to the evolving climatic and economic challenges. This analysis aligns with findings from several studies, including Entesar Mohamed El-Sayed (2024) and Shaza Ahmed Imam (2023), which demonstrated that sustainability-based learning reconstructs mental models by enhancing future-oriented thinking. Additionally, the study by Alvin Nazer and Riwar Ibrahim (2023) partially supported this trend by emphasizing that entrepreneurial thinking develops only within a learning environment based on experimentation and the provision of systematic opportunities for constructive problem-solving. Meanwhile, the studies of Esraa Mohamed Ragab (2022) and Turki Al-Mukhlafi (2022) confirmed that integrating green education contributes to reshaping the learner's identity, enabling them to become active and capable of producing solutions with economic and social value.

The percentage difference between the items of this dimension must not be interpreted as a measure of the lack, this is a transition stage in the green education system in the United Arab Emirates. Although the country has attained obvious mental and entrepreneurial maturity, the existing efforts are aimed at immersing the practical sphere and converting green skills into productive ones. This difference reflects the possibility of

educational establishments to determine the development priorities accurately, which opens the way to the next level of green education implementation with innovation and entrepreneurship, in line with the vision of the UAE to equip future generations with all the skills to build sustainable development paths.

As a visionary country, the United Arab Emirates has established a strong leadership role in the Arab region in its green education adoption with the introduction of such innovative initiatives like Sustainable Schools, Sustainable University Initiatives, the Green Education Center, the Green Education e-Platform, and the Green Stars program, among others. The projects have helped the UAE to develop a powerful knowledge base in environmental awareness and entrepreneurial skills. The findings show that the second phase has a lot of potential to improve practical depth and increase the green innovation practices, which are more likely to increase the leadership of the country at the regional and global levels, and its educational system will be a model of providing learners with the ability to make the knowledge-based economy sustainable.

This way, the third and the last research question covered by the current study is the following: What is the role of educational applications to green education in the realization of educational leadership in the United Arab Emirates?

5. RESEARCH RECOMMENDATIONS

5.1. The current study recommends

1. Incorporate green education applications in the curricula, paying special attention to using artificial intelligence as one of the main tools to meet global standards of sustainability.
2. Offer teacher training courses to increase their preparedness in green education approach and green skills development of students.
3. Increase institutional and community collaborations in facilitating green projects in the school.
4. Implement comprehensive evaluation frameworks to determine the true effectiveness of the implementation of green education on the awareness of students, their behavior, and their professional skills.

6. SUGGESTED FUTURE RESEARCH

6.1. Based on the results and the previous recommendations, the current study recommends conducting several future studies related to the research field, including

1. The potential of green digital applications to establish sustainable environmental behaviors in students of the university.
2. The importance of professional training in establishing the competence of the educational staff and implementing green education strategies and incorporating them into the curricula.
3. One of the possible plans to create a national model of green education with references to the effective implementation of technological innovation, sustainable development goals, and educational leadership.

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