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Identifying Key Standards for Sustainable School Design in Iraq: A Survey and Statistical Analysis

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ABSTRACT

Although most sustainability criteria are effective, outdated infrastructure and a lack of economic support pose a major challenge to their implementation in Iraqi schools. So, integrating sustainability criteria into school building designs in Iraq is a key factor in improving the infrastructure of educational facilities. This study aims to identify the most important fundamental criteria for designing sustainable schools in Iraq by evaluating six main criteria: energy, water, indoor environmental quality, waste management, materials and resources, and finally, sustainable site. This research was prepared by conducting a questionnaire that included many specialists in the field of school building construction in Iraq. The comparison between the averages was used to compare the criteria. The sustainable site criterion achieved the highest arithmetic mean of 4.28. In contrast, the indoor environmental quality criterion showed an arithmetic mean of 4.17, which indicates the importance of providing a healthy environment for school workers.. The waste management criterion came with an arithmetic mean of 4.11, as effective waste management practices are vital to reducing the environmental footprint of educational institutions. The results showed that the material and resource efficiency standard recorded an arithmetic mean of 4.062, which emphasizes the need for conscious use of materials and resources throughout the life of the building. In contrast, the energy efficiency standard achieved an arithmetic mean of 4.061, which indicates the importance of reducing the total energy consumption in the school building. Finally, water conservation is an important standard, as it recorded a rate of 4.01.

Keywords: Sustainable school, Waste management, Energy efficiency, Environmental quality, Water conservation.

1. INTRODUCTION

Researchers have shown that building activities account for 34% of the world's energy consumption and contribute to 37% of energy-related carbon dioxide emissions. To achieve

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a state with no net carbon emissions by the year 2050, emissions need to decrease by more than 98% compared to 2020 **(Abergel et al., 2019)**. Eliminating carbon emissions from the building sector is essential to achieving the targeted decrease in greenhouse gas emissions. The building industry must make significant and systematic changes to accomplish this goal. In 2021, there was a modest enhancement in the energy efficiency of the building sector. Despite advancements in green and sustainable building certification, renewable energy use in buildings still needs to be expanded **(Abergel et al., 2019)**. Green and sustainable design techniques have been created to tackle these issues by utilizing eco-friendly materials and technology in construction **(Fenner and Ryce, 2008)**.

Sustainable schools are defined as green schools or high-performing schools that provide a comprehensive environmental plan that covers three key sustainability characteristics: energy efficiency, water management, and indoor environmental quality to ensure occupant comfort **(Olson and Kellum, 2003)** . Green schools focus on environmental issues, while sustainable schools focus on the impact of the school building on sustainability. Green design, which considers the ecological impact of the school building, is a component of sustainable design **(Lippman, 2010)**.

The sustainable school employs a comprehensive approach, considering social, economic, and environmental factors. Sustainable schools offer advantages by utilizing environmentally friendly materials and designs that conserve energy and water, they also reduce their environmental impact and conserve natural resources such as water and energy, thereby extending the lifespan of these resources and decreasing energy, water, and operational expenses and enhancing interior air quality and lighting, thus enhancing the health and comfort of students and teachers. An optimal school atmosphere can improve academic performance and social connections. Sustainable schools educate future generations on environmental challenges and encourage sustainable behavior.

The study of school buildings is crucial due to their social value and large number as **(Boeri and Longo, 2013)** stated that statutory limits mandate substantial performance criteria. The building industry frequently regards the technical solutions within this discipline as standards for other industries. School building architecture differs depending on student age, educational models used, availability of space, and finances. School buildings are frequently conducive to sustainable design trials. Schools now serve as more than just academic buildings, as they provide opportunities to implement new construction criteria focused on the site, orientation, and overall bio-climatic settlement strategies. This issue allows school buildings to evolve into environments that actively support and educate about sustainability. This research identifies and evaluates the standards necessary to implement sustainable schools in Iraq. It used a literature review, questionnaires, and surveys as research tools. After a comprehensive and detailed study of these standards and their potential effects, the results were analyzed statistically. This research seeks to provide evidence that may contribute to the future design and implementation of schools in Iraq, achieving school buildings comparable to sustainable school buildings worldwide.

2. SUSTAINABILITY STANDARDS FOR SCHOOL BUILDING DESIGNS

Implementing sustainable school practices influences the environment, economy, and society, as they are recognized as critical undertakings in the constructed environment. Consequently, the sustainable school concept depends on supplementary components aligned with the same objective. The goal is to provide a comprehensive and inclusive learning environment that promotes enhanced education, student well-being, and optimal academic outcomes.

The objectives of sustainable building design encompass utilizing renewable energy sources, enhancing indoor and outdoor habitats, optimizing interior air quality, and minimizing energy and water consumption while maximizing efficiency. Furthermore, the optimal utilization of materials and resources and the appropriate utilization of local sources are crucial. These variables enhance human performance and productivity **(Al-Abbasi, 2022).** This research will address the most critical sustainability standards for designing and implementing school buildings in Iraq. **Fig.1** illustrates the main categories of standards for executing sustainable school construction projects in Iraq, and **Table 1** shows the main and sub-standards identified from previous research on sustainable school standards**.**

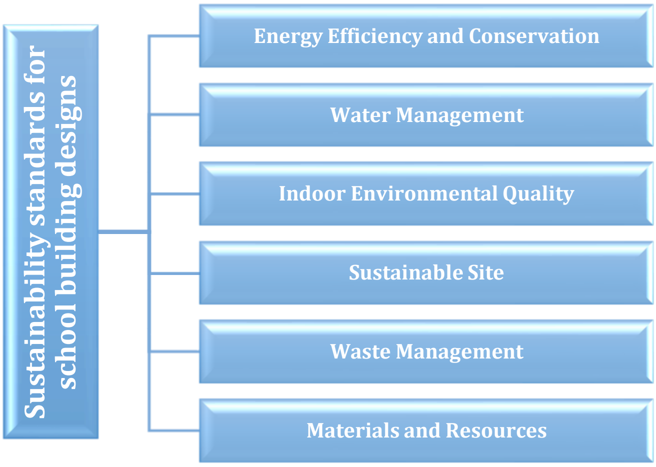

Figure 1. The main categories of standards of sustainable school.

Table 1. Sustainable school standards.

Item	Standards	References
A. Energy efficiency and conservation		
A-1	Natural daylighting	**(LEED, 2022; BS EN 12464-1, 2021)**
A-2	Renewable energy	**(Sarasook, 2020; Sudhakar and Keng, 2021)**
A-3	Energy metering	**(Mbaye, 2022; Picot, 2023)**
A-4	External shading device	**(Ogbeba and Hoskara, 2019)**
A-5	Building automation system	**(Yu, 2021)**
A-6	Walls insulation	**(Alsaffar, 2014; Lu et al., 2021; Moktan and Uprety, 2023)**
A-7	Roof insulation	**(Shrestha and Rijal, 2023; Moktan and Uprety, 2023**
A-8	High-performance windows and glazing	**(Moghaddam et al., 2023; Qahtan et al., 2024)**
A-9	External wall coating	**(Gupta and Deb, 2022)**
A-10	Energy-efficient lighting	**(Soleimanipirmorad and Vural, 2018)**
A-11	Pump motor	**(Harb and Sewilam, 2019; Bao et al., 2020)**
A-12	Energy-efficient HVAC system	**(Salimi and Hammad, 2020; Congedo et al., 2021)**
A-13	Landscaping	**(Donovan and Butry, 2009; Xu et al., 2017)**
B. Water management and conservation		
B-1	Water saving device	**(EL-Nwsany and Abd el-Aal, 2019)**
B-2	Smart water metering	**(Randall et al., 2018; Cominola et al., 2021)**
B-3	Water efficient landscaping	**(Ziemkowska, 2023)**

B-4	Treatment and reuse of gray water	**(Hamouda et al., 2021; Ways, 2023; Lanchipa-Ale et al., 2024)**
C. Indoor environmental quality		
C-1	Natural ventilated	**(Shrestha et al., 2021; Zhang and Bluyssen, 2021)**
C-2	Effective classroom seating arrangement	**(Kim et al., 2020)**
C-3	Strategic of color use	**(Mubinova and Gokgol, 2023)**
C-4	Acoustical performance quality	**(Van reenen and Plessis, 2022; Razali et al., 2024)**
C-5	Indoor chemical and pollutant source control and low voc material	**(Ezzati, 2017; Ielpo et al., 2021)**
D. Material and resources		
D-1	Using local materials	**(Dejeant and Joffroy, 2022)**
D-2	Reuse and recycle the contents	**(Ursua and Borlan, 2023; Kurniawan and Jannah, 2024)**
E. Waste management		
E-1	Construction and demolition waste management	**(Alajeeli and Al Kaabi, 2016; Islam et al., 2024; Alaa S. Shamran, 2024)**
E-2	Municipal solid waste management	**(Godfrey et al., 2020; Espiritu, 2024)**
E-3	Organic solid waste management	**(Masawat et al., 2021; Onyilokwu et al., 2024)**
F. Sustainable site		
F-1	Site selection	**(Baharudin et al., 2021; Asadpour and Asadpour, 2022)**
F-2	Design for people with special educational needs	**(Santos and Capellini, 2021; Julius and Tukiman, 2024)**
F-3	Outdoor playground design	**(Holmes and Kohm, 2017; Hyndman and Wyver, 2020)**
F-4	School building orientation	**(Adel et al., 2021; Mba et al., 2022)**
F-5	Safety and security	**(Ali and Fatima, 2016; Mubita, 2021; Qaddoori and Breesam, 2024)**
F-6	Sustainability expert	**(Harb, 2019)**
F-7	Transportation	**(von Stülpnagel et al., 2024; Gössling et al., 2024)**

2.1 Energy Efficiency and Conservation

(U.S. Environmental Protection Agency, 2011) states that energy expenditures are the most significant drain on educational institutions' operational budgets, surpassed only by employee costs. Consequently, numerous public schools are implementing measures to enhance their educational facilities' energy efficiency.

Investing in energy efficiency has the potential to deliver economic, educational, and environmental benefits in addition to significant energy cost reductions.

According **(Harb and Sewilam, 2019)** Approximately thirty percent of the school energy budget is wasted, equating to $12 per square foot or between $100,000 and $400,000 annually. Schools must prioritize energy-efficient building design to address this issue, including using natural lighting and ventilation and integrating renewable energy sources such as solar power.

2.2 Water Management

Schools consume water daily, including heating and cooling systems, restrooms, drinking fountains, dining facilities, labs, outdoor recreational spaces, and landscaping **(EL-Nwsany**

and Abd el-Aal, 2019). Furthermore, it is crucial to encourage the implementation of sustainable water management practices in schools. Given the school construction program and the significant role schools play in motivating students to prioritize water conservation during their developmental years, it is essential to incorporate water-saving strategies in the educational environment. According to **(Morote et al., 2020)** the water usage within the school is influenced by several aspects, including the student and teacher population, the irrigation of outdoor spaces, the type of gardens, the effectiveness of watering systems, the implementation of water-saving technologies, the size of surfaces requiring cleaning, and other relevant considerations. Increase water use is directly correlated with the expansion in the number of users (students and staff); the school's typical daily water usage is 4680 L per day, corresponding to an average of 7.34 L per person daily, which can be divide the total usage by the population to arrive at this calculation. Efficient water usage is crucial for achieving sustainable water management. Implementing the most effective management practices can accomplish this. The design of sustainable schools aims to optimize water usage efficiency, minimize costs, and prioritize water conservation. To achieve this, the school implements measures to decrease water usage, regulates and reduces water flow on the premises, and improves the reuse of grey water **(EL-Nwsany and Abd el-Aal, 2019).**

2.3 Indoor Environmental Quality

An indoor environment's qualities that impact people's comfort, safety, and well-being are called indoor environmental quality. By regulating air pollutants, supplying adequate lighting, upholding comfortable temperatures and humidity levels, minimizing noise, guaranteeing the availability of clean drinking water, and utilizing safe and ecologically friendly building materials and equipment, it seeks to improve the environmental conditions inside buildings **(Sadick and Issa, 2018)**

Improving the quality of the indoor environment can enhance career and academic performance, increase well-being, and reduce rates of environmentally related diseases.

During the school year, kids are in a classroom for at least six hours daily. As a result, it is critical to provide a suitable indoor environment that supports students' health, happiness, and academic success **(Bluyssen, 2017).**

2.4 Sustainable Site

A sustainable site embodies a holistic strategy considering environmental, social, and economic consequences. By implementing this strategy for school design and development, we can guarantee that these institutions can create educational environments that foster both learning and sustainability, thereby contributing to the construction of a more promising and environmentally friendly future **(Mihăescu, 2020).**

2.5 Waste Management

According to **(Joy-Telu and Telu, 2017)**Educational institutions discard many sorts of school solid waste (SSW) annually, such as paper, newspaper, cardboard, clothing, yard waste, wood pallets, food waste, cafeteria waste, glass, metal, disposable tableware, plastics, and numerous other variations, a school can generate about 4.3 pounds of solid waste (SSW) annually. While SSW is a significant issue, it constitutes a minor portion of a country's waste disposal and implementing efficient waste management programs can sustainably accomplish waste disposal.

2.6 Materials and Resources

Raw materials are crucial in achieving the environmental and socio-economic objectives outlined in the United Nations 2030 Agenda for Sustainable Development **(Mancini et al., 2019)**. They are also necessary for the transition to meet the climate goals outlined in the Paris Agreement **(Change, 2015)**. When sourcing raw materials, it is essential to consider environmental and social aspects, as these factors impact the sustainability of material supplies and contribute to achieving goals in communities transitioning towards a low-carbon economy.

3. METHODS AND DATA PRESENTATION

This study deals with the available standards for implementing sustainable schools in Iraq. The sources and data for this research were collected through conducting personal interviews with a number of experts in the field of school construction in Iraq, benefiting from previous studies and research on this topic. The sample was selected randomly, and a number of experts specializing in school construction in Iraq were involved to obtain accurate information. This study was conducted by preparing a questionnaire in the first section that included basic information for the respondents, such as the type of work in the private or public sector, the duration of experience in the construction industry, and academic qualifications. Before the questionnaire was officially launched, a trial version was launched—this trial version aimed to comprehensively examine some of the statistics to ensure the study's accuracy. Therefore, parts of the primary study were redesigned. This redesign process involved [Modify some standards], which helped to reduce problems and ensure no loss of time. **(Hertzog, 2008)** stated that the questionnaire must be tested on 10 to 40 participants. Therefore, the pilot questionnaire was tested on 40 respondents and rigorously analyzed using the robust Cronbach's alpha coefficient.

The second section of the questionnaire, which has six primary criteria, was subject to a reliability test. Every primary criterion comprises a set of sub-criteria. Cronbach's alpha values for the study results exceeded 0.7, deemed acceptable as shown in Energy 0.720, Water 0.742, Indoor Environmental Quality 0.716, Material & Resource 0.763, Waste Management 0.783, and Sustainable Site 0.719, and for all standards 0.885.

100 final questionnaires were distributed to experienced professionals working in the construction sector in Iraq. The distribution and completion of the questionnaires were facilitated through Google Forms, ensuring ease of access and usability for the respondents. Out of the distributed forms, 80 were completed and returned, providing valuable data for the study.

The results of the statistical analysis showed that 85% of the respondents work in the public sector, while 15% in the private sector. As for educational qualifications, it was found that 43.8% of the respondents hold a bachelor's degree, 42.5% hold a master's degree, 11.3% hold a doctorate degree, and 2.5% hold a higher diploma. It also indicates that 70% of the participants specialized in civil engineering, 13.7% in electrical engineering, 7.5% in architectural engineering, and 3.4% in mechanical engineering. Finally, the statistical results for years of experience show that 47.5% of the participants have 15 years of experience less than 20 years, 21.2% have 10 years of experience less than 15 years, 17.5% have 5 years of experience less than 10 years, and 13.7% have more than 25 years of experience, indicating the wealth of knowledge and experience among the participants.

The second part of the questionnaire included the principal and sub-sustainability standards that must be achieved to implement sustainable schools in Iraq. A five-point Likert scale was used to determine the importance of each sustainability standard. The number 1 was defined as completely disagreeing, and the number 5 was strongly agreed. Before the questionnaire was officially distributed, copies were sent to several experts to evaluate it, and they were asked to amend the unclear paragraphs.

The questionnaire's constant coefficient, 0.885, was analyzed to test the validity of the data collection tools. The SPSS program was used to analyze the collected data. The arithmetic mean and standard deviation were extracted, and the relative importance index method was used to estimate the importance of the main and sub-criteria.

The Index is computed in using Eq. (1) as **(Gündüz and Özdemir, 2013)**

$$RII = \frac{5n5+4n4+3n3+2n2+n1}{5(n5+n4+n3+n2+n1)} \quad (1)$$

Where:

n 1= The total number of participants who responded. "Strongly disagree."
N 2= The total number of participants who responded. "Disagree."
N 3= The total number of participants who responded. "Neutral."
N 4= The total number of participants who responded. "Agree."
N 5= The total number of participants who responded. "Strongly agree."

4. STATISTICAL ANALYSIS

In **Table 2**, the first column shows the main criteria, and the second and third columns show the arithmetic mean and standard deviation.

Table 2. Rank mean and standard deviation for main criteria.

Rank	Main criteria	Mean	Standard deviation
1	Sustainable site	4.2839	0.34133
2	Indoor environmental quality	4.1725	0.38549
3	Waste management	4.1167	0.47170
4	Materials and resource	4.0625	0.57023
5	Energy	4.0615	0.31166
6	Water	4.0156	0.44711

For **Table 3**, The first column shows the sub-criteria and the second and third columns show the arithmetic mean and standard deviation. In contrast, the fourth column shows each standard's relative importance index.

Table 3. Mean and relative important index for each sub-criteria.

Rank	Standard	Mean	Standard deviation	RII
F-3	Outdoor playground design	4.46	0.572	0.89
F-2	Design for people with special educational needs	4.45	0.501	0.89
A-6	Walls insulation	4.45	0.525	0.89

A-13	Landscaping	4.45	0.571	0.89
A-7	Roof insulation	4.41	0.630	0.88
F-5	Safety and security	4.35	0.530	0.87
F-4	School building orientation	4.31	0.565	0.86
C-1	Natural ventilated	4.29	0.482	0.86
C-4	Acoustical performance quality	4.27	0.573	0.85
F-7	Transportation	4.27	0.616	0.85
A-8	High-performance windows and glazing	4.24	0.621	0.85
C-5	Indoor chemical and pollutant source control and low **voc** material	4.20	0.560	0.84
A-9	External wall coating	4.18	0.569	0.84
A-2	Renewable energy	4.18	0.652	0.84
B-2	Water metering	4.16	0.605	0.83
A-10	Energy-efficient lighting	4.15	0.618	0.83
E-2	Municipal solid waste management	4.13	0.582	0.83
E-1	Construction and demolition waste management	4.11	0.595	0.82
E-3	Organic solid waste management	4.11	0.595	0.82
C-3	Strategic of color use	4.11	0.693	0.82
F-6	Sustainability expert	4.10	0.565	0.82
B-3	Water efficient landscaping	4.09	0.620	0.82
D-1	Using local materials	4.06	0.603	0.81
D-2	Reuse material	4.06	0.735	0.81
F-1	Site selection	4.04	0.683	0.81
B-1	Water saving device	4.04	0.719	0.81
A-3	Energy metering	4.00	0.574	0.80
C-2	Effective classroom seating arrangements	3.99	0.626	0.80
A-5	Building automation system	3.97	0.573	0.79
A-12	Energy-efficient HVAC system	3.94	0.663	0.79
A-1	Natural daylighting	3.90	0.836	0.78
B-4	Treatment and reuse of gray water	3.78	0.763	0.76
A-11	Pump motor	3.55	0.810	0.71
A-4	External shading device	3.39	0.974	0.68

5. RESULTS AND DISCUSSION

In this questionnaire, according to each sub-criteria's relative important index levels, the rank was calculated based on the priority that depends on the RII value, as indicated in **Table 4**.

Table 4. Relative important index levels.

RII value	**Sub-criteria rank**	**Importance level**
0.8 ≤RII< 1	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20 ,21,22,23,24,25,26,27,28	High
0.6 ≤RII< 0.8	29,30,31,32,33,34	High – Medium
0.4 ≤RII<0.6	—	Medium
0.2 ≤RII<0.4	—	Medium – Low
0 ≤RII<0.2	—	Low

According to **Table 2**, the main criteria of sustainability in school design—sustainable site, Indoor Environmental Quality, Waste Management, Materials and resources, Energy

Efficiency, and Water Conservation—earned the highest importance with scores of 4.2839, 4.1725, 4.1167, 4.0625, 4.0615, and 4.0156, respectively.

The analysis of sustainability criteria for school design underscores the pivotal role of the 'Sustainable Site' (SS) factor. This element encompasses a wide range of considerations aimed at reducing the environmental impact of the school's location and maximizing the site's potential. Following closely is Indoor Environmental Quality (IEQ), the second most crucial factor in sustainable school design. This standard focuses on the conditions within the school building that influence the students' and staff's health, comfort, and productivity. Waste management emerges as the third most crucial standard in sustainable school design. Effective waste management practices are vital for reducing the environmental footprint of educational institutions. Following this is Material and Resource Efficiency, the fourth necessary standard. This criterion underscores the need for conscientious utilization of materials and resources throughout the school building's lifespan, including construction, operation, and maintenance. Energy efficiency is the fifth standard. This standard focuses on reducing the school building's overall energy consumption and utilizing renewable energy sources to minimize environmental impact.

Finally, Water conservation is also a critical factor. This standard involves using water-efficient fixtures, rainwater harvesting systems, and xeriscaping to minimize water usage. Efficient water management conserves this precious resource and reduces utility costs.

Respondents place the highest significance on environmental sustainability, suggesting that the primary focus should be designing energy-efficient, water-saving, and environmentally friendly schools.

As depicted in **Table 3**, the most crucial sub-factors, such as outdoor playground design, insulated walls, design for people with special needs, and landscaping, emerged as the most significant. These sub-factors, with an RII of 0.89, were statistically the most important. The results reveal that the four standards with the highest rating (RII), two of which (design of the outdoor courtyard and design for people with special needs) fall within the leading standard of sustainable site, while the two subsidiary standards (wall insulation and landscaping) fall within the primary standard of energy.

The main criterion, sustainable site, received the highest importance among the other main criteria, as it is clear that the participants gave the most significant importance to this criterion as it enhances the social aspect of sustainability in some of its paragraphs, such as the safety and security standard, design for people with special needs, and design of the external courtyard, noting that the majority of schools Iraq lacks a regular outdoor playground that contains safety and security standards and green spaces, as the relevant authorities have exploited the outdoor playgrounds of many schools and converted them either build additional school wings or build new schools in them to break the momentum in many schools in Iraq, in addition to The majority of Iraqi schools do not take into account any unique designs for people with special needs, as this segment of society suffers from neglect. Also, there is a need for minimum safety requirements inside or outside the school. We noticed this from the many incidents reported by the media from time to time about no safety in the structural structure, a lack of safe roads for students to reach school, and a lack of regular crossing bridges to and from schools.

Using statistics, we can see that natural ventilation and acoustical performance received relative importance indexes (RII) of 0.86 and 0.85, respectively. These results align with other recent studies that found natural ventilation and acoustical performance crucial in the classroom. These studies confirm a strong correlation between acoustical performance, natural ventilation, and students' academic performance. **(Filho et al., 2022)** concluded that the internal environment of classrooms significantly affects students' physical health, mentality, and learning efficiency, providing a promising outlook for the potential benefits of sustainable design.

The energy-efficient light criterion received a relatively high importance of 0.83 from the survey respondents. Despite the importance of natural lighting, with an RII of 0.78, for educational facilities because of its positive impact on occupiers, it enhances individuals' psychological and physical health due to its effect on mood and biological regulation. **(Martins et al., 2023)** In contrast, energy-saving lighting is a sustainable and economical option for saving energy and preserving the environment.

The sustainability expert sub-criterion received moderate importance from the survey participants (RII 0.82). This is a good indicator of participants' increased awareness of the necessity of having experts in the field of sustainability within sustainable engineering projects. It underscores the importance of expertise in sustainable engineering projects, as Iraq generally needs more awareness or prior knowledge of sustainability and its significance.

Table 3 shows that the scores for all criteria were between 0.89 and 0.68, which is a very high level. These are high and acceptable percentages since everyone who filled out the survey showed how vital these criteria are and how they must be included in future school designs in Iraq.

6. CONCLUSIONS

The results indicate that the use of sustainable design standards in Iraqi schools can significantly improve the quality of the indoor environment, which is positively reflected in students' academic performance. These results are consistent with the study's objectives of identifying the best sustainability standards for school development. This study is a significant step towards achieving a more sustainable educational environment, which contributes to improving the quality of education in Iraq. It is recommended to gradually include these standards in new school designs, with a focus on training and awareness of the importance of sustainability.

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Credit Authorship Contribution Statement

Noor Dheyaa Rajab: Writing - original draft, review and editing, research and data collection.
Hatem Khaleefah Breesam: Supervision, review and editing, validation, project management.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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تحديد المعايير الأساسية لتصميم المدارس المستدامة في العراق: مسح وتحليل إحصائي

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الخلاصة

على الرغم من فعالية معظم معايير الاستدامة، إلا أن البنية التحتية القديمة ونقص الدعم الاقتصادي يشكلان تحديًا كبيرًا لتطبيقها في المدارس العراقية. لذا فإن دمج معايير الاستدامة في تصاميم المباني المدرسية في العراق يعد عاملًا أساسيًا في تحسين البنية التحتية للمرافق التعليمية. تهدف هذه الدراسة إلى تحديد أهم المعايير الأساسية لتصميم المدارس المستدامة في العراق من خلال تقييم ستة معايير رئيسية هي: الطاقة والمياه وجودة البيئة الداخلية وإدارة النفايات والمواد والموارد وأخيراً الموقع المستدام. تم إعداد هذا البحث من خلال إجراء استبيان شمل العديد من المتخصصين في مجال بناء المباني المدرسية في العراق. تم استخدام المقارنة بين المتوسطات لمقارنة المعايير. حقق معيار الموقع المستدام أعلى متوسط حسابي بلغ 4.28، بينما أظهر معيار جودة البيئة الداخلية متوسطًا حسابيًا بلغ 4.17، مما يدل على أهمية توفير بيئة صحية للعاملين في المدرسة. جاء معيار إدارة النفايات بمتوسط حسابي بلغ 4.11، حيث تعد ممارسات إدارة النفايات الفعالة أمرًا حيويًا لتقليل البصمة البيئية للمؤسسات التعليمية. وأظهرت النتائج أن معيار كفاءة المواد والموارد سجل متوسطاً حسابياً بلغ (4.062) مما يؤكد على ضرورة الاستخدام الواعي للمواد والموارد طيلة عمر المبنى، في حين حقق معيار كفاءة الطاقة متوسطاً حسابياً بلغ (4.061) مما يدل على أهميته في تقليل إجمالي استهلاك الطاقة في المبنى المدرسي، وأخيراً يعد معيار ترشيد المياه من المعايير المهمة حيث سجل معدلاً بلغ (4.01).

الكلمات المفتاحية: المدرسة المستدامة، إدارة النفايات، كفاءة الطاقة، جودة البيئة، الحفاظ على المياه.