

Environmental education (EE) in architectural departments Al-Nahrain University as case study

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ABSTRACT

Since architecture is concerned with the design of various buildings at the architectural and urban levels, and since buildings are responsible for nearly half of energy consumption worldwide, this matter calls for the need to pay attention to the curricula and theories of environmental architectural design originally based on environmental education curricula in the departments of engineering Architecture to seek to prepare the teaching staff and students to face this reality by developing curricula that distinguish academic and professional institutions and specifically related to environmental education curricula for the purpose of finding appropriate and compatible solutions with every design act in view of the increasing environmental problems in the light of global indicators, the research seeks to identify the most important stages of education Environmental in the field of architecture, starting from the stage of the exploratory approach through the stage of the proposal approach to the stage of the critical approach, with the identification of the most important environmental design theories such as biomiery, which helped in finding solutions to the problem of high energy consumption of eight buildings at the architectural and urban levels, as well as the research seeks to review the position of Environmental education curriculum in the Department of Architecture – Al-Nahrain University, To show its compatibility with the most important stages of environmental education approved globally. The research concluded that there is a weakness in the alternatives approach and the critical approach that must be activated as an important stage of environmental education in that department. The research also recommends the necessity of activating environmental design theories in the field of practical and academic architectural practice, such as the biomicrological design theory for the purpose of raising the environmental efficiency of buildings and reducing energy consumption. In those buildings.

Keywords: Environmental Education (EE), Architectural Education, Environmental Design.

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1. Introduction

The challenges of sustainable environmental designs in the twenty-first century are represented in developing an integrated and optimal process for architectural design that includes design, construction, and operation, which requires the development of an integrated design method that includes the use of small quantities of natural and energy resources and produces small quantities of waste without limiting creativity in contemporary design and innovation. This revealed the problem of the lack of coherent and synergistic cognitive thinking. And its mental and cognitive processes based on the environment and its nature based on the integrated and comprehensive interdependence of all levels of interaction between the elements of design and the environment and for all levels of design, implementation and operation in a way that converges with the integration of natural

ecosystems and the degree of influence of one on the other and the ability of the rest of the ecosystem to adapt, develop and respond to expected or unforeseen changes expected to reach the stage of ecological balance. This in turn requires conducting more research on the effectiveness of environmental education in the programs of academic institutions at all levels and specializations related to architecture and the environment , which encourages the development and introduction of a set of principles based and derived from nature and the environment in environmental education curricula in academic institutions and thus The built environment will have ecological designs and a high environmental sense, given that the natural environment and its systems must be considered an ideal model that must be taken advantage of. For environmental architecture and as a means of creating a local climate for the building and thus achieving environmental efficiency in a manner like natural ecosystems. This requires environmental education curricula to coexist more harmoniously and harmoniously with nature to achieve a sustainable future and reduce the emissions of waste and gases with the toxic part into the atmosphere.

1.1 The concept of environmental education

There have been many opinions in defining the concept of environmental education and its meaning, Environmental education is defined in the light of what was stated at the UNESCO conference, which was held in Tbilisi in 1977 as: a process of reorientation and linking the various branches of knowledge and educational experiences, in a way that provides an integrated awareness of problems, and allows for rational actions to be carried out to share in the responsibility of avoiding environmental problems and improving Regarding the quality of the environment [1]. This definition agrees with its predecessor in highlighting the role and importance of environmental education; Which develops the capabilities and knowledge of the individual towards solving environmental problems.[2] Environmental education is: an educational approach to building environmental awareness; by providing the individual with knowledge, skills, values and trends that regulate human behavior, and enable him to interact with his social and natural environment, protect it and solve its problems. [3]. This definition confirms the same ideas that were addressed in the previous definitions, with the addition of the importance of the individual's interaction with his natural environment by regulating his behavior. [2]. Environmental education is also defined as: an educational program that aims to clarify the human relationship and interaction with his natural environment and the resources it contains in order for students to acquire educational experiences; In the field of environmental facts, concepts and trends. [3].

As for Kumar, he defines environmental education as: a type of education that regulates the human relationship with his natural, social and psychological environment, the purpose of which is to provide students with educational experiences about facts, concepts and environmental ways of thinking related to environmental problems such as pollution, energy and depletion of natural resources [4]. Based on the foregoing, it can be said that there is no single definition of environmental education, rather definitions that differ from one society to another according to the nature of the problems that require focus in the education programs of each country. [5]. Environmental education is concerned with all aspects of the environment, such as the social, cultural, economic and aesthetic aspects, and is not limited to the biological aspects, because the existing environmental problems are the product of human activities and public and private institutions and are characterized by a local and global character [6]. for more information see [7]. From the foregoing it appears that environmental education has two main objectives:

- 1-Gaining scientific knowledge for the student; It allows him to contribute to achieving environmental sustainability and to gain him environmental awareness and sense.
- 2-Creating positive trends to prepare students for community participation in solving the increasing environmental problems and stimulating active participation in improving, developing, and protecting the environment [6].

1.2 Environmental education in architecture

In architecture, the subject of environmental education is referred to by terms such as “green”, “ecological”, “inter-sensitive” and “energy-saving”. The process of integrating environmental sustainability into architectural education in the past decades has taken an increasing focus. Because architecture is: a delicate combination of creativity, scientific and technological knowledge, and social and environmental domains, architects have a responsibility to possess sufficient basic knowledge to guide design decisions towards providing

environmentally friendly design solutions. On the other hand, the focus on energy-saving design in the past decades has widened the gap between Technological and theoretical aspects of architectural education. It can be emphasized that architectural education needs to embrace the fact that environmental sustainability is directly linked with architectural education within a unified engineering curriculum that combines all concepts that affect the process of teaching architectural designs production.[8]. Topics closely related to the production of environmentally friendly architectural designs that Passive energies are used through a set of strategies [8], such as:

- Formal alignment with nature.
- Inspiration from plant nature.
- Inspiration from biological nature.
- Integration between interior and exterior.
- The expressive level of the building or site.
- The nature of the material or construction materials used.
- Extent of coverage of the functional aspect.
- The climatic alignment of the approved forms.
- Affiliation to principles Biological (biological ideas).
- Recycling of consumables ((Entropy) Outputs.
- Ensuring that the building consumes energy ((Oxygen) Inputs.
- Use of mobilized passive energies.
- Use of effective renewable energies (photovoltaic cells, thermal cells).
- Use of control systems by opening and closing windows to control the quantity Sunshine and Wind Direction.

1.3 Environmental education in academic institutions programs

One of the priorities of the academic program in the departments of architecture is to enable graduates of architecture by implementing designs characterized by achieving comfort, joy, luxury. An important part of the learning outcomes required in this program includes preparing environmentally friendly designs by focusing on environmental education topics that touch on multiple topics that go beyond the topics of reducing consumption and recycling materials but need a new approach to reshape people's way of living, their values, and their daily behavior Production sustainable society [9]. Therefore, several researchers, such as David Orr, in his book (Ecological) [3], sought to put forward the idea that environmental sustainability can be achieved when the individual's values are linked with the vocabulary of nature, it is a way to achieve sustainability to solve the environmental problems resulting from the built environment. That is why some call and even encourage the production of sustainable environmental communities, which leads us to a sustainable ecological age. A new type of sustainable design philosophy has emerged and the shift from using the principles of nature to transforming the structure of the economy, through which society is encouraged to work with the broader general framework of the environment towards a larger sustainable environmental framework to achieve the comprehensive and integrated framework for sustainability.

Therefore, a new definition of environmental education emerged as "a design philosophy that links the natural processes of the Earth and the way ecosystems mutate themselves in the entire ecosystem being the starting point [10] and mentions [11] that interfacial sustainability is the ability of the entire system to remain healthy and healthy in a way. Ongoing [11] Also, environmental sustainability can be an integral part of sustainability, in which the economic and social factors are defined within the determinants of the environment, and this is contrary to the previous thinking and orientation that considered the environmental, social, and economic aspects to have the same weight and the same importance in achieving human happiness and well-being. shows that society lives within the limits of the environment and that the economy meets the requirements of the

society within the determinants of its environment [12] because without the environment, neither the economy nor society can be sustainable.

1.4 Bio mimicry is one of the most important design theories in environmental education

There are many terms that refer to the learning process from Nature, including (Bio onics, Bio mimicry, Bio Inspired Design) [13]. The term (Bionic) is associated with (Jack E. Steel) in 1958 when he studied living organisms or their parts after considering them as interconnected mechanical systems that work in an integrated and homogeneous manner and tried to use them in Designs (Aero and Fluid – Dynamics) His idea was related to understanding the natural ecosystem and transforming it into a frying system that can be practically applied in architecture through the origin and to be the basis To develop subsequent designs, the researcher [14] in (2009) linked the word (Eid mimitics) as a method to know the secrets and foundations of biological sciences based on the theories and techniques of the physical sciences [15]. As for the term (Biomimicry) it was associated with the researcher (Janine Benyus) In the nineties of the last century, the term became more general and comprehensive for the principle of learning and quoting from nature and its systems. The idea is based on the fact that the evolution of life over millions of years, natural systems were able to become efficient and sustainable by maintaining what is good and capable of development, resistance and survival. Therefore, the idea of (Bio-inspired design), which was developed by (Benyus) in (1997), appeared [16]. The need to analyze nature better and use it for the benefit of man and to reach the principle that nature can be a source of inspiration for designs [16] by simulating biological systems to develop architectural and technical solutions to solve and address the problems facing humans and thus became the broad base as a movement of environmental awareness for the production of designs sustainable and this explains its name associated with the Greek word (Bios), which means (life) and the word (Mimics), which means (tradition). Therefore, architecture can, during its lifespan, imitate the principles of natural life systems, and those ecological designs are an attempt to translate ecosystems into designs [17]. Biomimicry is a theory of design by simulating natural processes, creating sustainable, creative designs and succession, considering that nature is the model or growth.

The model, guide, and criterion for this design or solution, therefore, we need to study the nature, natural forms, and processes within the ecosystem through the (Eiomimicry) to extract what can be learned from or quoted for the purpose of solving human problems, and then applied by simulating them in creating sustainable designs [18]. Therefore, it is a creative process that encourages the transfer of ideas, processes, and strategies in living systems to reach the goal of achieving sustainable development. Adopting nature as an inspiration provides a highly efficient and credible way of learning and evaluation to find innovative design solutions, but it needs greater clarification Through ecological architectural designs [16], the subject of (Biomimicry) can be directly included in the design processes by imitating the nature of the relationships and strategies of the environmental aspects within living systems, including the way of behavior and its pattern, or the system in nature with the help of a translation system of the nature of simulation or from Through the indirect method by quoting the foundations and nature of relationships and understanding the principles of the relationship within living systems and how nature and its systems behave, or what can be called (the “Life principle”)[19].

1.5 Educational objectives and learning outcomes for environmental education

Environmental education must consider the following matters [15]:

1. Considering the natural and port environment as a whole – in addition to keeping pace with technology, considering the social factors (economic, political, cultural, historical, controversial, and aesthetic).
2. Providing environmental education in its relations with a multiplicity of disciplines in its approach, for the purpose of providing a comprehensive and balanced perspective•
3. The possibility of examining key environmental issues from local, national, regional, and international perspectives so that students gain insight into environmental conditions in other geographical areas.
4. Focusing on the current and potential environmental conditions, considering the historical perspective.

5. Enhancing the value and necessity of local, national, and international cooperation in preventing and solving environmental problems.
6. Clarify the complexity that arises because of environmental problems interrelationships with each other.

2. Methodology

Review of the previous literature that touched on the concept of environmental education to find out its most important principles.

- It touched on the concept of environmental education and the nature and content of its distinct stages in the education of environmental design in the academic programs in the departments of architecture and extracting its most important indicators.
- Take a Sample from a source of Environmental Education Curriculum form the department of Architecture-Al Nahrain University to Diagnose the Extant of its Effectiveness in Responding to the Stages of Environmental Education according to the international literature or its compatibility with it by diagnosing the type of stage or stages to which it belongs.

2.1 Indicators of the stages of the environmental education curriculum globally

It is clear from the foregoing that there are three stages of the environmental education curriculum, as they range from the stage of building environmental concepts to the stage of selecting them with practical applications to the stage of their integration with the rest of the other disciplines and studying their complex links with them and can be summarized in the following stages [15].

A. The first stage: The stage of the exploratory approach

(Sensing the environmental principles): the stage of the exploratory approach:

the environmental problems are felt in the first stage of environmental education, as the main principles and values of environmental [1]. In summary, this stage is achieved through theoretical lectures – where students are urged to address issues of sustainable environmental design. From it, students explore concepts and principles through their direct, realistic effects.

Objectives

To enhance a sense of environmental impacts on buildings through: -

- Developing awareness of contemporary challenges
- Enhancing enthusiasm and commitment to environmental sustainability.
- Motivation Create a dynamic and collaborative learning environment.
- Involve students in their learning of applied practices of theoretical concepts.

How can this be

Through Practical exploration and application of modern environmental design theories. – Experimental understanding of the physical principles affecting environmental performance measurement – Visits and analysis of various case studies.

B. The second stage: the stage of the proposals approach

(Achieving – validating the validity of those environmental principles through designed realistic cases or through designs developed by students).

The stage of the proposals approach: the second stage of the environmental education stages. Urging students to review the solutions provided to various environmental problems based on the knowledge gained about the first stage in the light of their designs. In investigating their designs and the efficiency achieved in solving various environmental questions, students must be provided with the necessary knowledge, and they must contribute to its production, to validate the concepts explored in the first stage of education [21]. Students'

designs at this stage should become a means of producing knowledge achieved in the first exploratory stage of environmental education [22].

As a conclusion, at this stage, theoretical knowledge is applied and produced in the context of architectural design projects, where design is the core in the process of environmental education. Students verify the validity of their knowledge, both qualitatively and quantitatively, through research-based design, suggesting different ideas and interpretations, and investigating their effectiveness in producing effective architectural designs.

Objectives

- To encourage students to analyze knowledge and develop independence in design applications.
- Experimental validation of the acquired concepts and principles.
- Suggesting design strategies and new solutions based on the data of environmental design theories.
- Focus on promoting design as an exploratory and research tool to provide effective design-verified solutions.

How can this be

- Motivating students to explore opportunities for a sustainable artificial intelligence approach to design by using different software to help draw different architectural designs in order to improve the performance of the building in terms of different environmental elements.
- Starting to activate the initial awareness in terms of the possibility of multi-disciplinary cooperation between different disciplines (multi-disciplinary) to produce buildings with efficient and distinct performance,
- Leaving space for individual expression through the selection and identification of various environmental problems with a problem-based approach in order to verify them realistically or through different architectural designs.
- Uses the Problem-Based Learning. for (Design = Essence of Teaching) [6].

C. The third stage: the stage of Critical approach

In the third stage of environmental education: thinking is directed towards encouraging students to deepen and personalize their needs, linking learning critically with its applications to professional progress, and commitment to the latest scientific research While pursuing applications of the most important environmental design theories. Design as well as promoting multidisciplinary direct exchanges. Curricula must be strengthened through providing advanced tools for simulating and validating performance data – with scientifically listed external resources and theoretical knowledge backed up by comprehensive real-world case studies – in order to initiate new avenues of research, as well as to develop innovative products or designs [22]. Environmental education data. Students are exposed to scientific research, practical practice, and its contributions to presenting effective designs based on careful education through various architectural designs. This curriculum, in the third stage of environmental education, is based on providing students with aggregates of knowledge intertwined with the environmental topic and the changes taking place in it and its effects on environmental education [23].

Objectives

- To link the theoretical knowledge obtained from academic environmental education with practical application and technological developments in this field.
- Promote research fellowships to conduct advanced scientific research and design research.
- Encouraging involvement in continuous professional development and keeping abreast of all the latest developments related to environmental education in general and architectural design in particular.
- Supporting everything that would motivate students to adopt a lifelong learning approach.

- Enhancing the exchange of knowledge and skills between different disciplines and the changes taking place in them and their impact on environmental education.

How can this be

The environmental education curriculum is supported through the transfer of experience, knowledge, methods and results between academic institutions and professional bodies, and research is strengthened as a tool for learning, examining completed designs and exploring performance The best environmental based on the data of the established curriculum for environmental education.

3. Groups of selected international architectural projects in the field of simulating living nature (bio mimicry).

3.1 The first project

Fukuoka's Tenjin Central Park – by the Argentine architect Fukuoka – Emilio Ambasz, Japan.as shown in Figure1[24].

The design idea of the project came through the transformation of a public park in Japan, with an area of 822,222 sq.m. 81 storeys of terraced and hanging gardens as well as 1 underground storey for ACROS Asian Crossroads Over the Sea (Sea). The building, culminating in a splendid garden affords a poignant view of the city harbor. Beneath the fifteen floors of the gardens are vaults There are multi-use spaces on more than 93,222 (m) 1, and this space includes an exhibition hall, a museum and a theater that accommodates 1,222 seats, as well as conference halls, government and private offices, as well as several floors of underground parking and retail stores. There is also a central glass atrium inside the building, which allows diffusion of light through the glass that separates the pools. Also noteworthy is the presence of a large stone at the foot of the terraced garden, where this stone forms the entrance in the form of a letter, and this rough stone suggests the underlying geological layers Behind the vegetation that makes the building seem like a huge block cut out of the ground, this void also helps to ventilate the underground floors, and the other side of the building faces the most financial street and consists of striped glass, reflecting every corner of its floors passing below, And thus reduce the mass of the building



Figure 1. shows Fukuoka's Tenjin Central Park [24]

3.2 The second project

The project of the Okinawa Institute of Science and Technology Sekiaokinawa / Japan). 2010 – 2008 . as shown in Figure 2 [17].

The design of the project takes advantage of Okinawa's unique environment and surroundings by applying the concept of ecological design and passive energy systems to conserve energy and preserve the natural beauty of Okinawa while at the same time employing nature in the project through the formation of the Institute of Science and Technology Design (Nikken the site and zoning, emphasizing social communication and interaction with the ocean (a residential area known as the village) by linking the campus to the local community through a dynamic axis that connects the project as a whole that leads directly to the sea, which is an underground tunnel: the laboratories are connected And the rest of the spaces through three bridges and at the same time linking the project with the surrounding landscape and the pond originally on the site: the central courtyard is an internal natural environment interspersed with green spaces, trees and water pools The entire project overlooks it through large windows, at the same time It works as a natural ventilation system by drawing hot air from the building and softening the atmosphere and environment by reducing strong sunlight in summer and hurricanes and by merging well with the green forest, with D science and technology is a unique and distinct entity in Japan The project is located on the hills overlooking the blue sea. .



Figure 2. shows Okinawa Institute of Science and Technology [17]

3.3 The third project

(Island City Central Park-Project in Hakna Bay – Japan) designed by Toyo Eto between 2002-2005. As shown in Figure 3 [25].

The project is an artificial island located in Hakata Bay, to the north of Fukuoka city, on the southwestern tip of Japan designed by the architect (Toyo Ito. His design idea is to sculpt forms from nature and from the site, as if the project stems from its surroundings. The project consists of three curved doors representing three natural underground spaces that include a different group of (Fig. No. 3) shows Central Park. . Plants Subtropical as well as a variety of flowers and a recreational garden, the domes are partially covered with hinged glass roofs consisting of elliptical skylights (with an area of up to 11 square meters) that allow the passage of the largest amount of sunlight for plant growth and natural lighting, while the rest is covered with green roofs from the cover The design of the project is similar to a small wavy chain of small hills along the length of the lake overlooking it and the surrounding gardens, reaching about 892 (meters) horizontal as if it is part of the terrain and irregular pearl serpents, the design of the inner space The vacant extends outward and overlaps with it alternately up and down, in addition to the parts of the domes that are built to create outdoor seating areas under them and to provide shade for them and at the same time refer to the project entrances: the project covers approximately 1222 (square meters), and the project surrounds the environment Natural represented by gardens with an area of 81 hectares connected to the lake, and there is a pedestrian path around 8222 (, - m 1 ceiling and

overlooking the garden and flowing with the ground undulations, the area of each dome ranges from 922 (the structural structure used (reinforced concrete and steel structure), project level 2 (m :) The site area is 819,822 m , (1) The building area is 1811 m . 1) The skylights are automatically controlled according to the ambient temperature, allowing ventilation on hot days or shutting them off in the event of rain or cold. In addition, the cantilevered structure of the domes provides protection from the summer heat, while during the winter the temperature is controlled to provide the necessary heat for the tropical plants inside the domes.



Figure 3. shows Island City Central Park.[25]

Table 1. (Academic Program Specification Form For the Academic Year 2020-2021) \source: department Achieve. TEMPLATE FOR PROGRAM SPECIFICATION

PROGRAM SPECIFICATION	
1. Teaching Institution	Alnahrain University – College of Engineering
2. University Department/Centre	Department of Architectural Engineering
3. Program Title	Environment Architecture I: "Climate" AREQ 416
4. Title of Final Award	BSc Architectural Engineering
5. Modes of Attendance offered	Full Attendance
6. Accreditation	Semester one/ Fourth year
7. Other external influences	45 hours
8. Date of production/revision of this specification	2/10/2020
9. Aims of the Program	
1.	Identify the student with a wide database of the whole basic concepts of the reciprocal relationship between the natural environment and architecture starting from climatic natural factors and their physical facts at the territorial level in general and at the local level of Iraqi regions in particular as an example of hot dry regions.
2.	Illustrate the importance of sustainable developments and its importance in conservation the resources and provide economy sustainable.
10. Learning Outcomes, Teaching, Learning and Assessment Methods	

<p>A. <u>Knowledge and Understanding</u></p> <p>a. Define concepts of climate, natural environment, and natural environment & architecture.</p> <p>b. Understand concepts of environmental architecture.</p> <p>c. Define concepts of sustainability, and sustainable architecture.</p> <p>d. Calculate, lightings inside buildings and shadows.</p> <p>e. Be familiar with climatic factors, energy, and sustainability concepts, and its importance in architecture.</p> <p>f. Understand and apply the principles of sustainability in architecture.</p> <p>g. designed buildings which adapted with natural environment.</p> <p>h. Be able to analyze and design form, functions, interiors of environmental buildings in hot arid regions.</p> <p>i. Be able to apply modern knowledge, science, engineering, and technology to sustainable buildings.</p>	<p>All of the goals (learning Outcomes) are in STAGE -1- ONLY In Environmental Education Principles There is no applications nor interdisciplinary Subjects</p>
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B. Subject-specific skills

- B1. Understand professional, social, and ethical responsibilities.
B2. Communicate effectively.

C. Thinking Skills:

- C1. Acquiring and developing the fundamental critical tools of environmental architecture:
C2. The ability to think critically about the choices involved in all architectural design.

11. Program Structure

12. Awards and Credits

Level/ Year	Course or Module Code	Course or Module Title	Credit rating
4	A,B,C	General environment concept climatically characters in world regions and especially hot dry region.	<p>STAGE -1- ONLY In Environmental Education Principles</p>
4	A,B,C	Climatically variables which effect living creatures (human, animals, plants) and their interaction.	
4	A,B,C	Bioclimatic evaluation and interfering with planning and design decisions for exterior and interior environment.	
4	A,B,C	Sunrays and direction effect on hot dry areas, and the relation of its intensity on thermal loads.	

4	A,B,C	Calculation of thermal loads on elevations and facades. Examination
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Table 2. (Academic Program Specification Form for the Academic Year 2020-2021) \source: department Achieve.

TEMPLATE FOR PROGRAM SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAM REVIEW

1. Teaching Institution	Alnahrain University –College of Engineering
2. University Department/Centre	Department of Architectural Engineering
3. Program Title	Environment Architecture II: "Acoustic" AREQ 424
4. Title of Final Award	BSc Architectural Engineering
5. Modes of Attendance offered	Full Attendance
6. Accreditation	Semester one/ Fourth year 45 hours 2/10/2020

9. Aims of the Program

1. Identifying the principles of sound behavior in the enclosed space and the nature of the acoustical phenomenon.
2. The subject deals with the most important acoustical principles, the adopted standards in evaluating the musical, speech, auditory spaces and the most important acoustical defects and their treatment, the methods of designing the auditoriums halls, and studying noise and its types and concentrating on the methods of reducing them in public and residential buildings.

10. Learning Outcomes, Teaching, Learning and Assessment Methods

B. Knowledge and Understanding.

g. designed buildings which adapted with man-made environment.	All of the goals (learning Outcomes) are in STAGE -1- ONLY In Environmental Education Principles There is no applications nor interdisciplinary Subjects
h. Be able to analyze and design form, functions, interiors of acoustical buildings in halls and theatre.	
i. Understand professional, social, and ethical responsibilities.	
J. Communicate effectively.	
K. a. Define concepts of acoustics& architecture.	
b. Understand concepts of acoustical architecture.	
d. Calculate, Sound reflection halls and theatres.	
e. Be familiar with sound factors and other parameters, and its importance in architecture.	
f. Understand and apply the principles of acoustics in architecture	

B. Subject-specific skills

- B1. Understand professional, social, and ethical responsibilities.
- B2. Communicate effectively.

C. Thinking Skills:

- C1. Be able to apply modern knowledge, science, engineering and technology to acoustical buildings.
C2. The ability to think critically about the choices involved in all architectural design.

11. Program Structure			12. Awards and Credits
Level/Year	Course or Module Code	Course or Module Title	Credit rating
4	A, B, C	The basic concepts which clarify the specifications of the acoustic phenomenon (frequency, wavelength, sound intensity, sound pressure)	STAGE -1- ONLY In Achieving Environmental Education Principles
4	A, B, C	Levels of sound intensity and sound pressure, the sound power level (exercises)	
4	A, B, C	The acoustic phenomena which clarify sound behavior in the closed space (absorption, reflection, penetrating, diffusion, diffraction).	
4	A, B, C	How to employ reflection in designing the reflective ceiling and absorption in the treatment of the acoustic defect	
4	A, B, C	The reverberation standard and identifying this standard and its calculation methods and its importance in design and acoustic evaluation.	
4		Exercises about calculating the reverberation time and its actual and ideal value in lecture and musical halls.	

4. Conclusion

A clear weakness was diagnosed in the field of environmental education in the Department of Architecture – Al-Nahrain University, given the weakness in the field of application of the second stage of environmental education, as well as what was diagnosed through the learning outcomes targeted in the environmental education courses that there is Weakness in linking the applicable environmental education curriculum with the rest of the various engineering disciplines to achieve cognitive integration for the student in view of the overlap of knowledge in the architecture ceremony with many other disciplines, which did not appear within the learning outcomes targeted for the two study terms tested in the department and shown in the attached tables for those headquarters in Architectural Engineering Department.

1. The necessity of activating designs that mimic nature (biometrics) within the educational objectives of the tested study vocabulary by starting to give students a knowledge injection of ideas based on them in view of the developments in the contemporary global reality and the energy crisis and global warming.

2. There is a clear weakness in the comprehensive understanding of what is meant by architectural education, which the shadow over the architecture profession may be due to the reliance on the idea that teaching environmental education as a goal may give ineffective results due to the gap between the quantitative and qualitative approaches.

5. Recommendations

1. The research recommends the need for teachers, students, and professionals to constantly develop the environmental education classes and through research practices to establish a clear and constantly evolving knowledge base based on documented research practices. Exploration and analysis different types of contemporary practice as well as from historical architecture – as well as biomicrological architecture that is concerned with simulations that are made in the design stages.
2. The research recommends that the knowledge base on sustainable environmental is not uniquely about energy efficiency and killing carbon emissions, but rather extends to an ethical commitment and opportunity for inspiring architecture. Sustainability values will bring benefits to the educational sector, the architecture profession, and society.

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