

INTEGRATE SUSTAINABLE STANDARDS IN INTERIOR DESIGN CURRICULUM (INTERIOR DESIGN DEPARTMENT – JUBAIL UNIVERSITY COLLEGE-CASE STUDY)

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Abstract- Humanity faces many challenges in this era. One of these challenges is the ability of people to satisfy their needs for living without consuming the resources for the coming generation. Through sustainability, societies can reduce their use of resources and minimizing the negative impact of their activities. Consequently, sustainability is a major way to change our world toward better welfare and healthy human lives. The paradigm shift from non-sustainable to sustainable design and construction is challenging for those who are responsible for the building environment. (Jones, 2008) A considerable changes should happen in education systems in order to achieve sustainable development, Through education a great shift can happen in people and societies towards more sustainable practices. (UNESCO, 1992) To ensure sustainability will be a normal practice in the future, a great shift in design education should happen especially in the fields of architecture and interior design. This research suggests integrating sustainability issues in the interior design curriculum through all levels and in different courses. Because sustainability is a comprehensive concept and must be fully understood and implemented, students should study it in many courses and in all levels of those courses.

Key words- Interior design - Sustainability – Curriculum – LEED categories

I. INTRODUCTION

Sustainable design is considered as one of the most important topics in engineering education. According to much of the current research, sustainability will soon be taken for granted, which means that, in the future, most buildings will follow sustainable standards (Madew, 2012). For example, all federal government new construction in United States should follow sustainable standards and achieve LEED certification- at least silver certificate-. (LEED, 2009)

Interior Design is one of the engineering programs, dealing with building environment and materials. So it's important to implement sustainable standards in interior design education. In interior design programs, sustainability should be fully integrated in the curriculum, which will consequently lead to more sustainable practice in interior design and sustainability will become a norm in this field. (Leddy, 2013)

This research will explain how to integrate LEED (Leadership in Energy & Environmental Design) standards into the Interior Design Department curriculum.

The Interior Design Department at Jubail University College (JUC) is an interior design program that bestows a Bachelor of Science degree after students complete four academic years and 122 credit hours. The program offers 49 total courses.

The following courses are part of the degree program, however they do not relate to the research area and will not be discussed in this study: 12 courses are general college requirements that cover subjects like professional Arabic skills, Islamic religious education, and health courses; 11

courses are drawing courses, for example, Foundation of Drawing and Computer Drafting, [these courses will not be discussed in this study because they focus only on the practice of drawing techniques].

This research will study how to involve LEED categories in the other 26 courses in the interior design program. To teach students the many different aspects in sustainable design, sustainability should be integrated in as many courses in the program as possible. Sustainability is a border concept, therefore it needs to be applied according to the criteria of each course independently. The main concepts of sustainable design can be covered in the theoretical courses while the implementation of sustainable standards can be practiced in studio courses.

II. INTRODUCTION TO LEED

LEED, or (Leadership in Energy & Environmental Design) is a green building certification program that evaluates building design and construction moreover the building performance during its life cycle. To receive LEED certification, building projects should satisfy prerequisites and earn points according to certain categories, the certificate have different levels, e.g. Certified if the building earns from 40 to 49 points, Silver from 50 to 59 points, Gold from 60 to 70 points, and Platinum from 80 points and above.

III. MAPPING INTERIOR DESIGN COURSES WITH THE LEED CATEGORIES

This study is suggesting a layout to involve sustainable standards in interior design curriculum by mapping the LEED nine categories with the program courses. Each category can be covered by one or more courses depending on course criteria.

Theoretical courses will give the background of sustainable design and discuss implementation of the standards. Studio courses will implement sustainable principles in the project design.

In the Interior Design program, the basic principles of sustainability should be studied in the first year, in order to give the student the necessary background in sustainable design. Then they will discover more details about sustainable design as they advance in the program in other courses. This will lead to a full integration of sustainability in the interior design curriculum. (Leddy, 2013)

Students can study the basic principles of sustainability in Introduction to Interior Design course which is offered in the first year.

ID 101 Introduction to Interior Design (3-0-3)

Course description: This course provides an overview of the interior design profession and its relationship to allied fields. Students become familiar with contemporary issues and approaches to include space planning, furnishing and material selection in a historical context.

This course is the perfect place to give an introduction of sustainable learning. At this basic level, students in interior design program would study the basic knowledge in sustainable design by discovering how the ecosystem work. They will begin to think on a global level, for instance, they will begin to learn about global warming and its effect on all habitats. Moreover, students will also begin to recognize how consumers affect the environment. (Nichols & Adams, 2011) This course will also introduce the interior designer's role in sustainable design and how designers can reduce all the negative effects noted above.

Correspondingly, history courses should provide a framework for understanding the environmental problems, Students should study the historical changes in the ecological systems, and this will guide them to understand the current situation and how to create a solution to the environmental issues. So this environmental knowledge can be produced throughout history courses. (Baweja, 2014)

ID 214 History of Interior Architecture I (3-0-3)

Course description: This course covers historical developments of interior architecture and decorative arts within a social, cultural, economic, political and technological context. Part 1 covers ancient time through the 18th century. Emphasis focuses on Western European and Islamic countries.

ID 317 History of Interior Architecture II (3-0-3)

Course description: This course covers design theory and practice in Europe and the United States from the mid-19th century to the Modern Movement. Students will study technological advances, products and methods and historical perspectives in the context of interior architecture, furniture, design philosophies.

These history courses should give more attention to the environmental history and the effect of human practice in environmental changes during the last

decades. Students should also study the heritage and traditional designs which use many effective techniques, especially in passive cooling and heating, for example, using of wind towers, Mashrabia, and courtyard design in hot climate.

3.1. LEED v4 category 1: Integrative Process

Integrative process is a new category added in LEED v4. This process encourages the design team to have a broader view of the design. In convention design, the different disciplines work separately, but in integrative processes all project team members like the owner, architect, civil engineer, mechanical engineer, contractor..... Etc. should work together from the beginning of the design to discover beneficial interrelationships between different systems and components in the building. To implement this the project team should have many workshops to share knowledge, analyze, and generate ideas which will lead to discovering the opportunity to sustainable design. (LEED, 2013)

The courses in the interior design curriculum that cover this category are:

A- BUS 283 Industrial Psychology (3-0-3)

Course description: This course is designed to enable the student to understand the fundamentals of human relations, workplace interactions, the forces involved in group dynamics, the importance of psychological testing, counselling and guidance, and interviewing techniques.

B- BUS 482 Business Principles and Practices (3-0-3) Course description: This class deals with common situations associated with the interior design practice such as business and office practice, estimates and contract preparation, professional ethics, marketing, public relations and hiring skills.

These courses teach students how to benefit from group work. The construction field is heavily dependent on group work between different members. Students should learn how to work effectively in groups from the first step of the design process to discover the opportunities and challenges in applying sustainable standards in the project. When the sustainable design is the goal, interior designers should be able to work in collaboration with different disciplines. In the integrated design process, communication skills and critical thinking in the team are important factors. (Gale, 2014)

3.2. LEED v4 category 2: Location and transportation

The Location and Transportation (LT) category reward thoughtful decisions about the selection of the building location, and encourage comprehensive development. The designer should consider the location of the building, according to the availability of the existing utilities, such as, electricity, water, gas, and sewage system. In addition, other services like schools, hospitals, shops, restaurants... etc. should also be considered in selecting building site.

Furthermore study the public transportation system, pedestrian paths and bicycle networks to be used by the building occupants, will help in saving energy previously used for private cars. In general, well located buildings will benefit from all available services. (LEED,2013)

The courses in the interior design curriculum that cover this category are:

A- ID 322 Interior Design Studio IV (1-8-3)

Course description: Research, design, analysis and problem solving are applied to multi-functional use projects to include residential and hospitality space. Functional and aesthetic problems will be addressed with an emphasis on presentation techniques.

B- ID 425 Interior Design Studio V - Advanced Design (1-8-3)

Course description: This course introduces students to complex building types, to include public and residential design problems. Issues related to client needs and synthesis in terms of design, functionality, value and safety will be addressed.

In these courses, students should work on real projects. This gives them a chance to study transportation systems, and other services like water and electrical pipe lines. Students in these advanced studio courses, select the suitable site for their projects from a certain given sites, so the accessible information, concerning various services, can help them to evaluate between these sites to select the suitable one depend on sustainability standards. Students will develop their knowledge and experience in a different kind of problem solving when they deal with real life projects. (Theodorson, 2014)

To provide a deep learning, students should study real projects with real clients and real requirements. This will give them a chance to examine the complexity of a real project. And will guide them to think in the multi-dimensional aspects during the design process. (Smith, 2005)

3.3. LEED v4 category 3: Sustainable sites

This category encourages the design team to complete site assessment and planning for the building and choose site treatments that protect the natural habitats and natural resources. The site design and landscape should reduce “heat island” effect and eliminate air and water pollution. This category inspires designers to add more open spaces in the building sites to increase occupants interaction with the environment, and use strategies to control rainwater runoff to avoid water bodies pollution. (LEED, 2013)

The courses in the interior design curriculum that cover this part are:

A- ID 319 Interior Landscaping (3-0-3)

Course description: This course is a general overview of the history and theory of landscape architecture. Students will be introduced to the process of planning, environmental interiorscapes from program formulation to implementation. The synthesis of

environmental factors and social concerns shaping the domestic issues in Saudi Arabia will be included.

B- ID 322 Interior Design Studio IV (1-8-3)

Course description: see it above

C- ID 425 Interior Design Studio V - Advanced Design (1-8-3)

Course description: see it above

In landscape courses, students should study how to protect the natural habitat and how to design the building site in a “green” way by using environmentally friendly materials, and green landscape designs (i.e. Native plants, drought adapted plants and low-water plants, etc.). This course introduces the benefit of open space to the site design and studies the “heat island” effect and how to reduce it.

The role of education in sustainable landscape design - both in academic settings and public education - should closely connected with the concern about the types of knowledge needed for sustainable landscape design. (O’Reilly, 1996)

In studio courses, students can implement the green site design by studying the site criteria and designing the landscape and the outdoor activity that protects the local habitat, uses open and garden spaces, reduces the effect of “heat island” and minimizes electrical lighting pollution.

3.4. LEED v4 category 4: Water efficiency

The Water Efficiency (WE) section addresses water use holistically. The design should orient to reduce potable water use indoor and outdoor by using efficient water fixture and proper landscape irrigation system. Moreover, this category encourages using a water meter to monitor the water use. The WE credits additionally recognize the use of non-potable water ex. Grey water recycling and use it for landscape irrigation and other non-potable water needs, and use alternative sources of water, like rain water harvesting, and use it for landscape irrigation. (LEED, 2013)

The courses in the interior design curriculum that cover this category are:

A- ID 426 Building Services Integration (3-0-3)

Course description: This course introduces students to structural systems (skeleton, pre-cast, load bearing) mechanical systems (elevators, HVAC, sanitation) Electrical systems (lighting, acoustics, power) Water supply systems in addition to safety and fire protection systems. Students will assess the best approaches to systems and services integration that correspond to user need and economic feasibility. Application of system integration methods in realistic situations, translated in the studio as well as in professional practice is stressed.

B- ID 319 Interior Landscaping (3-0-3)

Course description: see it above

In these courses, students will learn about water consumption inside and outside the building and how to reduce the use of potable water by installing proper

water fixtures, using recycled water, and selecting efficient irrigation systems.

Giving appropriate attention to teaching water management in environmental scope, will generate a realization of limited fresh water reserves and encourage students to think in the sustainable way to conserve water use. (LeVasseur, 2014)

3.5. LEED v4 category 5: Energy and atmosphere

Energy efficiency in green buildings is a holistic approach, start with appropriate design decisions about the building orientation, glazing area and type, openings size and location and other design decision which reduces the building heat and cool gain so decrease cooling and heating demand. Moreover, using passive techniques in building design has a great impact on reducing energy used for heating and cooling. This category also encourages designers to use, efficient lighting fixture and HVAC equipment to reduce the energy use. Additionally use of renewable energy - which can generate in the building site - is a suitable source of clean energy. (LEED, 2013)

The courses in the interior design curriculum that cover this category are:

A- ID 320 Lighting/Acoustics/HVAC (2-3-3)

Course description: This course looks at the role of illumination, methods and lighting and mechanical systems in the design of interior space. Emphasis is placed on colour and light, illumination aesthetics, human behavioral response to light.

B- ID 427 Advanced Lighting Techniques (3-0-3)

Course description: This advanced lighting techniques course explores lighting conditions in local built spaces and analyses functionality and effectiveness. Design and build of light fixtures are included.

C- ID 316 Interior Design Studio III (1-8-3)

Course description: This course focuses on technical aspects of interior design, focusing on construction techniques, building systems, and finishes.

D- ID 322 Interior Design Studio IV (1-8-3)

Course description: see it above

E- ID 425 Interior Design Studio V - Advanced Design (1-8-3)

Course description: see it above

In lighting courses, students discover the different types of lighting fixtures and what is the most efficient choice for energy saving. They also learn different techniques to control lighting systems, for instance, sensor lighting. The lighting system is responsible of a large sector of the energy consumption, so any techniques used, like control systems that turn off lights and equipment when the building is not occupied, can result in a considerable saving in energy. (Sorrento, 2012).

These courses also should introduce the benefits of using daylight in reducing the use of the artificial

lighting. In studying the HVAC part of the course, students can study efficient AC systems, which use less energy and even less water in their working process.

In studio courses, students will analyze the climate and select the proper building orientation. In addition, they should design the building envelope to reduce the energy used for cooling and heating. Moreover, they can learn how to implement passive techniques in the design solutions. Studio courses are the only courses which can use an integrated process to achieve a high reduction in energy use. New methodologies in design insist on using integrated methods and a collaborative process to design high performance and low-energy buildings. (Theodorson, 2014)

3.6. LEED v4 category 6: Materials and Resources

The Materials and Resources (MR) category focuses on the reduction, reuse, and recycling of the construction materials. Reducing the materials used in construction, reuse and recycle of the waste construction materials in innovative ways, will save the natural resources.

This category encourages the designers to use friendly materials to minimize the embodied energy and material chemical emission.

The courses in the interior design curriculum that cover this category are:

A- ID 213 Materials, Resources and Textiles for Interiors (2-2-3)

Course description: Students will study the principles used in the selection of appropriate materials, resources and textiles used for Interior design presentations.

B- ID 207 Building Construction (3-0-3)

Course description: This course covers the basics of structural design and building construction relevant to interior design. Students develop and understanding of building materials, and their function as structural elements. Building products, codes and safety applications will be covered.

C- ID 212 Concept of Structure (3-0-3)

Course description: The concept of structure design, major elements in constructions, types of supports and construction materials.

D- ID 424 Furniture Design and Interior Treatments (2-2-3) Course description: Study and design and fabrication of custom furniture for interior spaces will be covered. Familiarity with materials, joinery and mill work along with cost estimating, specifications and workroom process for casework.

E- ID 432 Contemporary Furniture Design (3-0-3)

Course description: Design and construct original real sized functional model of interior furniture with emphasis on its final design and details of construction.

F- ID 211 Interior Design Studio II (1-8-3)

Course description: Class will focus on the practice of problem solving related to functional issues of residential design. Emphasis will be placed on environmental factors, orientation, design theory, space planning, lighting, fabrics and furnishings. A project developing conceptual phases of finished design will be presented.

G- ID 316 Interior Design Studio III - Working Drawings (1-8-3)

Course description: see it above

All these courses, study the materials used in building like materials used for construction, finishing and furniture. So all these courses should be oriented to teach sustainable standards in selecting materials. Materials should have a low impact on the environment (friendly materials) and have low environmental emissions and should not be hazardous to the human health.

In studio courses, students can be oriented to search and select green materials for their design and study the impact of non-sustainable materials on building occupants. The appropriate material selection is an important issue in creating a sustainable interior design. The main cause of resource waste in construction is unsuitable materials. (Mate, 2006)

3.7. LEED v4 category 7: Indoor environmental quality

The Indoor Environmental Quality (EQ) category support decisions made by project designer about indoor air quality which has a great impact in occupants health and productivity, also this category recognize the effect of the thermal and acoustic in building user comfort. Designers should oriented to use a proper ventilation system, low emitting materials, daylight, and other design technics to improve the indoor environment quality.

The courses in the interior design curriculum that cover this category are:

A- ID 320 Lighting/Acoustics/HVAC (2-3-3)

Course description: see it above

B- ID 210 Human Factors (3-0-3)

Course description: This course analyses space and behavior within a cultural context. Students examine the theoretical foundations and concepts of environmental and human behavior as applied to design and design process.

C- ID 431 Indoor Plants Design (3-0-3)

Course description: Elements of coordinating and planning locations for indoor plants for achieving optimum compatibility with the interior design and architecture. These courses discuss the human comfort factors and the effect of these factors on human health and productivity. The human comfort factors are important areas of knowledge for interior designers to create sustainable designs and make better decisions in energy use. (Theodorson, 2014)

The indoor environmental quality can increase workers' productivity and improve the building occupant's health and wellbeing. Therefore, it is

important to every interior designer to study the elements of the indoor environment, such as, air quality, thermal conditions, acoustics, and lighting. (Lee, 2012). In the indoor plant design course, students will study the effect of interior plants in improving the indoor environment.

3.8. LEED v4 category 8: Innovation

Design techniques are continually developing and improving, this category awards building with innovation and creative sustainable strategies that are not listed in the previous categories, Also the project can gain credits if the performance exceeds the LEED requirements in the other categories.

The courses in the interior design curriculum that cover this category are:

A- ID 322 Interior Design Studio IV (1-8-3)

Course description: see it above

B- ID 425 Interior Design Studio V - Advanced Design (1-8-3)

Course description: see it above

In these advanced design courses, students should think out of the box by creating new techniques and coming up with creative ideas in sustainable design according to their project challenges. To reach a sustainable design, students should think in a holistic and creative way, beyond the traditional design phases. (Nichols & Adams, 2011)

3.9. LEED v4 category 9: Regional Priority (RP) credits

The RP category encourages project teams to focus on their local environmental main concerns. Any geographic area has its particular character, like climate, culture, and local regulations. The design team has to identify these distinct environmental priorities within their areas, and respond to them in the design.

The courses in the interior design curriculum that cover this category are:

A- ID 322 Interior Design Studio IV (1-8-3)

Course description: see it above

B- ID 425 Interior Design Studio V - Advanced Design (1-8-3)

Course description: see it above

The advanced design courses should express real project problems with real sites, so students can study the actual environmental issues of a given area and respond to these issues in their design. At this level of the program, the practical application of sustainable design criteria should be reflected in students analysis and project production.

CONCLUSION

To establish a sustainable development a great shift should happen in engineering education, by including sustainability in the teaching curriculum. Interior design is important field in implementing sustainable design. Sustainability is a broader concept so to full

integrate it in interior design curriculum it should be covered by many courses. And students should apply the theoretical concepts of sustainability in design studio.

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