Towards Implying Universal Design in Architectural Education in Egypt

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Abstract

Each design has the possibility either to imply or eliminate users. Universal Design (UD) asserts to grasp the user variety in ages, abilities, types, needs, and aspirations. Furthermore, it aspires to create a universally designed learning environment that allows all users of educational facilities to learn and participate. UD is a holistic approach, not a separate course that could be learned at the colleges of Architecture and Design. Thus, architects, interior, industrial, and landscape designers have a great responsibility to provide usable, readable, accessible, and inclusive products and environments for all species of users. Hence, the significance of the UD approach and its application within the architectural education in architecture colleges, as the application of this approach imparts the creation of new architectural generations that fulfill everyone's needs and provide environments and products that accommodate everyone.

The main purpose of this research is to point out the prominence of the UD approach in Architectural Education. The interviews which were carried out by the students of the Architecture Department from Aswan University have targeted to understand the extent of students' awareness of the term of UD, principles, and its concept. The study sample was 45 students from diverse classes through the academic year 2019-2020. The interviews were done one student by one to achieve the study goals.

The study outcomes pointed at that there has no sufficient integration and combination of UD in design education due to two main reasons. First, there have no separate courses that clarify the concept of UD in the curriculum of the Architecture Department of Aswan University. The second reason, the popularity of the participants who have no more ideas about the UD concept and its principles. Thus, there is a necessity to imply the UD approach in the design process in Architecture schools. Additionally, an increased need of providing products and environments which are designed and built concerning all persons.

ملخص

لكل تصميم القدره علي تضمين أو إستبعاد المستخدمين. ويؤكد التصميم العالمي (الشامل) على فهم تنوع المستخدمين في الأعمار، القدرات، الأنواع، والإحتياجات. بالإضافه لأنه يهدف للوصول الى بيئة تعليمية مصممة بشكل شامل يستوعب جميع مستخدمي الأبنيه التعليميه على التعلم والمشاركة من قبل الجميع. كما أن التصميم الشامل يعتبر منهج شامل، وليس مقرر دراسي منفصل يمكن تعلمه في أقسام وكليات العماره والتصميم. وبذلك نجد أن المعماريين والمصممين لديهم مسؤولية كبيرة لتوفير منتجات وبيئات قابلة للإستخدام ويمكن الوصول إليها بسهوله من قبل الجميع. ومن هنا تظهر أهمية منهج التصميم

الشامل وأهمية تطبيقه داخل التعليم المعماري بكليات العماره، حيث يوفر تطبيق هذا المنهج خلق أجيال معماريه جديده تلبي وتحقق إحتياجات الجميع، وتوفر بيئات و منتجات تشمل جميع فئات المجتمع.

تهدف الدراسه بشكل رئيسي إلي إلقاء الضوء علي أهميه منهج التصميم الشامل في التعليم المعماري. ومن ثم، تم إجراء مجموعه من المقابلات الشخصيه مع أفراد العينه من طلاب قسم العماره بكلية الهندسه جامعة أسوان. وتهدف تلك المقابلات إلى فهم مدى وعي الطلاب بمفهوم التصميم الشامل ومبادئه. حيث بلغت عينة الدراسة ٤٥ طالبًا وطالبة من مختلف الفرق الدراسيه للعام ٢٠١٩-٢٠٢٠. وتمت المقابلات بشكل مباشر مع كل طالب وذلك لتحقيق أهداف الدراسة.

أشارت نتائج الدراسة إلى أنه لا يوجد تكامل كافٍ ودمج لمفهوم التصميم الشامل في التعليم المعماري بالقسم وذلك لسببين رئيسيين. أولاً، لا توجد مقررات دراسيه منفصلة تتناول مفهوم التصميم الشامل في مناهج قسم العماره بالجامعة. السبب الثاني، هو أن أغلب الطلاب المشاركين في المقابلات ليس لديهم المزيد من المعلومات حول تلك المفهوم. وبالتالي، يرى البحث ضرورة تضمين منهج التصميم الشامل في المناهج الدراسيه، ومن ثم في العملية التصميميه في أقسام الهندسة المعمارية. بالإضافة لذلك، هناك إحتياج متزايد لتوفير المنتجات والبيئات المصممة والمبنية لجميع الأشخاص.

الكلمات المفتاحيه:

التصميم العالمي "الشامل"، مبادئ التصميم الشامل، تعليم التصميم، التنوع البشري.

Introduction

The expression "Universal Design" (UD) has its roots in the USA and has begun with an intense emphasis on the environment and the disability. The purpose of the philosophy of UD is to create a universal, sustainable environment in which everyone can participate in the most possible way (Ahmed, 2020). UD is an approach that makes human efficiency, health and wellbeing and social engagement better able to empower a wide range of people (IDEA Center, 2020). The concept of Universal Design took roots in the Architecture field. Eliminating barriers have encompassed buildings and built environments for vulnerable and disabled people (Ahmed, 2016). The UD purpose goes beyond the removal of discrimination against people with disabilities (Steinfeld & Maisel, 2012).

Presently, applying UD concept is achieved in various fields like designing products. The rapid aging society and the increasing number of handicapped people in the developed countries are the inherent reasons for the rising orientation of the UD approach. In the USA, the estimation points out that people aged 65 and up will rise by 12.4% in 2000 up to 20.7% by 2050, whilst the workforce will descend from 59.0% in 2000 to 53.4% by 2050. Regarding Japan, it is predestined that the proportion of people age 65 and over 17.4% in 2000, while it will boost to 35.7% by 2050. In addition, the workforce will come down from 68.1% in 2000 to 53.6% by 2050. The demographic variation in the style of people's lives and the need to imply elder people and people with disabilities in the workforce considerably. Disabled people still face a considerable issue in employment in the USA and Japan (Saito, 2006).

Considerable social alterations were done through the 20th century with regard to human rights. The medical progress during this period has allowed people to live longer than before, the median lifespan has augmented to 76, as a result of sanitary living and improved medicine (Story et al. 1998). The UD concept has lots of denotations which linked to it in different countries, for instance, Independent Living, Design for All, Human-Centered Design, Inclusive

Design, Usability, and Life-Span Design, etc… The background of the professionals, culture, and community have a great role on emphasizing a path on the concept (Skavlid et al. 2013).

UD as a design of "accessibility" to make available unusable segments, "usability" to make easy-to-use elements, and "user diversity" expanding target clients, as described by Fuji Xerox company (Fuji Xerox, 2020). Figure (1) shows the differences among UD, Usability, and Accessibility.
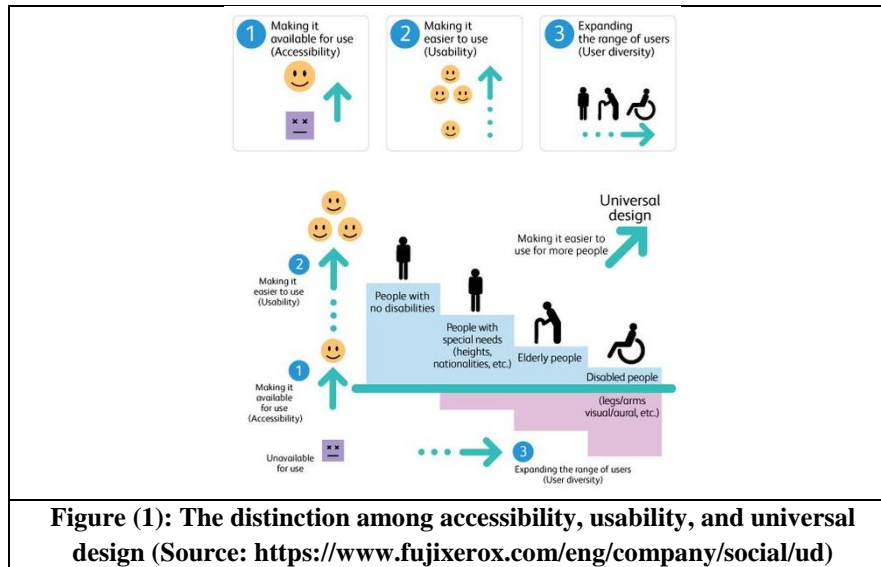
Figure (1): The distinction among accessibility, usability, and universal design (Source: https://www.fujixerox.com/eng/company/social/ud)

There is a notable gap in architectural education which forms the key problem of this research that represented in the lack of inclusivity due to the UD concept is not taught at Architecture Departments whether as a separate course or embedded in the existing curricula.

The principal purpose of the research is to explore the presence of UD in Architecture Education among the students of the department. Furthermore, to discuss the potential opportunities for UD teaching in the curriculum of the Architecture Department.

This paper is intended to illustrate the prominence of the UD approach in architectural education and for the development of the design process. In addition, the study is aimed at increasing the cognizance of UD. Universal Design education endeavors to raise grasp of the present legislation and regulations and to build a sense of liability. Besides, the paper's central purpose is to incorporate UD in Egypt's Architectural Education.

The significance of applying the methodology of Universal Design in Architectural Education:

▪ Gaining new generations of Architecture's Department graduates who have an accurate understanding and are capable of achieving inclusiveness in products, buildings, and built environments. Consequently, integrating all users with different abilities and ages.

▪ Creating universally designed buildings, urban open spaces, and environments that are accessible, usable, qualified for all people, meet their needs and motivate them to social participation. Thus, achieving social sustainability which is one of the pillars of sustainable development, and optimizing the quality of life.

Universal Design (UD) and Its Principles

In many nations, UD has been an embraced concept. The idea of universal design is now commonly practiced and widely applied worldwide, UD has been described in the Disability act for 2005 as "the design of an environment in which any person of any age or size or with any specific physical, sensory, mental health or intellectual capacity or disability can have access to, understand and use the wider range of circumstances with no need for adaptation, adjustment, assistance or specialized solutions" (Skavlid et al. 2013).

UD is Described by Ron Mac as the design of the products and environments which are to be used as far as possible by all people without any modification or specialization. In addition, UD can be defined as the design of entities which are as useful as possible and experienced without adaptation by people of all abilities (NC State University, 1997). There can be a growing interest not only in recognizing the UD's value but also in trying actively to include qualitative and constructive solutions based on personal or professional contexts (Helvacioglu & Karamanoglu, 2012).

The conception of UD asserts user-centered design through a holistic approach that addresses the needs of individuals of every age, size and ability. It accounts for the changes that everyone goes through. Accordingly, the universal design becomes integral portion of the planning, and design of the built environment (Null, 2013).

UD is a philosophy, strategy or purpose that allows all people to use goods and the built environment universally. It serves elderly and individual needs with obesity, those with very high or very low functional disabilities, like infants, pregnant women, who are typically being ignored. Universal design depends on the culture of the people who use the particular built environment. That is, in every country the universal design can be different because it is intended for universal use in this region (Ahmed, 2016).

In 1997 the seven UD Principles, led by Ronald Mace of NC State University, were created by a group of architects, engineers, designers, and environmental researchers. These principles can be utilized to assess current designs, to direct the process of design and to inform both designers and customers about the products' features and environments that are more functional (NC State University, 1997), as illustrated in Figure (2).

Figure (2): Explains the 7 principles of UD (NC State University, 1997).
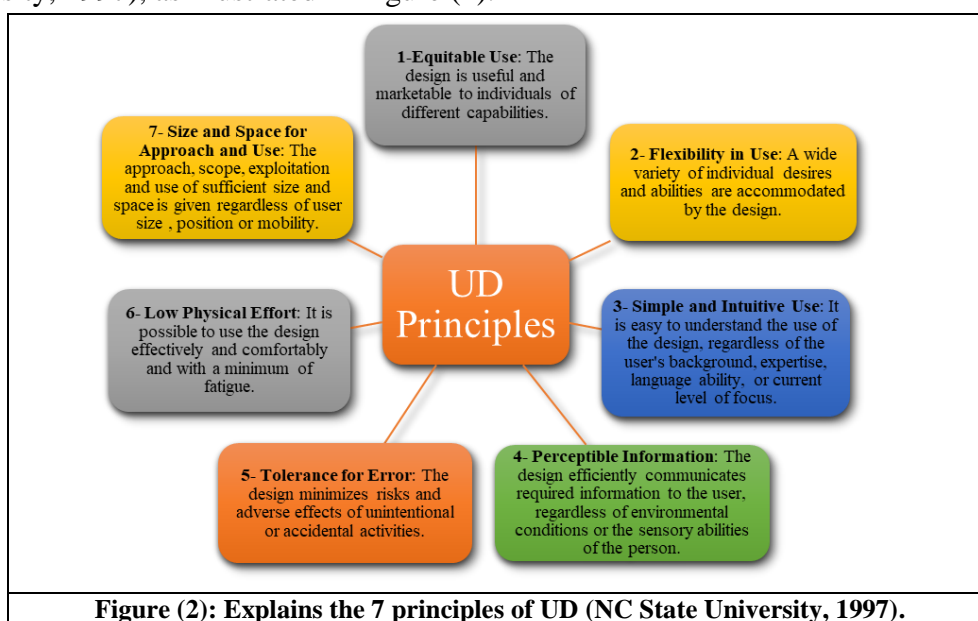
The Universal Design Objectives

Universal design indicates to the construction of physical learning and working environments such that a large variety of people can use them irrespective of their age, size or status (University at Buffalo, ٢٠١٧). "Universal Design implies the need to accommodate a variety of human skills. UD is based on equality and equal opportunity as principles at a social level. This strategy should be connected to inclusion, multitude, and self-respect for the individual" as stated by Dr. Inger Marie Lid "Oslo and Akershus University College", Norway (Skavlid et al., 2013). People with disabilities, people without disabilities, and the elderly benefit from universal design. UD usually help all (The City of Calgary, 2010), as shown in Figure (3).

Figure (3): Universal Design is intended for everyone (Ahmed, 2016)

The aim of UD is to ensure equal opportunities and eradicate discrimination on the basis of disability into the mainstream of society (Steinfeld & Maisel, 2012). The UD goals describe the consequences of the practice of UD in ways that can be assessed and implemented within the limits of current resources to all design domains. Furthermore, they cover functional, social, and emotional aspects. In addition, an interdisciplinary knowledge base (for example, perception, protection, health promotion, and social interaction) supports each objective.

The University of Buffalo's Inclusive Design and Environmental Access Center has developed the 8 objectives of universal design, extending the original emphasis of UD to include social engagement, health, and wellness (IDEA Center, 2020). Figure (4) explores the UD goals as follows:
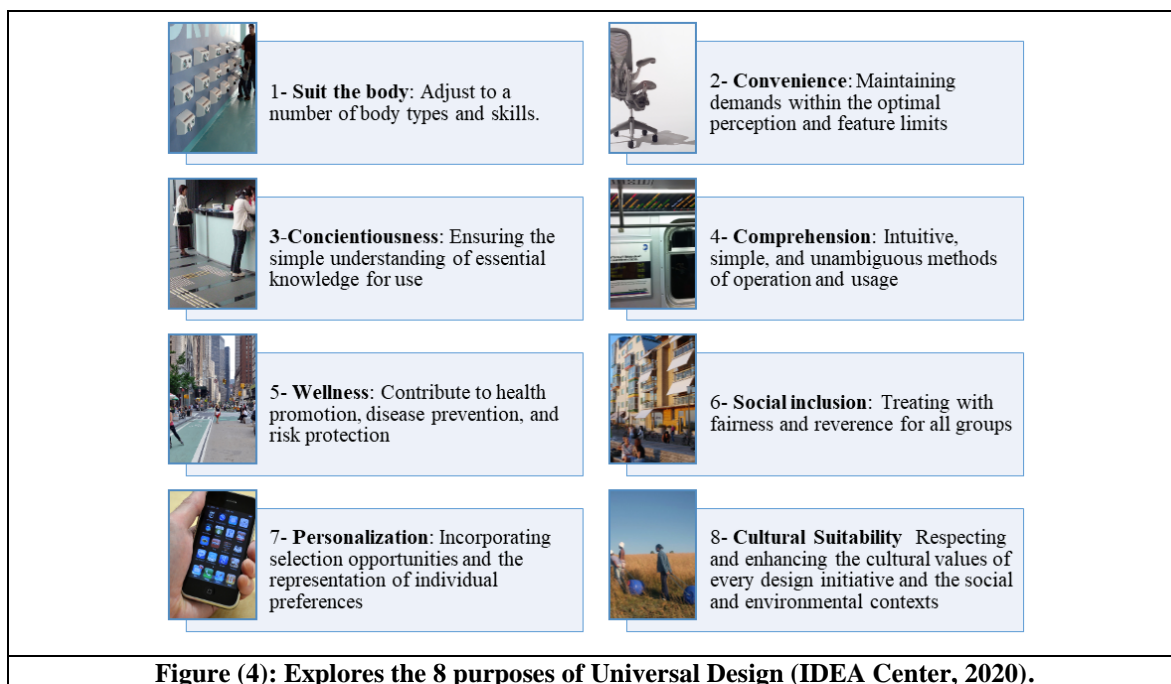

1- **Suit the body**: Adjust to a number of body types and skills.

2- **Convenience**: Maintaining demands within the optimal perception and feature limits

3-**Concientiousness**: Ensuring the simple understanding of essential knowledge for use

4- **Comprehension**: Intuitive, simple, and unambiguous methods of operation and usage

5- **Wellness**: Contribute to health promotion, disease prevention, and risk protection

6- **Social inclusion**: Treating with fairness and reverence for all groups

7- **Personalization**: Incorporating selection opportunities and the representation of individual preferences

8- **Cultural Suitability** Respecting and enhancing the cultural values of every design initiative and the social and environmental contexts

Figure (4): Explores the 8 purposes of Universal Design (IDEA Center, 2020).

Incorporating Universal Design in Teaching

UD is an approach designed to make the design of various products and environments available for everyone. It aims to do so without the need for adaptation or particular design solutions in the most autonomous and natural way possible. Universal Design is a way of thought that entirely encompasses all facts of what "Proper planning and sustainable growth" applies to the buildings and built environments. This requires a considered approach to positioning. Based on an integrated examination and comprehension of meaning and consumer needs. UD focuses on creating responsive, efficient, inclusive, and sustainable cities (CEUD, 2017).

The universal philosophy of design aims at simplifying life for all by making the products, built environment, and telecommunication equally available, functional, and understandable at little or no additional expense (NC State University, 1997). Universal Design for Learning (UDL) offers an efficient structure within the conventional teaching system for enhancing the learning experience of all students. UDL provides all people with equal learning opportunity, including students with disabilities, with a group of curriculum development principles. Through more versatile methods of teaching, assessment and service provision, the UDL aims at enhancing the educational experience of students by addressing the diversity of learners in classrooms (AHEAD, 2017).

Near the end of twentieth century, the history of teaching universal design started with exposure to the needs of users in design schools. The growth of universal design education is closely linked to the evolution of UD as a concept for a more equitable world and as a value for places to be designed (Afacan, 2011). By implying principles of universal design, instructors can teach in ways that accommodate a variety of learners and learning styles. The educational results would also be strengthened. According to University at Buffalo there can be effective elements to incorporate UD in teaching as follows (University at Buffalo, 2017):

▪ **Encourage an atmosphere of welcoming schools**: In relation to both diversity and inclusiveness, follow activities that represent high values.

▪ **Interactive learning:** Promoting frequent and meaningful interactions between students and the teacher and guaranteeing that all learners have access to methods of communication.

▪ **Be interest in the physical environment and materials for courses**: Ensure access to facilities, events, materials, and equipment for persons with physical, cognitive, and sensory impairments.

▪ **To access information, consider using multiple distribution methods**: Enable students to select from various learning opportunities where possible. Consider workshops, options for group learning, hands-on exercises, Internet-based interactions, applications for education, field study, and so on.

▪ **Provide access to various formats for information resources and technology:** For instance, delivering paper copies, along with sharing the software electronically in both Word and PDF formats.

▪ **Prepare reviews periodically for students**: Break up bigger projects into manageable pieces, and provide input along the way to guarantee that students are on track.

▪ **Using several open methods and resources, and review student progress periodically**: Make sure that you have accommodation for learners who have sent an accommodation memorandum to you. Note that for students with physical, cognitive or sensory impairments, certain evaluation methods, such as clicker quizzes, may pose challenges.

- **Supply accommodations**: There may be students who will need an accommodation to access course materials even with Universal design or to ensure that evaluation instruments assess the expertise of the students rather than their impairments. If you have any worries about a student with a disability, or whether you think the disability of a student is affecting his or her performance, contact the Accessibility Services Office.

Methodology

The qualitative and quantitative analyses were handled through this research to emphasize the significance of UD design in design education. The endeavor to integrate the UD concept into the curriculum in Architectural education increasingly evolves around the world. Rising the students' awareness from the Architecture Department should lead up to supply a high-quality environment that is universally designed. Although, the effective role of the UD's concept in the educational process, there has no systematic action to improve a curriculum in which Universal Design is not supplied as an independent course in the Architecture departments and design schools. New generations from Architecture departments have graduated with no clue about the term "Universal Design" and without an idea about the inclusiveness in buildings and the built environment. Thus, there is a serious need to imply UD in the curriculum in Architecture schools in Egypt.

➢ **Participants and proceedings**

The study was performed with undergraduate students of different classes during the Spring semester of the academic year 2019-2020 in the Architecture Department at Aswan University. The total sample of the study consisted of 45 students from the Architecture Department at Engineering Faculty, Aswan University. The students were selected through the academic year 2019-2020 by stratified quota sampling depending on their class. All participants were from different classes in addition to the class of graduation.

The selection of the number of students was relying on the total number of each class. In other meaning, there was a relevance between the students' number of the class and the selected number of each class. The sample was 45 respondents, which included 10 students from first-class, 5 students from the second class, also 15 respondents from third class, and finally 15 students from the graduation level. The percentage of the sample of the study was shown in Figure (5).

The total number of the undergraduate students in the department of Architecture through the year of 2019-2020 was around 60 students.

Figure (5): Explore the total number of the study sample
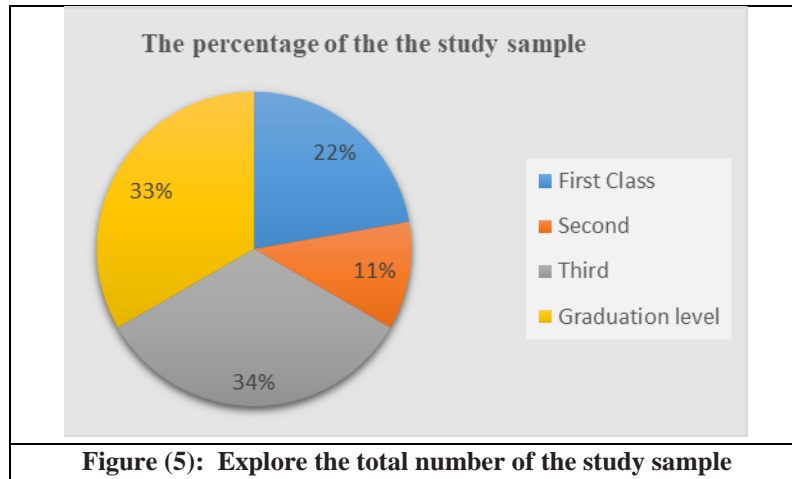
The interview process took nearly 3 minutes for each student, and the interview was carried out as one participant by one to finish the process. In addition to getting some notes and explanations from the students. The three questions were unified to all respondents. The students were asked three main questions as follows:

▪ The first one was to "**Define Universal Design concept and give an example linked to the definition**".
▪ The second question was to "**Specify the significance of UD**".
▪ The third was to "**Clarify the role of UD in the design process**".

Results and Discussion

The **45** respondents' answers to the declared questions were evaluated by comparing them with precise responses. Concerning the **first question**, the result clarified that **10** respondents out of **45** strictly defined the UD concept, in spite of their insufficient knowledge of principles and concept of the UD. **21** students described the UD concept in the wrong way and their responses were not specifically connected with the idea of UD but it was slightly close to the content. The rest of the sample, which is **14** respondents, did not give any definition or example about UD.

For **question two**, which were presented to **31** respondents who previously replied question one whether valid or not. The results showed that **10** students from **31** who have clearly expressed the significance of the UD concept, then they introduced good examples of its applications in the surrounding environment. Hence, **4** from **31** respondents answered the question from their point of view, their responses were slightly far from the proper ones but not wrong responses. The valid students' responses were formed by the information and introduced clarifications about the term of UD, its principles, and the possibilities of applying the approach through students' projects inside the design studios of the Architecture department at Aswan University. Besides, the respondents from the 3rd class also stated that they lightly applied the UD approach in their design projects at the department through the academic year 2019-2020. Those students mentioned that they have the opportunity to design their upcoming projects concerning all users not for specific slices of the community. While the rest students from the sample that were 18 students did not give any responses.

Regarding **the third question**, 8 students solely from 31 answered and clarified the role of UD in the process of design. In this regard, it is clear that the respondents who answered to the three

questions accrued were small numbers from the whole sample. Additionally, their answers relied on their extent of realization of the concept of UD through the general idea, which was explained inside the design studios as shown in Figure (6).
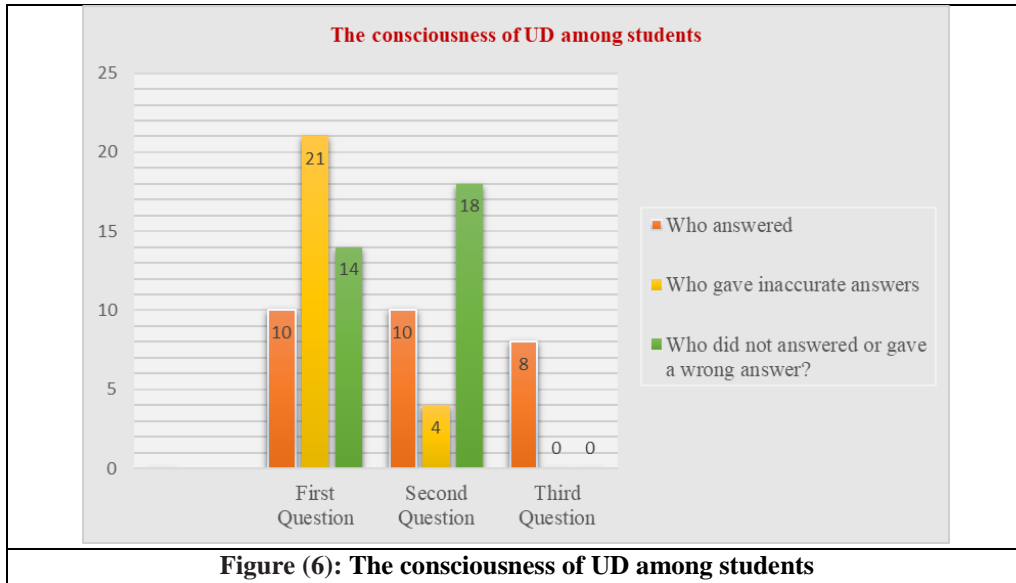

Figure (6): The consciousness of UD among students

The following are some examples of definitions provided by students:

• UD presents designs that benefit people with no impairment and those with a particular disability.

• UD interests of all people by universal designs that include everyone.

• The students introduced clear examples slightly about applying UD in their projects such as: (ramps, elevators, and entrance size and space).

Indirect interpretations of UD that were given by some students as follows:

• UD is a design which suitable and pleasing to all.

• Universal designs are clear and recognized by users.

• UD is suitable for all religions and cultures.

The obstacles that prevent students from linking among the diverse academic curricula through studying years of Architecture:

▪ A lack of a clear grasp of the relationship among different academic courses, the interacting and mutual influences among themselves.

▪ Some of the curricula of Architecture departments were taught theoretically with no link to the academic projects inside the department's studios, which leads to the unknown of those curricula effect on designing and maintaining those instructional projects.

▪ Most of the students believe in the separation of the curricula from each other. Also, students realize that no relationship between the curriculum and its real implementation on fact, which leads to neglecting several sides of the design standards through the Architecture studying years.

The suggestions of the department staff around applying the methodology of UD in Architectural Education:

- Propose new academic courses at the academic regulations of the Engineering Faculty, which enables the students through the four academic years of the Architecture studying to grasp the concept, principles, and the possibility of applying the methodology of the Universal Design.

- Prepare a group of workshops related to the concept of Universal Design, that target to discuss the approach of UD and how to apply its methodology at the Architectural studios of Architecture departments.

- New modifications should be accomplished on the current curriculum to support the methodology of UD and the possibility of its application through Architectural Education.

- Establishing specialized scientific conferences around the UD concept, the possibility of applying it, and achieving inclusiveness in built environments. Thus, awareness arises around the UD concept and the importance of its application. Hence, creating universal designed built environments for all.

- Rise the social awareness of integrating and applying the approach of UD in Architectural Education by training and site visits of existing buildings and how to optimize its performance improvement by applying the concept of UD.

- Issuing legislation that concerns applying Universal Design concept on buildings and built environments, which differ from the code of designing the buildings for handicapped.

- Further researches should be conducted in the field of UD, which affects the apparent grasp of the methodology and the potential of its application in diverse fields starting from designing products reaching buildings and built environments.

- Embed Architectural Design as primacy through the process of design of different kinds of buildings, communities, and urban environments, that the starting point from the studios of Architectural Departments reaching to constructing and Building Maintenance.

Conclusion

The Universal Design concept targets at inclusion and overcoming the discrimination among members of the Society. In this regard, the application of the UD concept and its principles to the built environment is considered a significant step to achieve the inclusiveness and to improve the chance the inclusion of the vulnerable groups into the community.

Hence, applying the UD concept making indoor & outdoor environments, and products easier and for everybody in spite of the disparity of age and capability. Accordingly, the UD concept is applied to all professions of design starting from Architecture, Urban & Landscape Design, and Interior & Exterior Design. The concept of UD is essential and beneficial to be implied in the design's process of all environments and products.

Wherefore, implying UD in Architectural Education and boosting the students' knowledge around its importance are theorized as a basic issue. Including the concept of UD to design Education lead up to create a new qualified generation of Architects who are aware of the design aspects to all user groups.

Furthermore, designing in the light of the UD within the design studio introduces an obvious emphasis on the respect of the user's diversity which leads to boost the design features, thus raise the life quality.

This research emphasizes on the UD significance in Architectural Education, in addition, to promote the realization of its concept.

The interviews' results uncovered that the majority of respondents do not have a notion about the context of universal design. Consequently, there is not an embodiment or inclusion of UD in the education of Design. Even, the slight number of the students who have little idea that came from introducing more articulating and discussing around the UD concept and its applications within the design studios.

With a view to achieving the UD concept and the best practice in its context in Architectural Education, the Architecture Department should introduce varied separate courses through the four years of the Architecture study, that curriculum should address the design process in the light of UD. Additionally, the department staff has to introduce focus groups of workshops, seminars, and Architectural competitions that address the concept of UD and inclusiveness.

Ultimately, UD becomes as an essential portion of the education of design, in addition, its emergence as an inherent aspect of the design process. Consequently, the UD concept and its application within design education will be promoted and developed distinctly.

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