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The Role of Architectural Diploma in Sustainable Urban Development

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Abstract: There seems to be an increase in awareness of sustainable development and university outputs for the labor market. Recently, there has been a decreasing demand for an architectural technician specialisation in the Architectural Technical Diploma Program at the Community College of Umm Al-Qura University in Makkah. The present study aims to explore the strengths and weaknesses of the Architectural Technical Diploma Program at the Community College of Umm Al-Qura University (UQUD) and study international experiences of similar programs at three US colleges. This research further attempts to evaluate the study plan, compare it with other similar projects, and study the most important reasons that have led to low demand for the program and how to increase the market for the architecture diploma. The research framework for this study is based on a review of the literature. To obtain necessary background knowledge, this study began with a review of books, professional journals, conference papers, government publications, internet resources and other sources. Programmatic transformation and academic curricula development are essential since the university is keen to develop its educational programs to meet the needs and requirements of practices. The results depicted that the Architectural Technical Diploma plan at Umm Al-Qura University would be updated to include modern 3D architectural drawing tools such as Rhino, DesignBuilder, and EnergyPlus, as well as changes to the course syllabuses linked to computer use. It is also critical that a portion of the computer drawing courses include simple energy consumption estimates to assist students grasp the link between architectural design and building energy consumption.

Keywords: Architecture Diploma-Sustainable Urban Development-Architecture Education-Umm Al-Qura University

1. Introduction

It is essential to develop the Architectural Technical Diploma Program at the university to increase the number of students joining it, and the development of the program must be by the trends of sustainable urban development. Figure 1 shows the number of admitted students from 2004 to 2020. The program can then be applied in different universities in Saudi Arabia to increase students' architectural knowledge. (Tarm and Adas, 2007) mentioned that the objectives of university education revolve around two critical issues, namely, the student (the product of the university) and the professor (the tool of production), and the educational curriculum that connects them purposively. Courses in construction, management, energy and environment are taught in the Saudi universities at a similar rate in terms of the educational dose. These courses represent an essential part of sustainable urban development.

(Nada et al, 2003) explained the importance of the main course in university architectural education (the architectural design studio), which is the heart and foundation of university architectural education and the main element of creativity focused

by university teachers and students. Obstacles and difficulties in practising the profession are mostly a defect in architectural education, which is the backbone of professional practice. It is essential to find a solution to develop architectural education programs in general and architecture diplomas in particular because these courses can efficiently be completed after graduation. The student obtains certification in an architectural and technical specialisation within two and a half years.

Architectural academic programs in Saudi universities are mainly related to the Vision 2030 realisation programs: human capacity development and quality-of-life programs (Addas, 2018). This is primarily associated with developing architectural engineering capabilities and competencies in the light of the changes required to achieve the Vision. Therefore, educational institutions and universities need to pay attention to the outputs of architecture specialisation to meet practices in terms of social and economic needs. Since its inception, the failure to develop the Architectural Technical Diploma Program has led to a lack of students' desire to specialise. The diploma does not contain courses compatible with sustainable urban development such as 3D drawing software courses for sustainability and urbanisation.

Umm Al-Qura University (UQU) is currently developing an academic transformation program at the university level to be compatible with the labor market and the Vision of the Kingdom of Saudi Arabia 2030. The Architectural Technical Diploma Program at the Community College of Umm Al-Qura University (UQUD) has not been developed during the last 17 years. This contributes significantly to students' reluctance to join the program and the students' lack of awareness of the importance of an architecture major to practices and in the labor market. Architecture is one of the most critical disciplines required in the Saudi labor market, as it is one of the disciplines that supports the Kingdom of Saudi Arabia Vision 2030 due to the current presence of vast and distinguished projects in Saudi Arabia that focus directly on the Vision for example, the Red Sea project and the New Future (NEOM) project.

On June 24, 2021, the Architecture and Design Commission, The Saudi Ministry of Culture announced a comprehensive strategy to develop the architecture and design sector in the Kingdom of Saudi Arabia, which included multiple dimensions and areas, including legislative and regulatory aspects, and the development of the educational and academic environment for the architecture and design sector. Continuing professional development was also one of the critical initiatives of the authority (Architecture and Design Commission, 2021).

The current status of the Architectural Technician Diploma courses at Umm Al-Qura University (UQUD) was studied, and a comparison study was conducted. A comprehensive program was developed with courses compatible with sustainable urban development, ideal for linking students to practices and acquiring critical basic skills required to qualify the university graduate (student) on academic and professional levels, with a focus on the professional aspect due to its strong connection with the labor market. The main research question is, can (UQUD) be developed and upgraded according to sustainable urban development to increase the number of students joining the program in the following years and achieve the goals and objectives of Vision 2030?

This research proposes the creation of a user-friendly urban design tool for upgrading details of the architecture diploma. This article also outlines the strategy for moving the urban design tool from where it is now to where it will be in the future, in tandem with more advanced design tools at the building level.

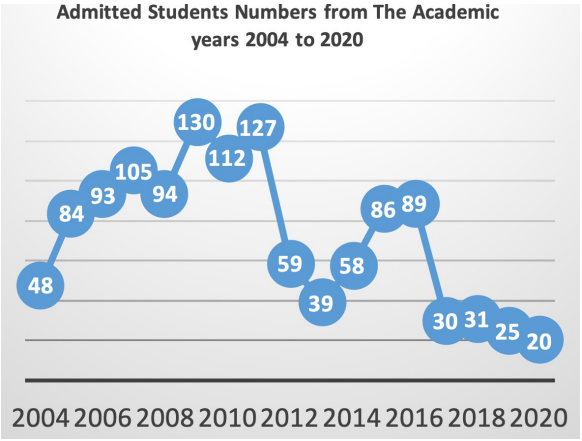

Figure (1). Admitted Students Numbers in Architecture diploma in Makkah Community College

2.Aim of this research

This research aims to explore the strengths and weaknesses of the Architectural Technical Diploma Program at the Community College of Umm Al-Qura University (UQUD) and study international experiences of similar programs at three US colleges. This leads to developing a system or additions and changes to building the Architecture Technical Diploma Program at Umm Al-Qura University (UQUD) while maintaining the program's strengths and addressing the weaknesses to turn them into strengths. The result would be a unique program supportive and compatible with cities, sustainable development, and Saudi Arabia Vision 2030. The Ministry of Education should support similar programs in universities to increase the number of prospective students.

3.Theoretical framework and an analytical study of the Architectural Technical Diploma Program

Recently, there has been a decreasing demand for an architectural technician specialisation in the Architectural Technical Diploma Program at the Community College of Umm Al-Qura University in Makkah. The duration of the program is two and a half years. The student graduates with an architectural, technical diploma as an assistant architect. The program has not been developed or updated since its establishment in 1425 H, corresponding to 2004. Both general and specialised subjects are studied during the first year. In the second year, the student delves into core subjects such as Architecture Design and Working Drawing to build their basic skills in architecture. One of the most important subjects taught is computer drawing application courses, which develop students' skills; and the content of which can be designed to suit 3D drawing programs.

After completing 70% to 80% of the program, the student will train in architectural offices or related governmental institutes for two months during the summer as one of the essential graduation requirements. Figure 2 shows all the Architectural Technical Diploma Program (UQUD) courses for the two years and summer training.

There are some challenges encountered in achieving urban sustainable development through Architectural Technical Diploma Program at the Community College of Umm Al-Qura University. There is no sustainable architecture design and urban sustainability in (UQUD) curriculum. Field training is an introductory course that links students to the labor market and practices; therefore, it is important to consider training development in more than one aspect such as duration and the type of institution offering training for students. The low turnout of students specialising in the Architectural Technical Diploma in the Department of Engineering Sciences at the Community College, Umm Al Qura University is due to their lack of awareness of the importance of an architecture major and modern urban simulation programs for it, and the extent of its connection with the Kingdom of Saudi Arabia Vision 2030.

The development of an architectural diploma program is essential to meet the needs of the labor market and achieve the Kingdom of Saudi Arabia's Vision 2030. It is also essential to involve relevant government sectors in developing an architectural diploma program, such as ministries concerned with urban planning and legislative bodies like the Saudi Council of Engineers.

First-year architecture diploma courses

Fall Semester

- Descriptive geometry
- Communication Skills
- Basic Sciences for Architects
- Computer Basics
- English Language 1
- Kingdom of Saudi Arabia History

Spring Semester

- Architecture Drawing
- Model Making Workshop
- Visual Training
- Shade and Shadows
- Design Methods and Processes

Second-year architecture diploma courses

Fall Semester

- Architecture Design
- Computer Drawing 1
- Foundation and Building Technology
- Material Properties
- Various Ceiling and Wall Technology

Spring Semester

- Working Drawing
- Quantities and Specifications
- The technology of Building Materials and Finishes
- Computer Drawing 2
- Sites Survey
- Sanitary and Electrical drawings

Figure (2). Architecture Diploma Courses at Umm AlQura University (UQUD). Source Umm AlQura University

4.Research Methodology

This study's research framework is based on a literature review. This study began with a survey of books, professional journals, conference papers, government publications, online resources and other sources to gather essential background knowledge.

The most critical weaknesses of the Architectural Technical Diploma Program were determined by studying previous literature and similar international programs, building a basis for the development of the program. Descriptive and analytical methods used for six subject areas (categories) were selected for the investigation. The percentage that each site makes up of the program as a whole was calculated using the following equation:

$$(ACH \div PCH) \times 100,$$

where ACH represents the subject area's credit hours and PCH denotes the Architectural Technical Diploma Program's credit hours.

Developing ideas contribute to bridging the awareness gap to raise the level of the program according to sustainable urban development and Vision realisation programs by following the descriptive approach in the present study.

We achieve results and recommendations to upgrade the Architecture diploma at Umm AlQura University (QQUD).

(Deming and Swaffield, 2011) noted that classification research methodology is one of the most essential and robust research methods. "Classification may be used to reveal and refocus attention on specific, meaningful patterns and themes hiding within data" (Deming and Swaffield, 2011, p 127). Classification methods are considered in this research as a general approach as the categorisation of study areas are defined by the course's title and description. The classification reveals that some courses fall under building sustainability and 3D Architecture drawing and field training. These courses support sustainable urban development. The study was conducted in three main phases. Phase one includes the research goal, data collection and research problem. Phase 2 describes and analyses the collected data from similar architecture programs, followed by dissociations and results for the selected six categories for the study. The final phase includes recommendations.

5.Result and Discussion

Building students' architectural skills improve their chances of success in the labor market. (Nada et al, 2003) stated that it is essential for students to adopt a scientific and logical method of thinking and creativity to develop independent and skilful architecture students. (Al-Mathhaji, 2007) emphasised focusing on quality rather than quantity when setting architecture programs and creating programs using modern teaching methods. (Nofal and Rahman, 2010) recommended teaching residential building design subjects within an existing urban fabric framework to broaden students' perceptions of urban planning.

Field training is one of the most important aspects of architectural education. Abu-(Ghazaleh, 2018) stresses the importance of relevant authorities and governmental entities such as the Saudi Council of Engineers, in practical training of architecture students and linking rules and regulations to training to ensure the sustainability of architects' continuing education process. Al-Shamiri and (Al Madhaji, 2020) highlighted the importance of diversity in techniques, teaching methods and architectural ideas. They indicated that study programs should be reviewed and developed periodically, emphasising teaching the hand's mental imagination and physical skills.

(Ali, 2020) emphasised the need for integration of both manual and digital technologies in both architecture and education and the importance of alignment with rapid technological improvements, not only in the field of visualisation but also in simulation software, building physics and building technology. Learning architecture has a physical aspect, and it is a challenge to deliver that aspect of education in the current era of remote learning.

(Nihal, 2019) indicated the importance of teaching architecture students how to implement a biomimetic approach as a different approach towards sustainability in architectural design. (Nihal, 2019) explains the abilities of biomimicry as design initiators in the Biomimicry in Architecture course.

(Balkasi and Ebrahiem, 2019) illustrated that taking the labor market requirements into account when designing the program outputs gives the program great credibility. The requirements will increase students' skills to meet the prospects of the labor market to achieve the Kingdom's Vision 2030 and fill the gap with national competencies.

Increasing the program's link with the community and going outside the university walls will introduce the program and establish partnerships, reduce dropout rates, improve the scholarly output results and save the number of expenses in academic programs (Balkasi and Ebrahiem, 2019).

One of the main criteria of (NAAB, 2020) for accreditation is curricular development. Architecture programs should demonstrate curriculum assessment and adjustment to identify required changes and responsibilities of coordinators, staff and department chairs.

(Al-Kubaisi and Mustafa, 2021) expect a promising future for virtual architect education. Both education and the professional practice of designing and supervising projects can benefit from virtual education. This increases student interaction and participation, save money and time and increases design efficiency. In this context, (Haidar, 2021) introduced augmented reality technology in architectural design education at various design stages (predesign stage, preliminary design stage and the final design stage). The results showed that augmented reality technology develops students' abilities to explore and analyse problems according to visual models with augmented reality technology with 3D techniques and spatial, urban, and climatic analysis programs. Augmented reality technology also helps reduce costs, speed up classroom preparation and implement the required tasks.

(Alhajaj, 2021) investigated 12 areas in the landscape architecture curricula of two bachelor's programs in Saudi universities, exploring course titles, descriptions and objectives; and the results showed significant weakness in public policy and regulation areas and an imbalance between regions of each curriculum.

5.1 Strengths and weaknesses of the program

One of the most critical weaknesses in the program is the lack of courses in sustainable urban development such as energy and design, architectural criticism, and site analysis. In contrast, the student may not need traditional courses in their current forms such as descriptive geometry and Visual Training. Field training is one of the program's greatest strengths. The student gets a robust, practical experience by working in architecture and urban development, and a rethinking must be conducted to increase the training period for students. One of the diploma's advantages is to enable students with a GPA of 3.25 out of 4 to enrol in the bachelor's degree in the Department of Architecture at the College of Engineering with 70 credit hours, allowing students to pursue their undergraduate studies.

Umm Al-Qura University is currently conducting a programmatic transformation initiative through the University Vice Presidency for Educational Affairs, which aims to bridge the gap between the university's education outputs and the labor market requirements, develop education and guide students to multiple career options. The development of the Architectural Technical Diploma Program is aligned with the aspirations of the university and the ambitious Vision. One of the most important objectives of the program is to develop students' skills in architecture and urban planning. There are no courses for building sustainability, while there are architectural drawing techniques and 3D rendering courses concerning basic architectural design and field training to effectively connect students with professional practices. These courses can help build talents and professional skills to upgrade the university's scholarly outputs and achieve the strategic objectives of the Kingdom of Saudi Arabia's Vision 2030.

5.2 Architectural, technical diploma in Saudi universities and US universities

Taibah University in Madinah Al-Monawarah offers an Architectural Technical Diploma at the Community College, the same diploma offered at Umm Al-Qura University with completely identical details. Other universities in Saudi Arabia do not provide an Architectural Technical Diploma (Elhamahmy et al, 2019). In contrast, some US universities offer a two-year associate architecture degree or diploma with differences in some courses and subjects. The Northwest College program (NWTC) includes essential subjects such as building information modelling, materials in building sustainability, construction materials and introductory architectural design courses. This equips students with the scientific awareness that improves essential skills and knowledge in sustainable urban areas development. In addition, the student is trained by authorities in the field. The addition of these courses and practical training reduces the gap between what the university

offers and the labor market requirements and practices. Chabot College in California (CC) also provides a distinguished model for its students in architecture where the curriculum contains courses in environmental architecture and urban planning. There are no courses for building sustainability while there is a heavy dose in architectural drawing techniques and 3D rendering, in addition to introductory architectural design courses and field training to connect students effectively in the labor market. Figures 3 and 4 show the aacademic programs for the Associate Professional Degree in Architecture at Northwest Technical College (NWTC) and Chabot College (CC). Community College Denver (CCD) courses are illustrated in figure 5, where Architecture technology and Architecture drawing skills courses represent a high percentage of the curriculum.

First-year architecture diploma courses

Fall Semester
- Arch Principles
- BIM Architecture 1
- Architectural print Reading
- CAD Architecture
- Buildings Sustainability 1
- English Composition 1

Spring Semester
- BIM Architecture 2
- Structural Residential
- Bldg Materials
- Architecture Residential
- College Technical Math 1A

Second-year architecture diploma courses

Fall Semester
- BIM Structural
- BIM HVAC
- College Technical Math 1B
- Technical Reporting
- Architecture Comm Studio 1
- BIM Plumbing
- Structural Analysis

Spring Semester
- Buildings Sustainability 2
- BIM Electrical
- Building Estimating
- Oral/Interpersonal Comm
- Architecture Comm Studio 2
- BIM Coordination

Figure (3). Northwest Technical College (NWTC) Courses. Source: NWTC website

5.3 Analysis and comparison of the various architecture diploma programs

Through the conducted studies and comparisons with US professional diplomas, it could be found that the category of architecture and drawing skills covers 35% of the courses at Chabot College (CC) and 15% at Northwest College (NWTC); Umm Al-Qura University Community College (UQUD) in comparison is 23.5% (Figure 5). It is 24% in Community college Denver (CCD) for the same category. As for the subject area of 3D drawing skills, its percentage is 26% at Chabot College (CC) and Northwest College (NCWT) and 18% for Community college Denver, in (QUQD) this area is reaching only 11%, which is a low percentage (Figure 6). This will add value to the program and increase the rate of new students joining it.

ARCHITECTURE

ASSOCIATE IN SCIENCE DEGREE

PROGRAM-LEVEL OUTCOMES

1. Develop computer drafting skills.
2. Develop advanced presentation skills.
3. Apply the basic Uniform Building Code requirements to residential and commercial drawings.
4. Use wood, truss, steel, masonry, and concrete to apply to structural systems.

REQUIRED COURSES		UNITS
ARCH 2A	Architectural Drawing and Graphics I	3
ARCH 68	CAD for Architecture and Interior Design	3
ARCH 2B	Architecural Drawing and Graphics II	3
ARCH 33	3-D Modeling	3
ARCH 4A	Architectural Drafting Principles I	3
ARCH 8A	Fundamentals of Architectural Design I	4
ARCH 12	Construction Materials and Methods	3
ARCH 4B	Architectural Drafting Principles II	3
ARCH 8B	Fundamentals of Architectural Design II	4
ARCH 16	Landscape Architecture	2

PROGRAM-LEVEL OUTCOMES

1. Develop computer Rendering and drafting skills.
2. Develop advanced presentation skills in 3D forms and posters.
3. Incorporate Uniform Building Code requirements and City regulations to residential.
4. Use different materials such as wood, truss, steel, masonry, and concrete to apply to structural systems.

YEAR ONE		UNITS
ARCH 2A	Architectural Drawing and Graphics I	3
ARCH 14	California Architecture and Urban Design	3
ARCH 68	CAD for Architecture and Interior Design	3
ARCH 2B	Architecural Drawing and Graphics II	3
ARCH 4A	Architectural Drafting Principles I	3
ARCH 33	3-D Modeling	3

YEAR TWO		UNITS
ARCH 4B	Architectural Drafting Principles II	3
ARCH 8A	Fundamentals of Architectural Design I	4
ARCH 12	Construction Materials and Methods	3
ARCH 8B	Fundamentals of Architectural Design II	4
ARCH 16	Landscape Architecture	2
ARCH 80	Architecture Internship	2

Figure (4). Chatbot College (CC) Courses. Source CC Website

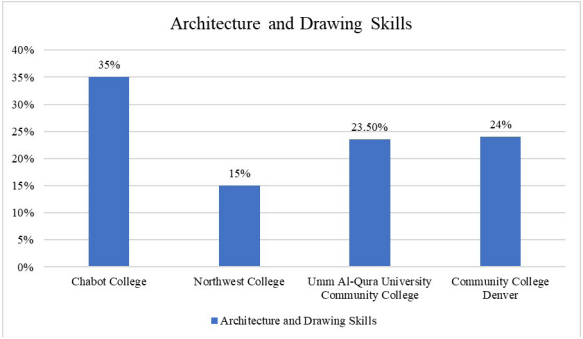

Figure (5). Architecture and Drawing skills

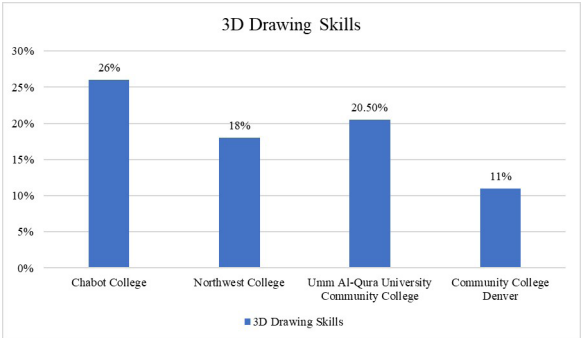

Figure (6). 3D Drawing skills

Adding courses related to the sustainability of buildings is one of the most critical factors in developing the Architectural Technical Diploma Program (UQUD). At Northwest College (NWTC), 7.5% of courses cover sustainable design. One of the essential features of the program offered by Chabot College (CC) is the availability of urban planning courses, which provide students with a broad perspective of sustainable development trends for cities. It is essential to provide knowledge to (UQUD) students in urban planning and sustainability of buildings to support students' approach to sustainable urban development in line with the Kingdom of Saudi Arabia Vision 2030. Compared with the three US associate architecture degrees, which teach a considerable percentage of courses covering architecture and drawing skills (up to 35%) in (CC) and 3D drawing skills (up to 26%) in (NWTC), these two categories in (QUQD) program reach about 23.5% and 11%, respectively. This shows the importance of these two categories in improving the students' skills, which need to be developed and enhanced in the Umm Al Qura University program (UQUD). 3D drawing skills ranged from 15% to 26% in the three selected American diplomas, which shows the importance of this category; this strongly indicates the importance of increasing this education category in (UQUD).

The review brings together views on the design process of students and teachers in architectural programs. Taking a short break from the critical process develops an atmosphere to share ideas. There is no single objective or clear format for criticism. They can be completed in different forms, and the work process can show several perspectives. Criticism has two essential attributes. Firstly, the focus should be on students' work and processes. Secondly, students should share their work with teachers and other peer colleagues. Therefore, exchanges of views will enhance the crafting process. In this regard, students will revise the sketch based on the design comments of the illustration. The critique that emerges ensures that the student is pointing in the right direction. Afterwards, students prepare the measurements needed for a three-dimensional preliminary framework. The purpose of the preliminary size is to ensure that the physical appearance of a two-dimensional design in a three-dimensional space is understood and can be studied based on environmental data. Introducing the design program completed to solve the problem is essential for students and teachers. A successful solution can reverse a hopeless situation by applying careless-sized models. For this reason, students should put a lot of effort into creating a model to avoid such problems.

Construction education ends in the form of diplomas. The process leading to the title of architect is the beginning of a new era of education. Architecture education must be aimed at various studies and gain a cultural level related to architecture. As a separate part of this concept, one can succeed by evaluating and reaching a standard level. The information dissemination by teachers in construction education must be based on the free choice of the profession from the beginning and the method based on its logic. The correct error is associated with the formula and must always be questioned. According to the source of information gathering that an applicant in architecture believes needs to be obtained through personal methods, observations and efforts, the accumulation of information he gathers must be supported instead of staying within the scope of the association. The source of education will be students, teachers and staff, specialists, institutions, construction sites,

etc., to make a significant contribution to education. At all levels of education, the efficiency of the conceptual system and the success of development must be ensured.

For a long time, architecture has shown evolution in professional knowledge in various fields such as design, construction and management. In this regard, the student must be motivated in terms of having a cumulative preparation but should be independent in terms of the subjects he chooses. Since education in architectural design has a multifaceted and experimental atmosphere, it is necessary to understand the continuity of information flow between disciplines from the point of view of building candidates. The atmosphere of a combined studio action cannot be seen as a product but must be focused on a process. Today, to draw what they think of will be the achievement of a combination of technology and artistic concepts.

A sustainable design course can only be found in Northwest College (NWTC) and Community college Denver (CCD), which is a course that should be added to the (QUQD) diploma for students' development. This category is considered the most important for developing the curriculum according to sustainable urban improvement. Filed training ranged between 5% to 7% upgrading. This category is essential to strengthen the student's link to practise. Increasing this percentage to 10% in (UQUD) is necessary for 5 to 10 years.

First-year architecture diploma courses

Fall Semester

- Introduction to Design Theory
- Building Materials
- English Composition I: GT-CO1
- College Algebra: GT-MA1
- Visual Concepts 2-D Design

Spring Semester

- Architectural Drawing Theory
- History of Architecture
- Conceptual Physics with Lab: GT-SC1
- AutoCAD Architecture

Second-year architecture diploma courses

Fall Semester

- Residential Construction Drawing
- Sustainable Building Systems
- Applied Statics and Strengths of Materials
- Revit Architecture
- Group Communication

Spring Semester

- Architectural Design and Development
- International Building Codes
- Construction Practices and Documents
- Commercial Construction Drawing
- Advanced Revit Architecture

Summer training

Figure (7). Community college Denver (CCD) Courses

5.4 Developing the Architectural Technical Diploma Program at Umm Al-Qura University (UQUD)

After studying the three US diplomas (CC), (CCD), and (NWTC) (associate architecture degrees) and the details of an architectural technician diploma at Umm Al-Qura University (UQUD) and noting the low demand for the Architecture diploma in (UQUD), it is essential to change and add some courses to qualify the program to be compatible with sustainable urban development and the Kingdom of Saudi Arabia's Vision 2030. The reason behind selecting and analyzing the three US diploma programs and then compared with UQU's diploma program is that these courses are considered among the world's top programs in this area. It is significant to add courses related to the sustainability of buildings, such as energy and buildings, energy assessment systems in buildings and site analysis in addition to developing computer program courses, to include updated simulation 3D Architecture programs such as Rhino-Revit for architectural presentation and DesignBuilder-EnergyPlus for energy studies in buildings. These programs form the students' ability to have a deeper understanding of the architectural design, where they can see the design in three dimensions to understand the spaces more accurately. Students can conduct quick experiments to understand the energy required for building operation, even if simplified. Thus, they can immediately change the architectural design to reduce energy waste.

In addition to the academic development of the program, it is essential to develop the program professionally in a sustainable manner through field training for students. It is possible to increase the number of training days for students related to practice, which could range between 4 and 6 months over two or three summer periods, to connect students to the labor market and practices. This could take place immediately after the first academic year. A recommendation of Umm Al-Qura University Vice Presidency for Educational Affairs

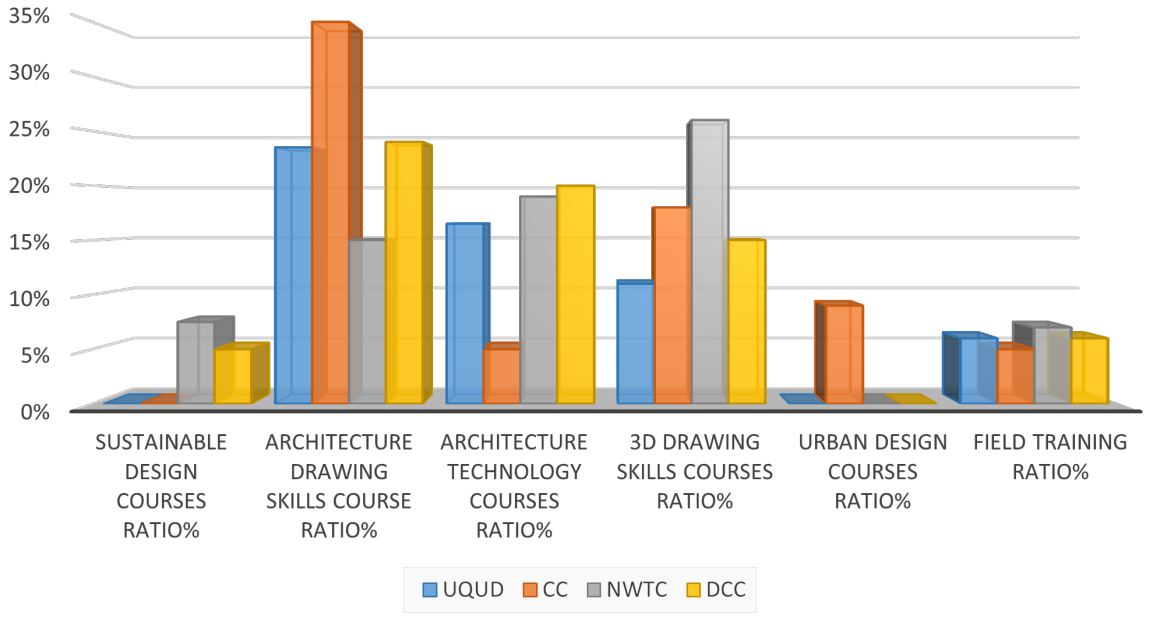

Figure (8). The Six Selected Categories Different Ratios in Community colleges selected for the study

is to link each student to a professional supervisor from the labor market to gradually involve the student in their practice through projects and simple tasks. In figure 8, the six selected categories ratios for the four selected architecture programs in the study. Architecture Drawing skills and 3D Drawing skills represent a high ratio percentage of the curriculum, especially in the American Community colleges, which indicates the importance of these two categories in architecture diplomas. Furthermore, Architecture drawing skills should be developed manually (hand drawing) and digitally through Architecture 3D software.

6.Conclusion and Recommendations

Integration of urban planning and design technologies with methods for assessing urban microclimates is a difficult task, but one with a bright future. Without independently involving scientists, urban planners will be able to examine the influence of their designs, i.e., changes in urban morphology, on the urban climatic situation. Updating the Architectural Technical Diploma plan at Umm Al-Qura University would change the course syllabuses related to computer use and include new 3D architectural drawing software such as Rhino, DesignBuilder and EnergyPlus. It is also essential to ensure that part of the computer drawing courses contain simple energy consumption calculations to help students understand the relationship between architectural design and energy consumption of buildings. Some of the essential recommendations rendered by the study are as follows:

- Addition of Sustainable architecture and urban sustainability courses to (UQUD) curriculum.
- Training faculty members and starting continuous development programs for faculty staff in 3D architectural drawing and building thermal performance evaluation software for buildings, as this software is continuously updated. This should transfer updated technical knowledge to the students.
- Developing a distinct model for the Architectural Technical Diploma Program that can be applied in three universities in Saudi Arabia.
- Rasing awareness and educate the community about the importance of an architecture major and the possibility of obtaining a diploma in an acceptable period of two and a half years, with the opportunity of bridging to the bachelor's stage in a distinct specialisation that is compatible with the Kingdom of Saudi Arabia's Vision 2030.

- Increasing the training period for students in practices to be 4 to 6 months, completed in two or three summer periods, to improve students' readiness for the labor market.
- Involving the governmental and private urban sectors related to architecture practice, such as the Saudi Council of Engineers and the Ministry of Municipal Rural Affairs and Housing in building training programs for architectural technician diploma students.

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دور برنامج دبلوم فني معماري في التنمية الحضرية المستدامة

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ملخص البحث. يتنامى الوعي في الآونة الأخيرة بالتنمية المستدامة ومخرجات الجامعات لسوق العمل. وتهدف الدراسة الحالية إلى استكشاف نقاط القوة والضعف في برنامج الدبلوم الفني المعماري في كلية المجتمع بجامعة أم القرى (UQUD)، ودراسة الخبرات الدولية لبرامج مماثلة في ثلاث كليات أمريكية. كما يحاول هذا البحث تقييم الخطة الدراسية ومقارنتها ببرامج أخرى مماثلة، ودراسة أهم الأسباب التي أدت إلى انخفاض الطلب على البرنامج، وكيفية زيادة إقبال الطلاب على دبلوم الهندسة المعمارية. يعتمد إطار البحث لهذه الدراسة على مراجعة الأدبيات. وللحصول على المعرفة الأساسية اللازمة، بدأت هذه الدراسة بمراجعة الكتب والمجلات المتخصصة وأوراق المؤتمرات والمنشورات الحكومية وموارد الإنترنت ومصادر أخرى. يعد التحول البرنامجي وتطوير المناهج الأكاديمية أمرًا ضروريًا؛ لأن الجامعة حريصة على تطوير برامجها التعليمية لتلبية احتياجات ومتطلبات الممارسات. وقد أظهرت النتائج أنه سيتم تحديث خطة الدبلوم الفني المعماري في جامعة أم القرى لتشمل أدوات الرسم المعماري ثلاثي الأبعاد الحديثة مثل: Rhino، و DesignBuilder، و EnergyPlus، بالإضافة إلى تغييرات في مناهج الدورة التدريبية المرتبطة باستخدام الكمبيوتر. ومن الأهمية بمكان أيضًا أن يشتمل جزء من دورات الرسم على الكمبيوتر على تقديرات بسيطة لاستهلاك الطاقة؛ لمساعدة الطلاب على فهم الرابط بين التصميم المعماري واستهلاك الطاقة في المبنى.

الكلمات المفتاحية: دبلوم العمارة، التنمية العمرانية المستدامة، تعليم العمارة ، جامعة أم القرى.