Suggested framework to merge Building Information Modelling Technology in the Interior Design education in Egypt

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Summary

BIM is an acronym for Building Information Modeling or Building Information Management. It is a highly collaborative process that allows architects, engineers, real estate developers, contractors, manufacturers, and other construction professionals to plan, design, and construct a structure or building within one 3D model.

In the past, Building Information Modeling (BIM) adoption has grown significantly in the architecture, engineering, and construction industry. In response to this trend, the industry and academia realized that BIM education in university curricula is an important requirement for satisfying educational demands of the industry.

BIM, as a set of technologies and processes, has now a pivotal role in the AEC industry as it enables project team members to virtually represents information required for design, construction.

In recent years, there has been an increasing interest among AEC educators to integrate BIM into degree programs.

The construction industry in the 21st century is facing huge challenges, especially with the emergence of Building Information Modelling technology, which has produced great development in the fields of architecture especially in the interior design.

Now many companies are designing and implementing construction projects using BIM technology. However, the Building & construction sector suffers from a shortage of experts & specialists with (BIM) skills, as there is a huge gap and lack of skills for this technology.

BIM is a relatively new technique that has been developed and applied in the engineering field. It is a data model that integrates all relevant information for engineering projects with three-dimensional digital technology. BIM is mainly used in the design phase, but also during the construction and operation phases. Utilizing BIM significantly increases design efficiency and reduces risk throughout the engineering and construction process.

BIM is one of the most promising recent developments in the architecture, engineering, and construction (AEC) industry.

The building information modeling market was valued at USD 5.4 billion in 2020 and is projected to reach USD 10.7 billion by 2026. It is expected to grow at a CAGR of 12.5%. Rising adoption of remote working due to COVID-19, rapid rise in urbanization globally, wide-ranging

DOI: 10.21608/MJAF.2022.138853.2764

benefits of BIM realized by AEC industry, and growing government initiatives for adoption of BIM are contributing to the growth of the building information modeling market. Rising trend of IoT in construction sector, increasing trend of BIM, and growing focus of organizations on introducing new standards such as ISO 19650 in BIM market act as a growth opportunity for the market players.

Stanford University's Center for Integrated Facilities Engineering reported the following benefits of BIM:

- Up to 40% elimination of unbudgeted change.
- Cost estimation accuracy within 3% as compared to traditional estimates.
- Up to 80% reduction in time taken to generate a cost estimate.
- A savings of up to 10% of the contract value through clash detections.
- Up to 7% reduction in project time.

Based on the findings of a questionnaire survey completed by 82 architects, 101 engineers, 80 contractors, and 39 owners (total sample size of 302) in the United States, the key findings are as follows:

•Architects were the heaviest users of BIM—43% used it on more than 60% of their projects, while contractors were the lightest users, with nearly half (45%) using it on less than 15% of projects and only a quarter (23%) using it on more than 60% of projects.

•82% of BIM users believed that BIM had a very positive impact on their company's productivity.

•79$ of BIM users indicated that the use of BIM improved project outcomes, such as fewer requests for information (RFIs) and decreased field coordination problems.

•66% of those surveyed believed use of BIM increased their chances of winning projects.

•Two-third of users mentioned that BIM had at least a moderate impact on their external project practices.

•62% of BIM users planned to use it on more than 30% of their projects in 2009.

The study aims to suggest a Building Information Modelling integration model for architectural education in adopting BIM culture as there is a gap in the labor market

The study consists of three chapters, findings and recommendation along with suggested framework for emerging BIM in education.

The first chapter deals with Building Information Modelling in Industry, as BIM is known as a promising platform that can solve those problems. Although the field of Construction industry known as being complicated, risky and uncertain that certainly contribute in project delay, cost overrun, low product quality and others.

The implantation of BIM in the industry is known under many different names and by different companies, noted that countries have made many different plans to implement BIM in the Industry.

For interior designers, as for architects and other building design professionals, building information modeling is a powerful tool for thinking and communicating about design and is a strong competitive advantage for interior design businesses.

There are a few countries that have implemented BIM in the Middle East. According to a survey made in 2016 on 130 of the top-ranked contracting and consulting firms, Egypt has shown that most of the construction and design firms have a high requirement for engineers with the skill of BIM.

The second chapter deals with Building Information Modelling in education as education must prepare students for the labor market by providing them with the capabilities needed and valued in professional practice.

The goal of architectural education is preparing an efficient architect, that has the ability to practice the profession after graduation, and professional compete at both national and international levels

The architectural education in Egypt depends on Computer-Aided Design (CAD), which deals with lines and surfaces in 2D and 3D drawing without the elements characteristics integrate, in mean time BIM system appeared to draw 2D and 3D elements with all its properties, which has added many features. Therefore, BIM in education requires bringing in some changes in the current teaching methodology.

This affects specially to coordinate between different faculties and courses and enhancing coordination and collaboration between different courses because it would not be reasonable to work on a BIM project if the student cannot see how the different parts of project fit with each other.

If the system of education is resistant to change, cannot react quickly to such challenges, systematically BIM-technologies in universities are practically not taught. Nevertheless, it seems important to find ways to introduce innovative technologies in the educational process for the formation of specialists with new corresponding skills.

Many obstacles are hindering the implementation of BIM in the architecture education system which can be divided into three main categories as follows:

1.The misunderstanding of BIM as a process.

2.The difficulty of student learning it.

3.The training of the academic staff and their resistance to change.

To emerge BIM in education, suggestion can be summarized as follows:

Students are expected to work on actual construction projects in collaboration with companies. Thus, architecture and engineering programs have to be planned to hold a sequence of BIM contents.

The first activities are integrated with Digital Graphic Representation disciplines, the second with Design Studio and Building Technology and the third with Management courses.

In conclusion, to meet the future needs of (BIM) skills in the labor market, it was necessary to take serious actions for graduates to suit the labor market. BIM curriculum should start with BIM technical content and guide the students through a technical and conceptual process of learning (what, why and how).

This includes concepts derived from BIM tools, BIM management, case studies, potential problems, and the implementation of BIM.

The process of introducing BIM in education has revealed that it is more complex than just adding a new course to the curriculum, as BIM has the potential to be an intrinsic part of the whole architecture program.

For planning a BIM curriculum, it is highly recommended to identify what are the responsibilities, functions, and competencies of the BIM specialists, the course intends to supply and to plan the syllabus according to them.

This can be made through literature review and developing research with local firms to list what are the skills, knowledge and attitudes demanded from BIM professionals.

Finally, it is advisable to find out the obstacles for implementing BIM at the university through local survey with faculty based on literature review, as they are usually hard to change.

In the future BIM tools and processes will become mainstream in the labor market approaches, the demand for BIM specialty raised steadily and then fast.

The universities must adapt their curricula to turn their graduates' students into qualified specialists.