BUILDING INFORMATION MODELLING EDUCATION IN HONG KONG

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Abstract

BIM Technology introduced to Hong Kong Architecture, Engineering and Construction (AEC) Industry for more than 12 years, and it added to the curricula of higher diploma programmes of Hong Kong Institute of Vocational Education (IVE) for nearly a decade. At the same time, the BIM technology continuously updated and extended to a much broader scope. With the introducing of BIM mandate to almost all government public works projects, there are profound changes in the competencies demand. All the above development imposed new challenges for the teaching and learning approaches to the subject.

This paper presents the current situation of Building Information Modelling (BIM) Education in IVE of Vocational Training Council (VTC), Hong Kong.

Keywords: Building Information Modelling (BIM), Education, Architecture, Engineering, Construction, Hong Kong

Introduction

In September 2016, the Buildings Department of the HKSAR Government issued the “Practice Notes for Authorized Persons, Registered Structural Engineers and Registered Geotechnical Engineers (ADV-34)” which expressly encourages authorized persons (AP), registered structural engineers (RSE) and registered geotechnical engineers (RGE) to consider adopting BIM in building projects under the Buildings Ordinance.

In January 2017, The Chief Executive of the Hong Kong Special Administrative Region (HKSAR) in the Policy Address asserted that the HKSAR Government would actively seek to require consultants and contractors to use Building Information Modelling (BIM) technology to undertaking design of major government capital works projects from 2018 onwards. The Chief Executive also urged all eligible consultants to prepare for facilitating a smooth implementation of this initiative. The message reiterated in the Policy Address in October 2017. The adoption of Building Information Modelling in Capital Works Project has been rolled out in January 2018 as scheduled.

Development of BIM in Hong Kong

BIM Technology introduced to Hong Kong Architecture, Engineering and Construction (AEC) Industry for more than 12 years, and it added to the curricula of higher diploma programmes of Hong Kong Institute of Vocational Education (IVE) for nearly a decade. At the same time, the BIM technology continuously updated and extended to a much broader scope. With the introducing of BIM mandate to almost all government public works projects, there are profound changes in the competencies demand. All the above development imposed new challenges for the teaching and learning approaches to the subject.

Literature review

Building Information Modelling (BIM) is not simply a new technology. It is not just software, hardware or a few personnel that can easily be master and become a functional business area. BIM becomes another essential business function that is crucial for every Architectural, Engineering and Civil Engineering (AEC) companies. Many AEC companies that need to introduce BIM to their business function may start by transforming the existing function department or re-training their staff to adopt BIM for their business needs. Unlike other well established AEC professional, technologists or technicians who have corresponding undergraduate courses or Higher Diplomas and Associate Degrees.

Regarding professionalism, BIM still does not have a universal recognised professional. There is no clear definition for the scope of work and job duties of the BIM personnel. Barison and Santos (2010a) identified several types of BIM job positions:

- BIM Modeller
- BIM Analyst
- BIM Application Developer or BIM Software Developer
- Modelling Specialist
- BIM Facilitator
- BIM Consultant
- BIM Researcher
- BIM Manager
BIM Manager which usually in a leading role of a team of BIM initiative of the company can further classify into:
- Project Model Manager, Modelling Manager or Model Manager
- BIM Manager at Design Firms or Chief BIM officer
- BIM Manager at General Construction and subcontractor Firms

Degree-awarding higher education institutions considered as the source of AEC professional. Employers of AEC companies expect that construction related program graduates will already have a working knowledge of BIM. There is no a BIM specific undergraduate course or Higher Diplomas BIM exists. It is even not compulsory elements for most AEC related course offered by these institutions.

Maghiar, Jain and Sullivan (2013) revealed one possible barrier that limited the availability of BIM education in the various program. Although BIM already noted as essential elements by the industry, BIM is still not formally acknowledged as the accreditation criteria of any AEC courses. Students also lack the incentive to take additional courses for BIM education that is not part of their program curricula, as far as they are not necessary to graduate.

However, with the rapid adoption of BIM over the past few years, BIM becomes the essential skill for graduates to remain competitive in the job market. Maghiar, Jain and Sullivan (2013) suggested the following important skill needed:
- Ability to apply and work with new technology;
- Basic modelling and manipulation skills;
- Ability to model detailed conditions in 3D;
- Ability to assemble and review a clash detection model;
- Ability to create 4D models using a schedule and then derives a total project estimate.

Maghiar, Jain and Sullivan (2013) concluded that “The leading instruction of this class with a few industry experts explored several areas of BIM integration and after careful considerations have determined that implementation throughout the curriculum is the most advantageous way to achieve both academic and industry”. They also opine that “the next generations of construction professionals are not the BIM experts, but they are capable of applying their BIM knowledge to their daily job tasks.” Wu and Issa (2013) study affirmed that BIM-oriented career development was still new to most academic AEC programs. Nowadays companies preferred to hire seasoned professionals instead of fresh college graduates for BIM staffing.

Barison and Santos (2010b) studied the approach to introduce BIM to the curriculum of Architecture and Engineering courses and conclude that the simple addition of a new BIM course may not fully unleash the potential of BIM. An integrative approach by spreading the BIM subject into separate courses and with attempts to collaborate with each other would need. Indeed, there was a similar framework developed by The Higher Education Academy and BAF (BIM Academic Forum) in the UK. The report “Embedding Building Information Modelling (BIM) within the taught curriculum” (2013) outlined a “BIM Learning Outcomes Framework”. The framework covers three levels of need: strategic, management and technical.

One of the key difference highlighted by Barison and Santos (2010c) is that unlike other traditional subjects, “Collaboration” is an essential component for BIM curriculum activities. It is clear that the learning experience is still rather new and the pedagogy applied is not yet been consolidated.

**Provision of BIM Modules in IVE**

<table>
<thead>
<tr>
<th>Higher Diploma (HD) Programme</th>
<th>Building Information Modelling (BIM) Module title</th>
<th>Curriculum Hours</th>
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</thead>
<tbody>
<tr>
<td>HD in Architectural Studies</td>
<td>Computer 3-D Visualization and BIM</td>
<td>39</td>
</tr>
<tr>
<td>HD in Architectural Technology and Design</td>
<td>BIM A</td>
<td>39</td>
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<tr>
<td></td>
<td>BIM B</td>
<td>39</td>
</tr>
<tr>
<td>(’Elective Module)</td>
<td>BIM for Building Services Engineering*</td>
<td>39</td>
</tr>
<tr>
<td>HD in Building Studies</td>
<td>BIM for Construction Management*</td>
<td>39</td>
</tr>
<tr>
<td>HD in Civil Engineering</td>
<td>Structural Detailing and BIM</td>
<td>39</td>
</tr>
<tr>
<td>HD in Environmental Engineering</td>
<td>BIM for Environmental Applications</td>
<td>26</td>
</tr>
<tr>
<td>HD in Surveying</td>
<td>BIM and CAD</td>
<td>52</td>
</tr>
<tr>
<td>HD in Building Services Engineering</td>
<td>BIM in Building Services Design</td>
<td>39</td>
</tr>
<tr>
<td>HD in Real Estate and Property Management</td>
<td>Intelligent Building Systems &amp; BM</td>
<td>39</td>
</tr>
<tr>
<td>Enrichment Modules (Offer to all IVE HD students)</td>
<td>Introduction to Building Information Modelling</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>Parametric Modelling for Building Design</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>Building Information Modelling with ArchiCAD</td>
<td>26</td>
</tr>
</tbody>
</table>

The above table lists the latest provision of BIM in IVE.
In the early stage of introducing BIM to the IVE curriculum, BIM Modules only introduced to very limited Higher Diploma Programmes of the Department of Construction. With the experience gained in delivery BIM modules and through observation of the industry development, feedback from various industry stakeholders, we finally notice that the provision of BIM modules to particular Higher Diploma cannot fit the sustainable development of BIM which focuses a lot in collaboration as mentioned in previous paragraphs.

In recent years, with the popularity of BIM, more IVE Higher Diploma programmes started to introduce BIM module into the curriculum. Currently, we have 8 Higher Diploma with one or more than one BIM modules as core or elective modules of the curriculum.

**Challenges in BIM Education**

Unlike hand-drafting or Computer Aided Drafting, BIM technology is a tool that can be capable of allowing one to develop a complete set of drawings including plans, elevations, Sections, schedules, 3D views, animation. The requirement of hardware is relatively higher than that of other software. Additionally BIM software tends to upgrade annually; one of the major BIM software introduced a practice that BIM files created by newer version are not backwards compatible with the older version. We cannot stick to an older version for a prolonged period as the newer version will always have new functions and improved functionality.

With the continuous development and the maturity of using BIM technology, the scope of BIM has extended rapidly. From the number of software available to the technology adopted. Examples include the use of virtual reality (VR) in visualisation, Terrestrial laser scanning of the construction site, existing building or internal environment. The popularity of unmanned aerial vehicle (UAV) and photogrammetry in surveying. All these latest development which introduced rapidly as the norm of BIM operations added new demand from Employer and various stakeholders, yet all these new technologies require a considerable amount of resources for adapting to the curriculum.

**Conclusions**

The paper reviewed the latest development of BIM in Hong Kong. It also reviews the challenge of incorporating BIM into the curriculum and reported the latest status of BIM provision in IVE.

**References**


