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Solving the Construction Industry's Shortage of Skills and Talent Gap

Background

The Irish Construction Industry now faces an unprecedented skills shortage within the Construction Sector that could potentially impact on their proposed Project Ireland 2040 targets. A recent report from the International Construction Market highlights that the Irish Construction Industry is reporting a trade labour shortage. This is further expected to exacerbate construction costs, as wages have risen in Ireland by 5% in the past 12 months. The findings from this study are reinforced in a recent survey carried out by Lecturer Dr. Rosin Murphy and Researcher Eoghan Ó Murchadha of Technological University Dublin for the Construction Industry Federation, where it was discovered that 86% of contractors identified staff shortages as a problem. The skills shortage is further confounded through ongoing diversification issues with only 400 females training in apprenticeship schemes out of a possible 15,500.

The platform of Digital Construction is seen as a critical driver in navigating the Irish Construction Industry through this skills shortage. To assist with this, the Roadmap to Digital Transition for Ireland Construction Industry 2018 – 2021 outlines a series of recommendations to deliver a broad awareness and upskilling learning framework for both educators and industry through a National BIM Education Taskforce. A necessary action for the National BIM Education Taskforce is the inclusion of Digital Design and Construction in second-level curriculum. This case study will focus on two successful initiatives that Ireland could potentially mirror to help promote construction as an exciting and rewarding profession to both primary and secondary school pupils.

Class Of Your Own

Land Surveyor Alison Watson and Architect Dan Gibson set up Class Of Your Own Limited in May 2009 to provide hands-on workshops, and a dedicated STEM (Science, Technology, Engineering, and Maths) focussed creative curriculum. They aimed to encourage students, teachers, and parents to recognise careers in Architecture, Engineering, and Construction as highly skilled opportunities, and wholly relevant to future employment prospects. Class of Your Own work in partnership and collaboration with schools, government and industry organisations to inspire young people to reach their full potential through world-class education and opportunity. Their mission is to develop innovative, contextualised approaches to teaching and learning, enable young people from all backgrounds to explore aspirational career pathways, and establish sustainable relationships between education and industry to provide a world of opportunity for young people.

Class of Your Own delivers the Design Engineer Construct (DEC) Learning Programme, an accredited learning programme for secondary-school-age students. DEC is recognised as the only qualification that helps to develop a range of skills and knowledge for a career in the Built Environment. The programme allows schoolchildren to learn about digital design and construction using the latest software, processes, and tools. With DEC students experience genuine Project Based Learning and work with industry. They develop vital skills such as research, understanding context, generation of ideas and development of solutions through to final modelling, an understanding of materials, as well as an insight into post-construction management and behaviors. DEC enables coverage of a wide range of

general knowledge, understanding, and competencies, and has three progressive levels offered from Key Stage 3 (11-14 years) to Key Stage 4 (14-16 years) and Key Stage 5 (16-18 years). The DEC qualification is recognised by schools and supported by industry throughout the UK.

Class of your Own run a yearly design challenge in partnership with industry to help further promote a career in the construction industry. This year the challenge is co-partnered with Carbon Dynamic and MOBIE and involves the design of modular student accommodation for Teesside University. Each team is expected to submit Plans and elevations, Photograph of their model, a report about their design and how their model has been tested for structural stability. Figure 1 provides an image from the Class of Your Own team that presented at the CitA BIM Technology Challenge in 2016.

Figure 1: Class of Your Own Team 2016

To ensure teachers are suitably upskilled to deliver the curriculum, including those who have no prior experience of the Built Environment a number of training and supports have been put in place. This includes access to experienced DEC Teachers and their classes, mentoring and CPD programmes, Progressive Training Schemes, Workshops & Seminars, etc. A virtual staffroom for teachers is available in the form of The BEST Network. This is an online collaborative environment that links to both an experienced DEC teacher who will be their 'Guide,' and to a small group of other like-minded teachers who are less experienced in terms of DEC.
To further strengthen the links to demonstrate construction career paths Class Of Your Own have

established a Peer Assisted Learning Scheme ("COYOPALS"). This scheme fosters interdisciplinary support between university students currently studying for degrees in Architecture, Engineering, and Construction, and secondary school students are progressing through the DEC study programme at all levels. COYOPALS encourages young people to support each other and to learn co-operatively under the guidance of students from local universities.

BeIMCraft

BeIMCraft (Built Environment Information Modelling Craft) which is based on the globally successful Minecraft platform, has been created by Ulster University academics, in conjunction with an external consultant, to help young people better understand the built environment. The game highlights the emerging role of technology in the construction sector and ensures young players consider planning issues, health and safety risks, structural aspects, sustainability and cost when creating their 3D world.

BeIMCraft is a modification of the existing Minecraft platform and builds on it to highlight the emerging role of digital technology in the construction sector. It reflects the interdisciplinary nature and requirement for collaboration with the built environment's supply chain by challenging pupils to consider planning issues, health, and safety risks, structural aspects, sustainability, and cost when creating their 3D world. Any player of any age can grasp the basic concepts that are extolled through BeIMCraft. The game appeals to educators and children in the 11-to-16-year old bracket, as well as to primary school children. The Minecraft game was selected as it includes a range of constraints that reflect the complexity of the construction industry and the gameplay itself. The game incorporates many real-life skills that link effectively to the primary school curriculum, i.e. clear links can be made to numeracy topics such as perimeter, area, volume, and money.

The game closely aligns to aspects of the BIM process, as it allows the players to become comfortable working in a 3D environment, appreciate how costs can be assigned to the asset and think about timings, site constraints and aspects of sustainability. A particular focus of BeIMCraft is the collaborative requirements expected of the modern interdisciplinary design team to develop the near optimum design for complex structures from an infinite range of possibilities within the game play. Teachers can set design briefs and budgets, and participants can be selected to work in teams to achieve a particular outcome.

The gameplay is similar to the original Minecraft game, but with a few major tweaks to make it reminiscent of a current building project workflow. As Minecraft, for the most part, is a single-player game, it was necessary to adapt this to a multi-player format. Before students enter the game, they receive a brief on how much time and money they have at their disposal to finish the project. They will also need to decide who will take on which role for the project, i.e. Architect, Engineer, etc. When players sign into the game, it is treated as clocking in. The game times how long teams work on their projects and multiplies this by an hourly rate to keep track of the project's budget.

Players start out in a predeveloped mini-city with three different building plots on it. These building plots are located adjacent to a slew of regular structures, i.e. fire stations, nightclubs, apartment complexes and more. Players will then need to select a site for their given project based on real-world criteria, including consideration of surrounding buildings, planning issues, health and safety concerns and more. Players will also have access to materials that aren't part and parcel of the Minecraft game including materials with thermal properties to make players consider aspects such as the sustainability of their buildings. These materials will show up in the project's bill of materials. Costs have been assigned to bespoke materials to highlight the importance of having an appreciation of material costs. Health and safety aspects have also been included, such as PPE

and site safety. Figure 2 illustrates an image from the BeIMCraft.

Figure 2: Image from BeIMCraft

The pupils are taught the basic of construction design, i.e. when creating a building; they will need first to place foundations or else the building will collapse. They can also only build to a certain height before stability issues need to be considered. Some of the learning will come after the game is complete when teams obtain feedback on how their design has compared to others in their class. An example of this is if one side ignores the cost constraints and focuses on the speed of construction and sustainability, they might find that they've exceeded their budgets, while other groups have managed to achieve all of their objectives through better planning. The aim is to encourage teams to have another go and consider the additional constraint to come up with even more inventive solutions. This is reflective of competitive tendering within construction procurement and good academic practice in developing problem-solving skills, learning through play and reflective learning within education.

In 2017 Morgan Sindall confirmed a sponsorship package for BeIMCraft. This partnership continues to enable the rollout of the game to many schools in Scotland. BeIMCraft continues to inspire students who are getting ready to pick their careers to consider the AEC industry.

Conclusion

The Irish Construction Industry can take the learnings from Class of Your Own and BeIMCraft to help in

targeting the skills shortage at its core. A condensed focus on pupils before they finish secondary school can assist in presenting them with a broad and diverse range of career choice opportunities available to them within the construction sector. The platform of BIM and other digital technologies can be used to demonstrate the attractiveness of the industry in meeting the aspirations of future generations.

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Published: April 2019