



Autodesk Inspires University of Bristol Students with a Creative Curriculum

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Dr Julian Booker, senior lecturer in Design and Manufacture, University of Bristol

The University of Bristol has a reputation for excellence in design, especially the Department of Mechanical Engineering. The university prides itself on the fact that courses within the department are rigorous, practical and enjoyable and that graduates make an important contribution to society in terms of wealth generation, safety and environmental sustainability.

So when Autodesk's Education programme manager Stephen Stott approached senior lecturer in Design and Manufacture, Dr Julian Booker, to discuss how the Department of Mechanical Engineering could benefit from applying creative concepts to design, Dr Booker was interested to find out how it could transform his first year students' largest project.

Gaining familiarity

Microcontrollers are now used in a vast array of products from cars to computers. They provide environment control, instrumentation and plant maintenance and have become so widely used that they can even be found in household appliances such as microwaves, fridges and TVs. This has resulted in a growing demand for engineers with a background in the design and development of microcontrollers.

In order to provide students with an understanding of how microcontrollers, sensors and actuators have become an integral part of product design, a Design and Make Project (DMP) is given to students at the end of the first year of the design and manufacture course. This offers students first hand experience of microcontrollers, which they will use extensively during the second year of their course, and ultimately in their future careers. It also allows them to become familiar with vital aspects of the product development cycle.

The DMP asks students to design and build a microcontroller-based vending machine. The students must conceive, detail, cost, plan and build a prototype to a Product Design Specification (PDS) in an active learning environment mirroring industrial product development. The project is completed in teams, and lasts more than 60 hours over two terms, consisting of eight weeks design time and a one week build phase.

Creative scope

Dr Booker has been teaching this course, with the DMP, for a number of years and decided that it could be improved through inspiring students to be more creative – this is where Autodesk's Creative Curriculum came in.

Autodesk's Creative Curriculum, is a visionary educational initiative with the goal of encouraging a more holistic, creative and original approach to product design and engineering. The curriculum has been developed in close collaboration with engineers, designers, teachers and university lecturers and has modules for teaching Design and Technology as part of the national curriculum, plus schemes for higher education students. Autodesk's Creative Curriculum offers course materials and a method of teaching to help transform the way Design and Technology is taught in the classroom and lecture hall.

Students are encouraged to find inspiration in art, sculpture, organic or scientific form. Take for example, a creature such as a starfish – step-by-step – the student evolves its form into an innovative desktop lamp. Alternatively, they may wish to study the movement of a dancer or athlete and deconstruct this form and flow, identify its geometric structure and translate it into a product such as a table or toothbrush holder.



“The DMP was more of a clunky mechanical design project before we were introduced to the Creative Curriculum” said Dr Booker. “It has inspired the students to think about the aesthetics of the project and has definitely motivated them to be more creative”.

Stott, a former university and technical college teacher and most recently an advisory teacher for Design and Technology in secondary education, was invited by the Department of Mechanical Engineering to give a lecture to all the first year mechanical design students before they began the DMP.

“The Creative Curriculum requires a shift in culture. However, it will help students to move away from predictability and replace it with the highly-original, ground-breaking work that continues to differentiate successful designers from the rest,” says Stott.

Project skills

The students are guided through a schedule of work to complete the DMP, but ultimately manage the project themselves. The first three weeks are spent brainstorming, evaluating and selecting system solutions to satisfy the detailed PDS. It was at this stage that the Creative Curriculum was the most effective.

“The students have to build a workable vending machine, so all the electrics and mechanical aspects need to be up-to-scratch in order for it to dispense the cups. In the past they would concentrate solely on the electrics and mechanics and give very little thought to how it looks. The DMP as it stood was very constrained by the architecture of the vending machine.

“Since Stott’s lecture, the designs they were coming up with were more creative so they had to incorporate the mechanics within that architecture. This gave an added challenge to the project, which they really seemed to enjoy and the inspiration from Autodesk meant that visually the projects we were seeing from the students were really different,” said Dr Booker.

Following the brainstorm stage, four weeks are spent on the embodiment and creation of a detailed design and, finally, one week is spent on the manufacture and assembly of a prototype.

The project allows students to learn about the interface of sensors and actuators, and also provides them with a basic knowledge of mechatronics, both of which form a major part of their second year study. Mechatronics is the combination of mechanical engineering, electronic engineering and software engineering.

Student feedback

Students have always enjoyed the DMP part of their course, saying they like the opportunity to apply the theory they have learnt during the year with a hands-on task. This positive feedback was increased through teaching students about the opportunity to incorporate creative design in mechanical engineering.

“The students were very receptive to the idea of incorporating an element of creativity to the project and it led to some real innovative thinking. Students said they had never had that in any of their lectures before and they found it really rewarding.

“It is very difficult to teach creativity, but by showing students real-life examples of great design, it really helped to inspire them with their own projects,” said Dr Booker.

Benefits of a Creative Curriculum

The students are guided through a schedule of work. The vending machine project continues to make a valuable contribution to the first year of the design and manufacture course, being both challenging and remaining within the constraints of an undergraduate degree. The university is always striving to improve the DMP, and by introducing Autodesk’s Creative Curriculum into the mix, the project remains current and introduces a new element that inspires students to create effective and innovative mechanical designs.

Dr Booker said the Creative Curriculum has helped not only to improve the project – the creative aspect means the project has every element covered now – but it has also increased the success rate of the students.



“There's no going back to the old way of presenting this project because the creativity has inspired students to come up with some wonderful designs, a lot better than the designs of previous years. This is because they are not solely focused on the mechanical and electrical aspects of the vending machines.

“Since introducing the Creative Curriculum, more students are passing the course by designing workable and elegant prototypes”.

The project is intended to provide the students with a comparable experience to working to specification, deadline and cost target. The added value of applying an element of creativity to the project gives students a complete view. The DMP allows students to develop personal and team skills, such as initiative, resourcefulness, communication, technical knowledge and decision making – all of which will be useful in their future careers.

About Autodesk Education

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Autodesk's Creative Curriculum, student software licenses and many other learning resources are available for free download from the Autodesk Student Engineering and Design Community at www.autodesk.co.uk/edcommunity