Seven Vinton
Oberon High School
seven.vinton@education.vic.gov.au

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Helping Students Make Informed Predictions Using Simulation Software

Making predictions is high in the order of cognitive skills needed for lifelong learning, however, successful and informed predictions require experience in the areas that the predictions are being made.

We often ask students to predict what might happen in a specific learning scenario, but as teachers, we sometimes forget that our learning and teaching takes place within a confined window of reality, which is restricted in time and real-life practical application.
This workshop provides an interactive insight into a curriculum model aimed at using experiences in virtual simulation software environments to backfill students' knowledge, to help inform their predictions.

The curriculum centres around bridge and house design and construction using the software tool Fusion 360 as a way to short-circuit the design and construction process, and then to provide a safe space to test and analyse these designs. The students engaged in pre-learning about conventional designs and stress/strain forces, and preliminary design exercises using paper and uncooked pasta.

These preliminary learning exercises fed into more complex design experiences which allowed students to incorporate all of their pre-knowledge into successful designs. The Fusion 360 CAD software allowed students to quickly create and modify designs according to the results of their simulated structural analysis tests. This approach helped to maximise the chance of successful designs and increase productivity, because the students had an 'open ticket' at 'failure' within this safe test environment.

Once designs had been finalised, the students were given the opportunity to create their designs with real-world materials using contemporary manufacturing methods such as laser cutting. This allowed them to test their designs within a real-world scenario using secured weights.

In the evaluation stage of this learning unit, the students were asked to compare the real-world results with the simulated results and the predictions that they had made. The learning intention is to help students understand the benefits and constraints of using simulation software to inform good design, and how these tools can be used to increase productivity in engineering and design situations.

Workshop participants will be presented with a walkthrough of the learning process and software tools, and be given an opportunity to participate in design, prediction, and test activities.