

### 3.33La Salle College—The Bridge Design

<b>Teacher Name</b>	Mr Timothy GOH
<b>Subject</b>	School Design and Technology Lesson
<b>Subject Level</b>	Secondary 1
<b>Learning Objectives</b>	To simulate a bridge with Bridge Designer and make a wooden model for loading tests in groups.  Key concept: Structure design Value and impact
<b>Applied e-learning platform and tools</b>	Laptop, Bridge Designer

#### Lesson Introduction

**Part 1 – Introduction of bridge design (use of videos)**

**Part 2 – Computer simulation (Laptop, The Bridge Designer) – Individual**

**Part 3 – Bridge model making – Group of 2**



#### Learning Effectiveness Assessment

Understanding of structural design will be assessed by questioning and observation of whether students are able to apply the structure into their simulation and model. The tested results in software as well as real model will also reflect the level of understanding and application of bridge structures.

#### Degree of Innovation, sustainability and universalness of lesson plan

Computer simulation provided an authentic situation for the students to build a bridge. The bridge falls if the structure is unstable, which provided an exciting trial and error experience for students. Students are encouraged to control the cost at the same time providing a stable structure. While they are building the model, knowledge of force such as compression and tension can be learnt.

The bridge model making allow students to use different hand tools to make a model for testing in group of 2. It provides an opportunity for students to acquire collaboration skills. In the process of constructing an ideal bridge model, students are to analyse both simulation results from the groups which stimulate problem-solving skills as well as critical thinking skills.

#### Teaching and Learning Reflection

In the projects, it can be further improved if there is an evaluation session for students to review their fallen bridge and study ways of improvement so that the students will be able to learn from mistakes and consolidate their knowledge of bridge structure.

**The Bridge Design - Lesson Plan (80 mins per lesson)**

<b>Lesson</b>	<b>Topic</b>	<b>Material</b>	<b>Learning Objective</b>	<b>Activities</b>	<b>Assessment</b>	<b>Evaluation</b>
<b>1</b>	<b>Introduction to bridge</b>	<b>Slides, videos</b>	<ul style="list-style-type: none"> <li>• Understand the importance of bridge design and engineering</li> <li>• Introduce key concepts in bridge design, such as forces, materials, and types of bridges</li> </ul>	<ul style="list-style-type: none"> <li>• Understand the importance of bridge design and engineering</li> <li>• Introduce key concepts in bridge design, such as forces, materials, and types of bridges</li> </ul>	<ul style="list-style-type: none"> <li>• Conduct a short quiz to assess students' understanding of basic concepts introduced in the lesson</li> </ul>	<ul style="list-style-type: none"> <li>• Monitor class participation and engagement during discussions</li> <li>• Review quiz results to determine which concepts may require further clarification</li> </ul>
<b>2-3</b>	<b>Computer Simulation</b>	<b>Laptop, The Bridge Designer</b>	<ul style="list-style-type: none"> <li>• Learn to use computer simulation software to model and analyze bridge designs</li> <li>• Understand the role of computer simulations in the design process</li> </ul>	<ul style="list-style-type: none"> <li>• Learn to use computer simulation software to model and analyze bridge designs</li> <li>• Understand the role of computer simulations in the design process</li> <li>• Discuss factors that can influence the success or failure of a bridge design (e.g., material choice, load distribution)</li> </ul>	<ul style="list-style-type: none"> <li>• The bridge structure and the test result are assessed with comparison to the cost in the software</li> </ul>	<ul style="list-style-type: none"> <li>• Monitor students' progress and engagement during software demonstrations and hands-on activities</li> <li>• Review submitted bridge designs to assess understanding of software tools and bridge design principles</li> </ul>

Lesson	Topic	Material	Learning Objective	Activities	Assessment	Evaluation
4-6	<b>Model Making</b>	<b>Hand tools (cutting plier, coping saw, hot glue gun), bamboo sticks, hot glue</b>	<ul style="list-style-type: none"> <li>• <b>Construct a physical scale model of a bridge</b></li> <li>• <b>Test the model's performance under various load conditions</b></li> <li>• <b>Analyze the results of the tests to identify areas for potential improvement in the design</b></li> </ul>	<ul style="list-style-type: none"> <li>• <b>Provide an overview of scale model creation, including material selection, measurement conversion, and fabrication techniques</b></li> <li>• <b>Instruct students on how to construct their own scale model of their previously designed bridge</b></li> <li>• <b>Set up a testing station with equipment for applying loads and measuring deflections/deformations</b></li> <li>• <b>Guide students through the testing process, encouraging them to analyze the performance of their model and identify potential design improvements</b></li> </ul>	<ul style="list-style-type: none"> <li>• <b>Evaluate students' scale models based on craftsmanship, accuracy, and adherence to their original design</b></li> <li>• <b>Assess students' ability to analyze the performance of their model through testing and identify areas for improvement</b></li> </ul>	<ul style="list-style-type: none"> <li>• <b>Monitor students' engagement and progress during model construction and testing activities</b></li> <li>• <b>Review students' analysis of their model's performance to assess their understanding of bridge design principles and the application of those principles to real-world scenarios</b></li> </ul>