An Introduction to 3D printing using the Maker’s Empire App

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| **Lesson Sequence** |
| **Key Concept / Learning Objective** | **Activities** | **Resources/Room Design** | **Assessment** |
| **An Introduction to 3D Printing**Suggested timeframe: 2-3 lessons | *Summary: This lesson sequence will offer students an opportunity to explore the concept of 3D printing as well as models of 3D objects. Students will brainstorm questions about 3D printing and be invited to find answers as they complete the 3D printing unit. Students will learn about the* ***Maker’s Empire App*** *and design a pendant using the software and print it (optional depending on availability of 3D printers).**NOTE: This lesson could be modified to introduce a range of 3D Apps and programs.* |
| *Curriculum Content Covered:***KNOWLEDGE & UNDERSTANDING:** Digital Systems > Digital systems have components with basic functions that may connect together to form networks which transmit data**PROCESSES PRODUCTION & SKILLS:** Creating Solutions by: Investigating and Defining > Define a problem, and set of sequenced steps, with users making a decision to create a solution for a given task, Identify available resources. Producing and implementing > Select, and apply safe, procedures when using components and equipment to make solutions**GENERAL CAPABILITIES/CROSS CURRICULUM PRIORITIES:** Critical and Creative Thinking, Information & Communication Technology (Investigating with ICT) |
| **Students will:*** Explain what 3D printing is;
* Critique the need and opportunities for designing with this technology;
* Develop a graphical representation of a 3D object using design software;
* Safely print an object using a 3D printer.
 | **Lesson Plans****Introduction to 3D Printing**  *Year 7 | 2 lessons***Introduction:** Students are shown the 3D printer and some 3D printed objects are passed around.DO NOT give a detailed explanation of 3D printing, the idea is for students to discover this in the next task.**Brainstorm:** In groups of 4, students complete columns 1&2 of a **KWL chart.** The questions column should be completed as a group brainstorm first. These questions can be placed on interactive mind maps, Google Docs or other collaborative tools ) traditional cards, post-it notes etc. Students then select the questions they wish to find answers to.**Software Demonstration:** Suggest to students that there are many software programs and Apps that are available to design / create 3D objects and today they will be introduced to Maker’s Empire (see resources for Link)Demonstrate the Maker’s Empire app using a data projector. Show very basic overview of ‘Shaper’ module:a) how to create new objectb) move shapes etc. c) Ask questions to encourage thinking: - what happens if you put a shape in the air?- how can you create a circle for your pendant?**Create:** Develop a keychain/pendant design using tablets. Create two or more designs. Students then selct the design they think will work best in the 3D Printer. Swap with a partner and see if they come up with the same choice. Discuss the rationale for the choice(s).Extension: This activity could be done using a set of design principles that identify good and bad design features (e.g. width of layers, surface area of base, printing time etc).**Observe 3D Printer:**  | **Materials:**WorksheetExamples of 3D printed objectsIndex cardsMaker’s Empire App installed on tablets / androidWireless internetData projectorLesson Plan3D printerlaptop connected to 3D printer

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| **Room Design** **(suggested)**Campfire (instruction)Freeform (shared discovery)Watering Hole (showcase creation) |

Preparation * Print / source some 3D printed objects to be examined
* Index Cards / post-it notes or collaborative learning spaces for student groups to write questions
* Maker’s Empire app installed on tablets (iPad/Android) for students and teachers
* Wireless internet
* Data projector to connect to teacher iPad for software demonstration
* Print Worksheet - 1 per a student
* Print Worksheet answer sheet - 1 per teacher
* Print Lesson Plan to follow - 1 per teacher
* Working 3D printer

Laptop connected to 3D printerUseful links:<https://www.makersempire.com><https://itunes.apple.com/au/app/makers-empire/id867338125?mt=8><https://www.youtube.com/channel/UCWm3UF4GRDH2Q-RxN1AcCwQ> | Contribution to class discussionGraphical representation and 3D print of key chain / pendantCompleted worksheetManipulation and placement of at least 2 separate shapes to create a single 3D solid Review of designs and evaluation of the ‘best’ design based on a set of design principles.

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| **Assessment Mode****(suggested)**Informal (plans)Project Based (in situ)Presentation (attempt)ePortfolio (collated work) |

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| **Plenary Activity:**  | Students create an infographic about 3D printers based on the information they have discovered. |