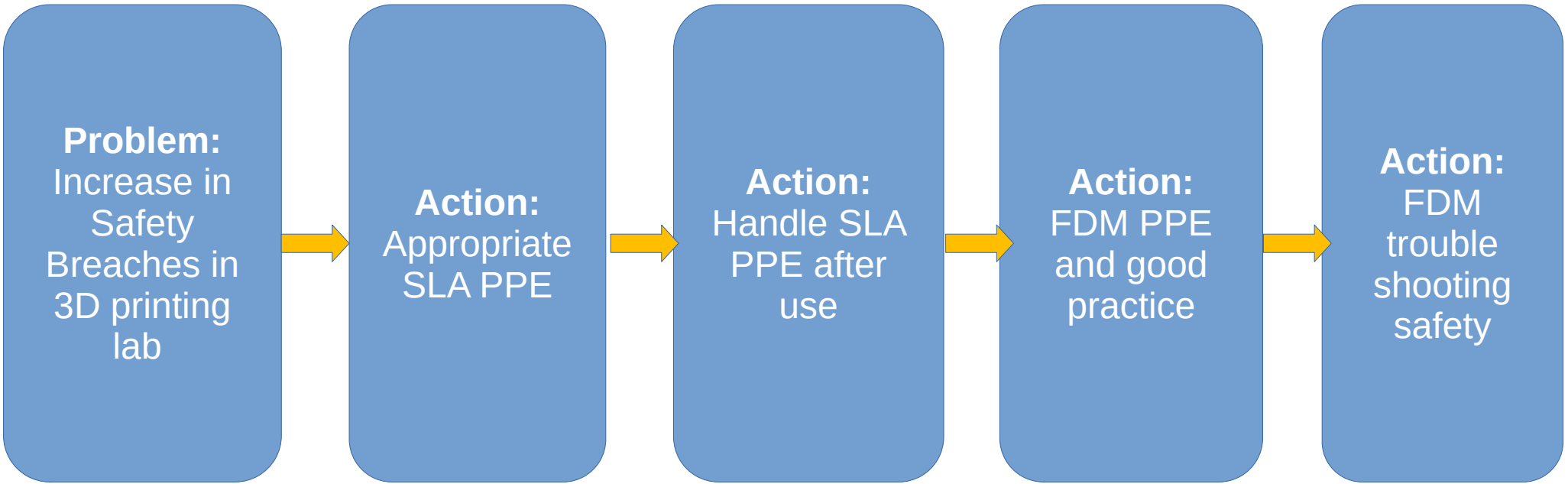
Storyboard for “3D Printing Safety”

Modality: E-Learning Module
Duration: < 15 minutues
Authoring Tool: Articulate Storyline 360

Content Outline



1.1 Title with Start Menu		
Text	Visuals	Programming
• 3D Printing Safety	• 3D Printer Icon • Safety Helmet Icon • Safety tape banner	• Select “Start” to go to next “Sound Test” slide

1.2 Sound Test		
Text	Visuals	Programming
• This elearning module will have sound enabled. • Test your device by clicking on the sound icon below.	• Sound Icon • Safety Helmet Icon • Safety tape banner	• Select “Sound” icon to play Text to speech for testing purpose • Select “Continue” to go to “Intro” slide

1.3 Intro (Problem-centred learning principle)		
Text	Visuals	Programming
• Hi, I am your safety officer for the 3D printing lab • Recently there has been increase of safety breaches in the 3D printing lab • Would you like to go around the lab with me to do a safety spot check?	• Let’s Go! Icon • 3D printer visual • Safety officer character • Safety first visual	• Select “Let’s Go” to go to next “Familiarity Test” slide

1.4 Familiarity Check (Activation: Engage Learner By Presenting a Problem)		
Text	Visuals	Programming
• Before we proceed, can you tell me how familiar are you in 3D printing safety? • Stereolithography Safety (Not familiar, somewhat farmilia, familiar) • Fused Deposition Modeling Safety (Not familiar, somewhat farmilia, familiar) • FDM Troubleshooting Safety (Not familiar, somewhat farmilia, familiar)	• Safety Officer present with hand gesture • Slider visuals x 3 • “Submit” button	• Each slider has 3 states, and 4 steps. (No selection, Not familiar, somewhat farmilia, familiar) • Submit button will only be enabled if the user make the selection for all sliders. Else submit button remained disabled. • Submit button to go next slide

2.1 SLA Entrance (Application: Allow Learners to solve problem themselves)		
Text	Visuals	Programming
• We are about to enter the SLA lab. Shall we wear our PPEs?	• Safety Officer avatar • Danger Zone sign • Enter/Exit sign • Lab door • SLA Lab sign • Wear PPE button	• Click on Wear PPE to proceed to eye protection selection.

2.2 - 2.5 Protection Eye Wear Selection (Application)		
Text	Visuals	Programming
• First, choose the appropriate protective eyewear. • Wrong choice 1: Sunglasses hinders your vision • Wrong choice 2: VR headset will block your vision • Correct choice: That's right! Safety glasses protects your eyes when handling chemicals during SLA preparation.	• Sunglasses • VR headset • Safety glasses • Retry button • Continue button	• Clicking on each visual will bring the user to each slide explaining the correct or wrong choice of eye protection equipment. • Wrong choice would lead to Retry button • Correct choice will lead to Continue button. • Select continue button to go to Respiratory protection selection.

2.6 Respiratory Protection Selection (Application)		
Text	Visuals	Programming
• Next, we are going to protect ourselves from the toxic fumes. • Wrong choice 1: Medical only protect us from droplets • Wrong choice 2: N95 protect us from airborne particles • Respiratory mask protect us from SLA fumes.	• Medical mask • N95 mask • Respiratory mask	• Clicking on each visual will bring the user to each slide explaining the correct or wrong choice of respiratory protection equipment. • Wrong choice would lead to Retry button • Correct choice will lead to Continue button. • Select continue button to go to hand protection selection.

2.6 Hand Protection Selection (Application)		
Text	Visuals	Programming
• We are going to protect our bare hands from contacting with liquid resin • Wrong choice: explanation on it is a wrong choice • Correct choice: Latex gloves protect your from liquid resin	• Latex gloves • Winter gloves • Work gloves • Continue button • Retry button	• Clicking on each visual will bring the user to each slide explaining the correct or wrong choice of respiratory protection equipment. • Wrong choice would lead to Retry button • Correct choice will lead to Continue button. • Select continue button to go to clothes protection selection.

2.10 Clothes Protection Selection (Application)		
Text	Visuals	Programming
• We are going to protect our clothes from spills • Wrong choice: explanation of wrong choice. • Correct choice: Lab coat protect skin and clothing from exposure to uncurred resin, which can be harmful.	• Apron • Lab coat • Hazmat suit • Proceed button • Retry button •	• Clicking on each visual will bring the user to each slide explaining the correct or wrong choice of respiratory protection equipment. • Wrong choice would lead to Retry button • Correct choice will lead to Continue button. • Select continue button to go to overview of worn PPEs.

2.12 Selected PPE Overview (Application)		
Text	Visuals	Programming
• Awesome, you have wore safety glasses, repiratory mask, latex gloves and lab coat.	• Safey glasses, respiratory mask, latex gloves and lab coat begin worn on trhe character.	• Click “proceed: button to SLA lab

2.13 SLA Lab (Demonstration)		
Text	Visuals	Programming
• Do you mind helping me to refill the liquid resin for the SLA printer tray?	• SLA printer • Resin • Table • Ventilation vent • Refill SLA printer button	• Click “Refill: button to proceed to Refill scene

2.14 SLA Refill (Demonstration)		
Text	Visuals	Programming
• Pour the liquid resin in a slow and steady manner to minimize spillage.	• SLA tray • Liqud resin with cap open tilting • Liquid pouring on the tray • Fumes • Droplets	• Click “Got it: button to proceed to After Refilling Scene

2.15 After SLA Refill (Demonstration: Show how safety procedure solves the problem)		
Text	Visuals	Programming
• It is inevitable to have some liquid resin spillage and fumes when handling the liquid resin • Look at how the PPEs has protected you.	• Overview of the main character with full PPE, filled with liquid resin stains and fumes.	• Click “Leave: button to proceed to Handling PPE after use scene

2.16 – 2.0 After Using PPEs (Demonstration)		
Text	Visuals	Programming
• After using PPEs, we need to handle them properly to minimize contamiations. • Select each PPE to see how to handle them. • Safety Glasses: Clean with disinfectant • Respiratory: Change filter • Lab coat: wash seperately • Latex gloves: dispose in biohazard bin	• Dirty PPEs • Clean PPEs	• User able to click on each PPE to proceed to see how each PPE is being handled after • Animation of handling the used PPEs • To return to main PPE selection page • Hide the contaminated PPE image after being clicked • Show the clean PPE after PPE has been clicked • Show next text and button after all PPE are clicked.

3.1 FDM Entrance (Application)		
Text	Visuals	Programming
• After SLA lab, now we visit FDM lab for spot check	• Proceed button • FDM Lab sign • Lab door • Enter/Exit sign	• Clicked on “Proceed” button to go the FDM lab scene

3.2 FDM Lab (Application)		
Text	Visuals	Programming
• Smell from FDM printer is strong. Could you please ventilate the room?	• User character • Closed window • 3D printer • Fumes • Safety gloves • Safety glasses	• Clicked on “Window” to ventilation the room.

3.3 Ventilated FDM Lab (Application)		
Text	Visuals	Programming
• Not necessary to wear a respiratory mask in the FDM but still need have well ventilated area.	• User character • Opened Window • 3D printer • Safety gloves • Safety glasses • Roger that button	• Clicked on “Roger that” to proceed to FDM PPE scene

3.4 PPE for FDM Lab (Application)		
Text	Visuals	Programming
• 3D printed part ready to collect, can you help me collect? • Wrong: please remember to wear PPE • Correct 1: Wearing gloves help to prevents cuts and burns • Correct 2: Wearing safety glasses help to prevent flying debris when handling FDM printer.	• User character • Opened Window • 3D printer • Safety gloves • Safety glasses • User Character with gloves and glasses	• If safety gloves or glasses is not clicked, and click 3D printed instead, will display warning message. • If PPE is clicked, display explanation message for each PPE, and the PPE will be worn on the user character. • If safety glasses and gloves are clicked, then if 3D print part is clicked, it will proceed to the Collected 3D print scene.

3.5 Collected 3D print for FDM Lab (Application)		
Text	Visuals	Programming
• Wearing safety glasses and gloves protects you from physical injuries when handling 3D printer.	• User character • Opened Window • 3D printer • User Character with gloves and glasses • 3D printed parts on User Character’s hand.	• Click on “Proceed” to go to trouble shooting FDM scene.

4.1 Trouble Shooting FDM – Stop printer (Application)		
Text	Visuals	Programming
• The filament of the printer has broken halfway during the could you help me to stop the FDM printer? • Warning 1: Power supply • Warning 2 half printed part • Warning 3: Filament • Warning 4: info panel • Warning 5: nozzle	• 3D printer body • Filament • Half printed 3D print • Nozzle • Control panel • Info panel • Power supply	• If user click on the wrong part of the 3D printer, it will display respective warning message at below left corner. • If user click on the correct part, proceed to next scene. • Printer head animation will loop back and forth

4.2 Trouble Shooting FDM – extrude materials (Application)		
Text	Visuals	Programming
• Could you help me to extrude the remaining filament on the nozzle? • Warning 1: Power supply • Warning 2 half printed part • Warning 3: Filament • Warning 4: info panel • Warning 5: nozzle	• 3D printer body • Filament • Half printed 3D print • Nozzle • Control panel • Info panel • Power supply	• If user click on the wrong part of the 3D printer, it will display respective warning message at below left corner. • If user click on the correct part, proceed to next scene.

4.3 Trouble Shooting FDM – extrude materials (Application)		
Text	Visuals	Programming
• Could you help me to extrude the remaining filament on the nozzle? • Warning 1: Power supply • Warning 2 half printed part • Warning 3: Filament • Warning 4: info panel • Warning 5: nozzle	• 3D printer body • Filament • Half printed 3D print • Nozzle • Control panel • Info panel • Power supply	• If user click on the wrong part of the 3D printer, it will display respective warning message at below left corner. • If user click on the correct part, proceed to next scene.

4.4 Trouble Shooting FDM – minimize print failure (Application)		
Text	Visuals	Programming
• How can we minimize the print failure? • Warning 1: control panel • Warning 2 half printed part • Warning 4: info panel • Warning 5: nozzle	• 3D printer body • Filament • Nozzle without filament • Control panel • Info panel • Power supply	• If user click on the wrong part of the 3D printer, it will display respective warning message at below left corner. • If user click on the correct part, proceed to next scene.

4.5 Trouble Shooting FDM – damaged filament (Application)		
Text	Visuals	Programming
• Prolonged exposure of 3D print material to moisture will cause filament breakage. • Make sure to replaced damage filament.	• 3D printer body • Filament with sparkle • Nozzle without filament • Control panel • Info panel • Power supply	• Click on “Continue” to go to next slide

5.1 Ending (Integration)		
Text	Visuals	Programming
• Thank you for completing the course • Click on “safety checklist” to download.	• 3D printer • Safety officer with OK sign • Safey first sign • Safety checklist button • End Course button	• Click on “Safety Checklist” and the check PDF file will be opened on a new browser tab • Click on “End Course” to mark the course as completed.