



# TEAM EXCELLENCE ASSESSMENT MARCH 2024

## AEROLUTION DYNAMICS

*ITE College Central, School of Engineering,  
Nitec in Aerospace Technology*

# DEPARTMENT & ORGANIZATION GOALS

**Aerospace Department**

To generate skilled technicians making the aircraft airworthy

**ITE Vision**

A Trailblazer in Career Technical Education and Work-Study Training

**ITE Mission**

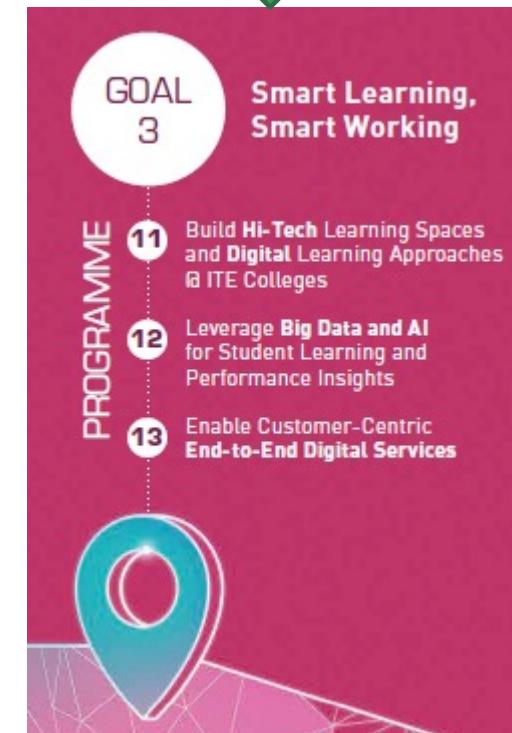
Create Opportunities for Students and Adult Learners to Acquire Skills, Knowledge and Values for Employability and Lifelong Learning

**ITE Strategic Roadmap**

**ITE Create Plan**

- Employability Resilience, Future Readiness
- Lifelong Learning, Workforce Adaptability
- Smart Learning, Smart Working
- Agile Capabilities, Responsive Organisation

Workplan on sustainability and IoT



# TEAM MEMBERS

Name	Members
Thian Eng Poh	Team Manager
Elvin R.	Facilitator
Ronald Lim	Team leader
Ng Tat Hwee	Project leader
James Ong	Member
Kelvin Koh	Member



## PROJECT SUMMARY



**Project title:**  
Enhance Sheet Metal Patch Repair Training



**Project Overview:**  
The project aims to improve training methods for sheet metal repair that promotes better visualization and understanding

# AEROLUTION DYNAMICS

## I. SELECTION

## IA. DESCRIBE THE METHOD AND/OR TOOL USED TO SELECT THE PROJECT, AND EXPLAIN THE CRITERIA USED

No.	Criteria Problem	Benefits to students				Ease of implementation				Cost savings				Time savings				Total
	Members	Ronald	Tat Hwee	James	Kelvin	Ronald	Tat Hwee	James	Kelvin	Ronald	Tat Hwee	James	Kelvin	Ronald	Tat Hwee	James	Kelvin	
1	Long turnaround training time for component replacement for World skills trainee	3	2	3	3	2	2	1	2	2	1	2	2	2	1	1	1	30
2	Poor competence in sheet metal repair for students	5	4	5	4	5	5	4	5	4	5	5	4	5	5	5	5	75
3	High corrosion rate for tools and equipment	4	3	4	4	2	2	2	3	4	4	5	5	2	2	2	2	50
4	Long duration for booking out tools	3	4	4	4	2	3	3	3	2	2	2	2	4	3	4	4	49
5	Noise hazard during riveting	4	4	4	4	3	2	2	3	2	2	2	2	2	2	2	2	42

Decision Matrix Diagram

- Our team met up with the stakeholders, gathered feedback, brainstormed and identified 5 problems that are urgent.
- Decision matrix is tabulated against the criteria through a rating scale of 1 to 5

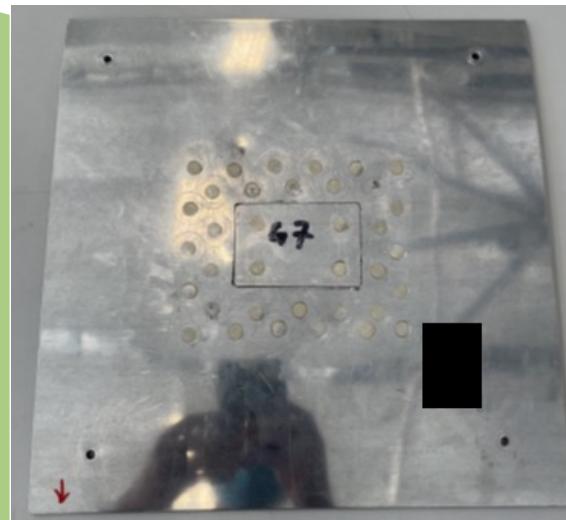
# IA. DESCRIBE THE METHOD AND/OR TOOL USED TO SELECT THE PROJECT, AND EXPLAIN THE CRITERIA USED

Reason for choosing criterion	Criterion	Rating Scale				
		1	2	3	4	5
Provide greater student satisfaction and enhance learning for all aerospace students	<b>Benefits to students</b>	≤ 25% of the aerospace students benefit from the project implementation	26-50% of the aerospace students benefit from the project implementation	51-70% of the aerospace students benefit from the project implementation	70-85% of the aerospace students benefit from the project implementation	86%-100% of the aerospace students benefit from the project implementation
Easier implementation greater involvement of students and productivity	<b>Ease of Implementation (man hours)</b>	≥ 201	151 – 200	101 - 150	51 - 100	≤ 50
Improve cost effectiveness (Cost vs results)	<b>Cost savings (SGD \$)</b>	≤ 10K	10-30K	30-70K	70-100K	>100K
Minimize down time for students and staff during lessons	<b>Time savings</b>	1 Hours	1 – 3 Hours	3 – 5 Hours	5 – 10 Hours	>10 Hours

**Criterion Rated Scale**

## I.B. EXPLAIN THE REASONS WHY THE PROJECT WAS SELECTED.

The problem with the **highest score** in the decision matrix diagram requires greater urgency



Sheet metal patch repair

1.) **Feedback** from teaching staff on the difficulty of explaining the repair process to students.

2.) **Lesson observation** was conducted by module coordinator and noticed students have numerous doubts and questions on the repair process.



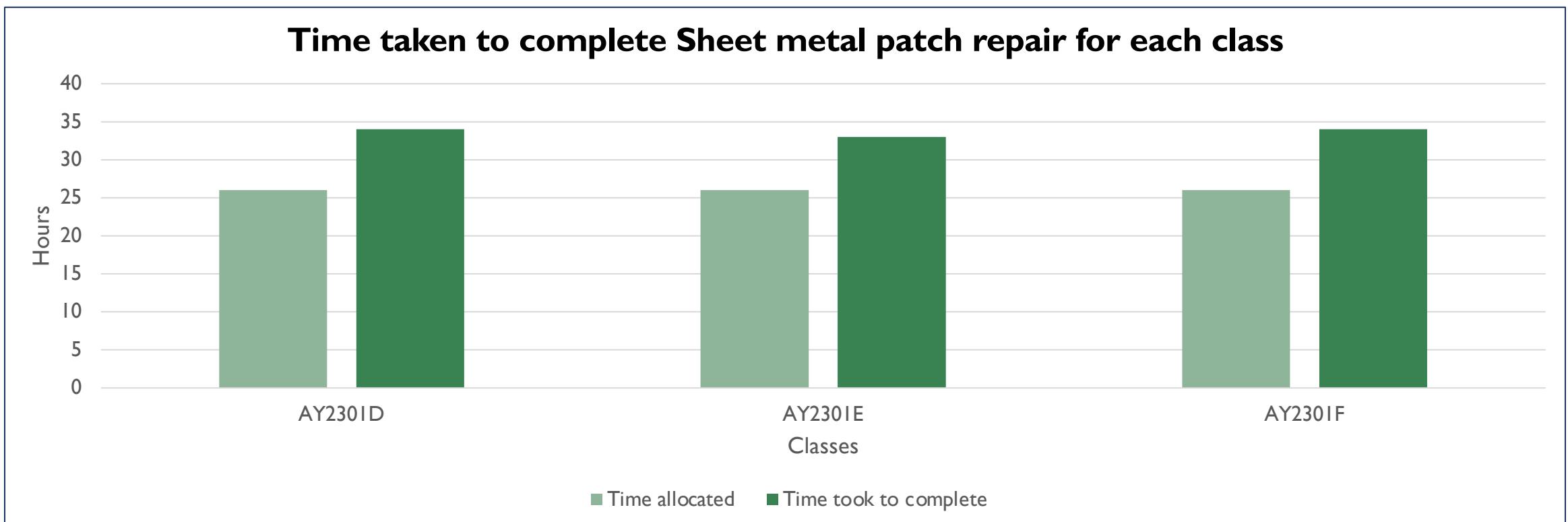
# HOW TEAM MEMBERS WERE SELECTED AND INVOLVED

**“Process Questioning” is used to determine individual strengths and capabilities to assign roles**

<b>Thian Eng Poh</b> 	<b>Elvin R.</b> 	<b>Ronald Lim</b> 	<b>James Ong</b> 	<b>Ng Tat Hwee</b> 	<b>Kelvin Koh</b> 
<u><b>Team Manager</b></u> <p>Helped to facilitate discussions between staff and senior management. Provided valuable insights throughout the course of this project to help the team achieve its objectives.</p>	<u><b>Facilitator</b></u> <p>Provide advice to project management and contribute some innovative solutions to overcome numerous challenges. Guides and reviews project.</p>	<u><b>Team Leader (Lead team and develop solution)</b></u> <p>Formulate objectives and timelines. Organizes and conducts meeting. Lead the team in using tools to perform analysis and brainstorming. Identify and delegate tasks to team members. Lead in solution development.</p>	<u><b>Member (Research and Analysis)</b></u> <p>Perform analysis of the root cause in terms of physical areas. Participate in solution development. Assist in trial implementation. Generate ideas on how to sustain implementation results.</p>	<u><b>Member (Research and Analysis)</b></u> <p>Perform research on solutions and improvements to project. Analysing feedback to standardize results collected among the classes to the project. Participate in project development.</p>	<u><b>Member (Research and Data collection)</b></u> <p>Conduct trial runs with students and staff to gather feedback and analysing the feedback with team members to provide inputs for improvements to the project.</p>

## I.B. EXPLAIN THE REASONS WHY THE PROJECT WAS SELECTED.

**Data collected** by the Class Advisor of each class shows that on average each class took about 25% more time to complete the patch repair task. The data calls for a need to address the problem.

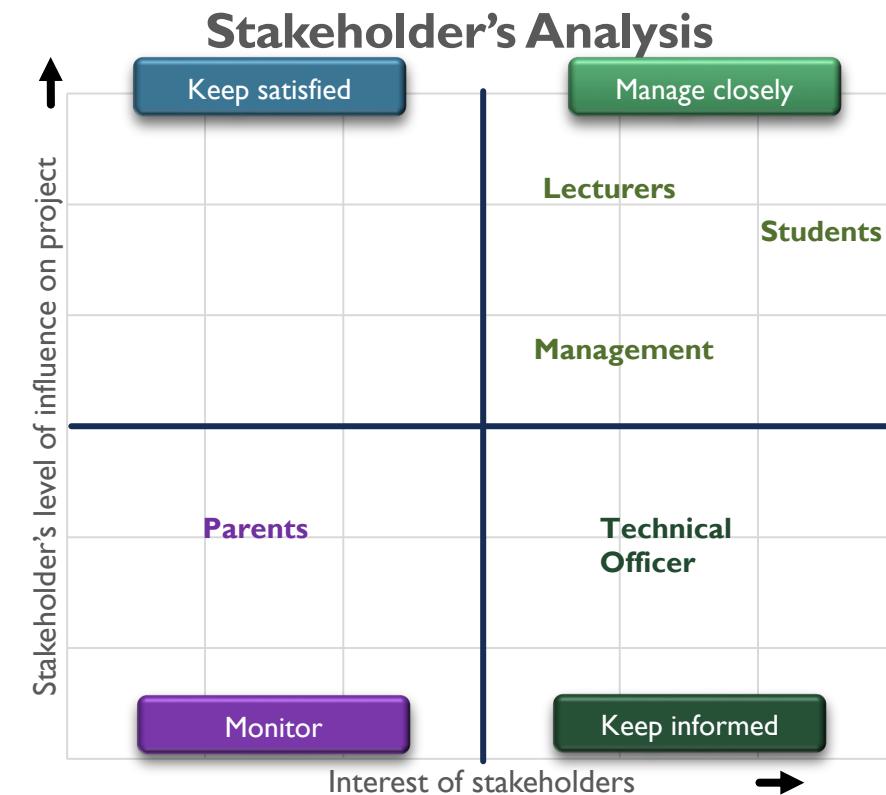


## IC. DESCRIBE HOW THE STAKEHOLDERS WERE IDENTIFIED; AND THE POTENTIAL IMPACT ON STAKEHOLDERS WAS DETERMINED

“Process Questioning” technique was used to identify potential stakeholders

<b>Questions</b>	<b>Potential Stakeholders</b>
Who will address the problem?	AET Lecturers/Module coordinator
Who will implement the solution?	AET Lecturers
Who will benefit from the solution?	AET students/Lecturers/Management
Who is will the subject matter expert to provide advice?	AET Lecturers/Module coordinator

Stakeholder's analysis was used to determine impact of stakeholder's



## IC. DESCRIBE HOW THE STAKEHOLDERS WERE IDENTIFIED; AND THE POTENTIAL IMPACT ON STAKEHOLDERS WAS DETERMINED

<b>Stakeholders</b>	<b>Potential Impact</b>	<b>Type of impact</b>	<b>Degree of impact</b>
Students (Internal)	<ul style="list-style-type: none"> <li>• Create vibrancy among students learnability.</li> <li>• Improve their competency in the skill-sets required, thereby increasing their chances of employability.</li> <li>• Increases credibility of the organization</li> </ul>	Direct	High
Lecturers (Internal)	<ul style="list-style-type: none"> <li>• Develops students holistically.</li> <li>• Allows students to learn in a fun, safe and authentic environment.</li> <li>• Motivates and ensure competency of students</li> </ul>	Direct	High
Management (Internal)	<ul style="list-style-type: none"> <li>• Motivates and give advice to staff.</li> <li>• Maintains relevance of course syllabus in accordance with the needs of the industry and ITE missions and visions.</li> </ul>	Indirect	Moderate
Technical officers (Internal)	<ul style="list-style-type: none"> <li>• Ensure low wastage of consumables and good condition of tools and equipment</li> </ul>	Indirect	Moderate
Parents (External)	<ul style="list-style-type: none"> <li>• Ensure well-being of students and guidance is an integral part of their learning</li> </ul>	Indirect	Low

## ID. DESCRIBE THE METHOD AND/OR TOOL USED FOR TARGET SETTING; AND EXPLAIN HOW THE TEAM LINKED THE PROJECT TARGET TO ORGANIZATION BUSINESS / OPERATIONAL GOALS.

**S**pecific

- By the end of this project in 9 months, our team would enhance Sheet Metal Patch Repair training for instructors and students.

**Linkage to organization goals**

Aligns with ITE Mission and Vision

**M**easurable

- At the end of the project, we are able to resolve this problem by spending about **\$1150**.
- Reduce material(Sheet metal) wastage by 20%
- Reduce time taken to complete sheet metal patch repair by 20%

Aligns with ITE Create Goal I: Enhance Student Success and Engagement

**A**ttainable

- Utilize technology and software to achieve desired outcomes
- Commit to time frames and capitalize on subject matter experts

Aligns with ITE Create Goal I and 3: Adopt Flexible Curriculum Structure and Programming. Build Hi-Tech Learning Spaces and Digital Learning Approaches @ ITE Colleges

**R**ealistic

- Resources and management support were provided to complete the project
- Obtain feedback and adopt continuous improvement to refine the project

Aligns with ITE Create Goal 4: Enhance Staff Engagement and Passion at Work

**T**ime-based

- Trials carried out on June 2023 semester
- Total of 9 months to complete and obtain results

Aligns with ITE Create Goal I: Enhance Student Success and Engagement

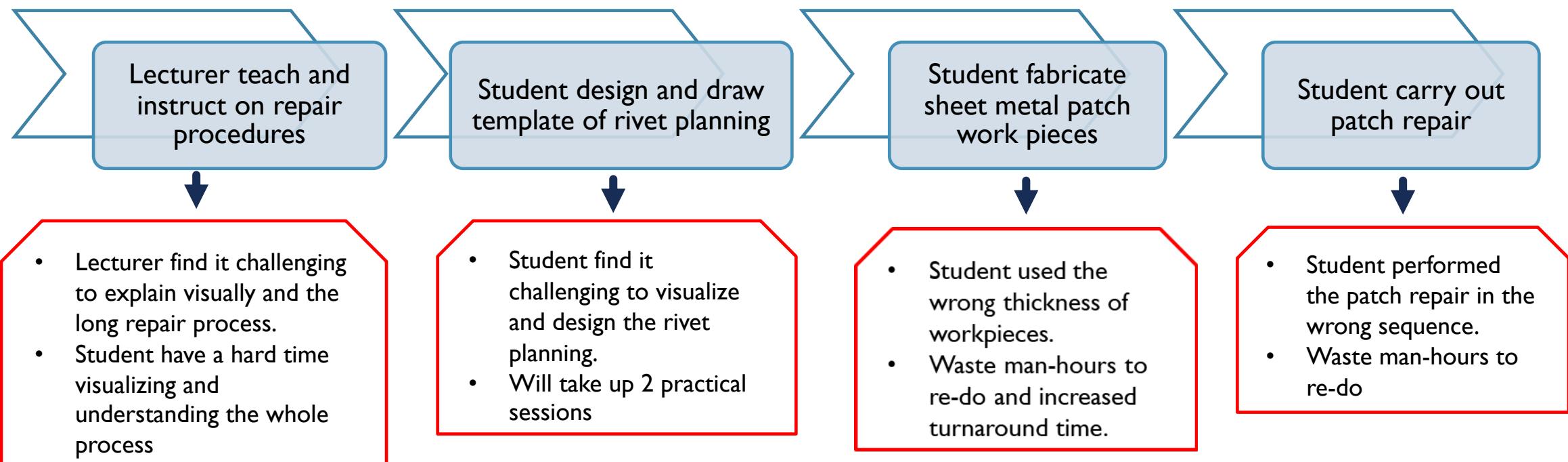
# AEROLUTION DYNAMICS

## 2. ANALYSIS

## 2A. DESCRIBE THE EXISTING SITUATIONAL PROBLEM/PRACTICE

- During the practical task of Repair Airframe Structure, students are required to performed a sheet metal patch repair. Most of the class took approximately 8 sessions to complete.

### Process Flow of Task:



## 2A. DESCRIBE THE EXISTING SITUATIONAL PROBLEM/PRACTICE

### Existing Problem

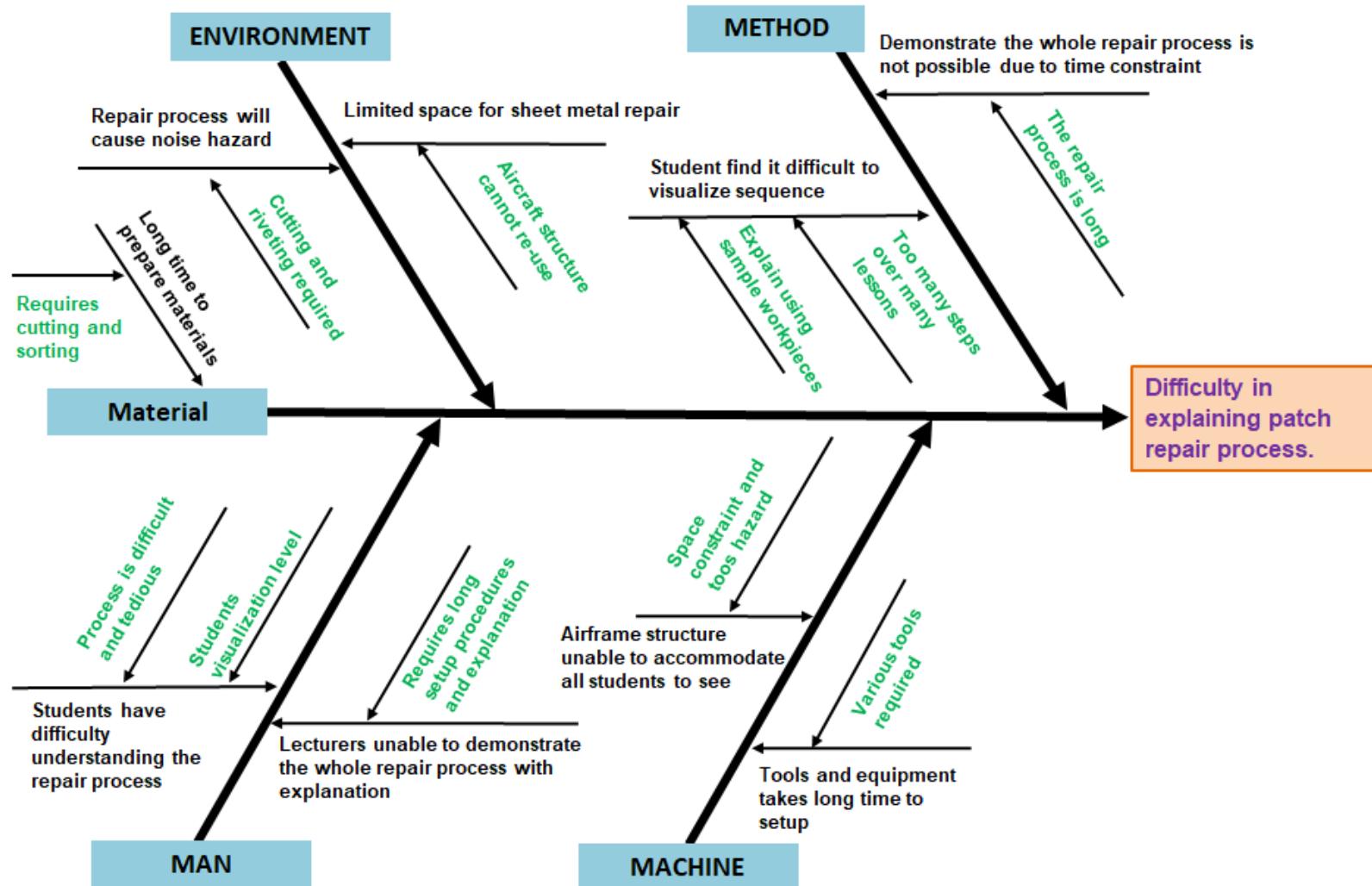
Practical task **exceed an average of 25%** of the required duration

Average **wastage** of **20%** of material due to student mistakes

Average of **30% of students** have difficulty visualizing the repair process

**Problem statement:** How do we enhance the teaching effectiveness of sheet metal repair.

## 2B. DESCRIBE THE METHOD AND/OR TOOLS USED TO IDENTIFY POSSIBLE ROOT CAUSES; AND EXPLAIN TEAM'S ANALYSIS OF DATA TO VERIFY THEM.

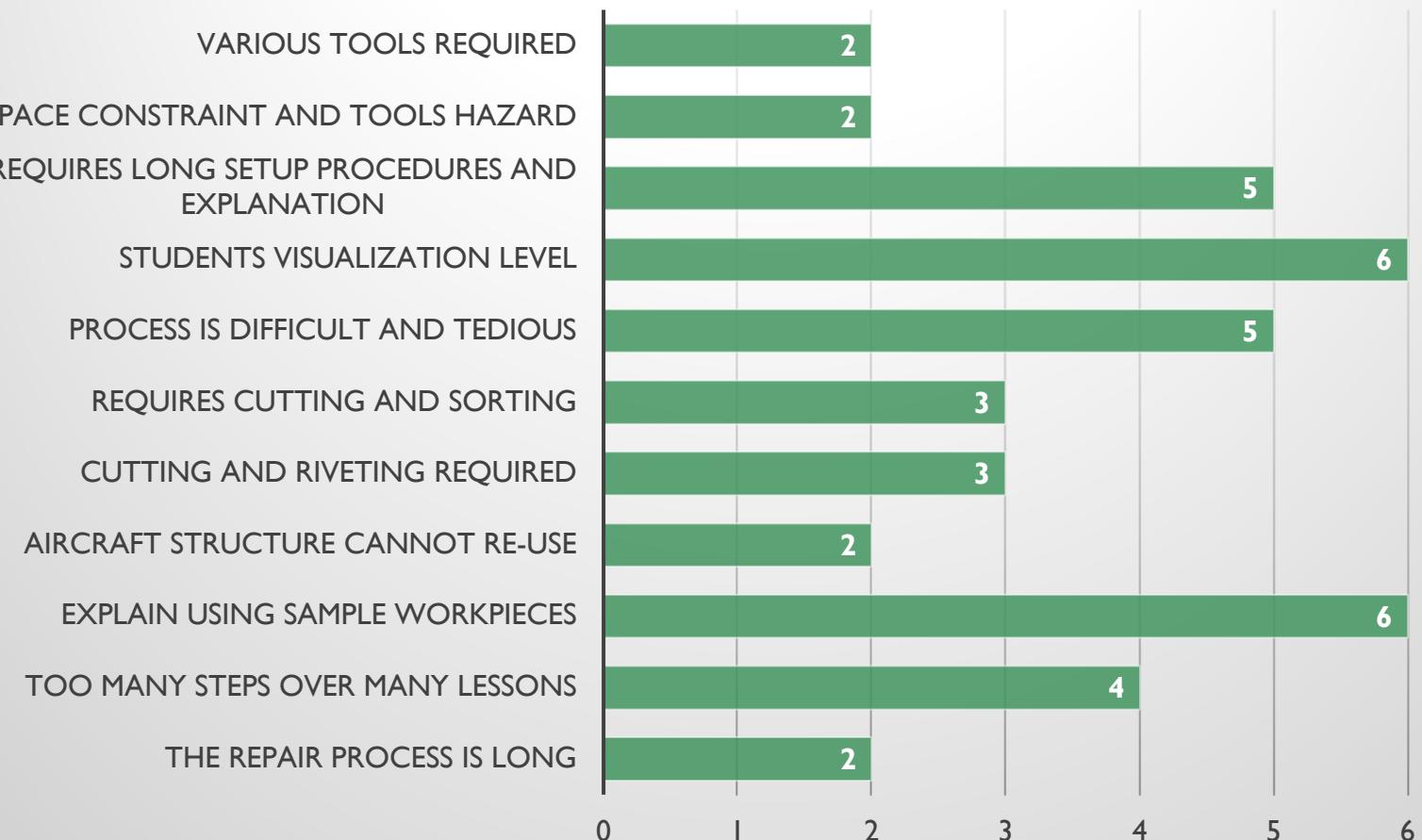


## 2C. DESCRIBE THE METHOD AND/OR TOOLS USED TO SELECT THE FINAL ROOT CAUSES; AND EXPLAIN TEAM'S ANALYSIS OF DATA TO SELECT THE FINAL ROOT CAUSES

### Verification of Root Causes

During record of standardization meeting, Survey was carried out through a poll by the **6 module lecturers** teaching the subject for I semester to support our verification of possible root cause. The results showed the possible root causes are **valid**.

### Verification on Valid Root Cause



## 2. PROJECT ANALYSIS

### INVOLVEMENT OF TEAM MEMBERS

<b>Thian Eng Poh</b> 	<b>Elvin R.</b> 	<b>Ronald Lim</b> 	<b>James Ong</b> 	<b>Ng Tat Hwee</b> 	<b>Kelvin Koh</b> 
<u><b>Team Manager</b></u> <p>Helped to facilitate discussions between staff and senior management.</p>	<u><b>Facilitator</b></u> <p>Provide experiential advice on more urgent problems</p>	<u><b>Team Leader (Lead team and develop solution)</b></u> <ul style="list-style-type: none"> <li>Investigate on existing problem</li> <li>Brainstorm on possible root cause</li> </ul>	<u><b>Member (Research and Analysis)</b></u> <ul style="list-style-type: none"> <li>Brainstorm on possible root cause</li> <li>Interview and get feedback from students</li> </ul>	<u><b>Member (Research and Analysis)</b></u> <ul style="list-style-type: none"> <li>Brainstorm on possible root cause</li> <li>Feedback on existing problems</li> </ul>	<u><b>Member (Research and Data collection)</b></u> <ul style="list-style-type: none"> <li>Brainstorm on possible root cause</li> <li>Conduct a poll survey on all module lecturers</li> </ul>

## 2C. DESCRIBE THE METHOD AND/OR TOOLS USED TO SELECT THE FINAL ROOT CAUSES; AND EXPLAIN TEAM'S ANALYSIS OF DATA TO SELECT THE FINAL ROOT CAUSES

	Final Root Cause	Is it a root cause?	Is it controllable?	Can it be solved?	Will it improve teaching effectiveness after solving?	Verified by
<b>Method</b>	The repair process is long	Yes	No	No	No	Kelvin
	Too many steps over many lessons	Yes	No	No	No	Kelvin
	<b>Explain using sample workpieces</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>	<b>Ronald</b>
<b>Environment</b>	Aircraft structure cannot re-use	No	No	Yes	No	Tat Hwee
	Cutting and riveting required	No	Yes	No	No	Tat Hwee
<b>Material</b>	Requires cutting and sorting	No	No	Yes	No	Ronald
<b>Man</b>	Process is difficult and tedious	No	No	Yes	Yes	James
	<b>Students visualization level</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>	<b>James</b>
	<b>Requires long setup procedures and explanation for demonstration</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>	<b>James</b>
<b>Machine</b>	Space constraint and tools hazard	Yes	No	Yes	Yes	Kelvin
	Various tools required	No	Yes	No	No	Kelvin

## AEROLUTION DYNAMICS

# 3. SOLUTION + IMPLEMENTATION

### 3A. DESCRIBE THE METHOD AND/OR TOOLS USED BY THE TEAM TO DEVELOP POSSIBLE SOLUTIONS; AND EXPLAIN THE TEAM'S ANALYSIS OF DATA TO ESTABLISH THE POSSIBLE SOLUTIONS.

**Substitute**

Can the conventional method of explaining to students be replaced?

**Combine**

Can we combine the use of technology / digitalization features to improve understanding?

**Adapt**

Can we add new element to improve student's visualization?

**Modify**

Can we modify the Job sheet instructions?

**Put to another use**

What other means can be used to improve students sheet metal repair competence?

**Eliminate**

Are we able to eliminate wastage of resources for demonstration?

**Reverse**

Can we re-arrange the process to improve student's sheet metal repair technique?

Possible solutions

Create a more interactive learning platform for students to pace themselves using adobe captivate  
To include discussion forum for sheet metal repair processes

Show process by using of Augmented reality

Create a 3D software model where students can see at different view of the repair process.  
Create video for the whole process .

To include sections of QR code in the job sheets for different procedures.

Usage of Virtual Reality platform to simulate sheet metal repair.

Eliminate the use of excess sheet metals, rivets for multiple demonstrations using 3D printed model.

Inclusion of re-usable training aid for students to try out before performing actual tasks

### 3. SOLUTION + IMPLEMENTATION INVOLVEMENT OF TEAM MEMBERS

<b>Thian Eng Poh</b> 	<b>Elvin R.</b> 	<b>Ronald Lim</b> 	<b>James Ong</b> 	<b>Ng Tat Hwee</b> 	<b>Kelvin Koh</b> 
<u><b>Team Manager</b></u> <p>Helped to facilitate discussions between staff and senior management.</p>	<u><b>Facilitator</b></u> <p>Provide secondary opinion on some possible solutions.</p>	<u><b>Team Leader (Lead team and develop solution)</b></u> <ul style="list-style-type: none"> <li>• Facilitate and brainstorm on possible solution</li> <li>• Plan out target timelines</li> <li>• Final solution selection process</li> </ul>	<u><b>Member (Research and Analysis)</b></u> <ul style="list-style-type: none"> <li>• Discuss on innovativeness of solutions</li> <li>• Research on existing solutions</li> <li>• Brainstorm on possible solution</li> <li>• Final solution selection process</li> </ul>	<u><b>Member (Research and Analysis)</b></u> <ul style="list-style-type: none"> <li>• Discuss on innovativeness of solutions</li> <li>• Research on existing solutions</li> <li>• Brainstorm on possible solution</li> <li>• Final solution selection process</li> </ul>	<u><b>Member (Research and Data collection)</b></u> <ul style="list-style-type: none"> <li>• Discuss on innovativeness of solutions</li> <li>• Research on existing solutions</li> <li>• Brainstorm on possible solution</li> <li>• Final solution selection process</li> </ul>

### 3B. DESCRIBE THE METHOD,TOOLS AND CRITERIA USED TO SELECT THE FINAL SOLUTION(S) AND EXPLAIN TEAM'S ANALYSIS OF DATA TO VALIDATE THEM.

Criterion	Criticality Rating				
	1	2	3	4	5
A Effectiveness of solution	Very low	Low	Moderate	High	Vey high
B Ease of implementation	Very hard	Hard	Moderate	Easy	Very easy
C Cost of implementation	>\$15,000	\$8,000 - \$15,000	\$3000-\$8,000	\$1000-\$3000	<\$1000
D Benefits to Students	0-20% students benefit from the project	21-40% students benefit from the project	41-60% students benefit from the project	61-80% students benefit from the project	81-100% students benefit from the project

#### Reason for choosing the criterion

A

##### Effectiveness of solution

- The solution will help meet the student's competence and reduce time taken to complete the task.

B

##### Ease of implementation

- The ease of implementation will depend on manpower resources, attainability of resources (software), ease of usability by the students and complexity of carrying out.

C

##### Cost of implementation

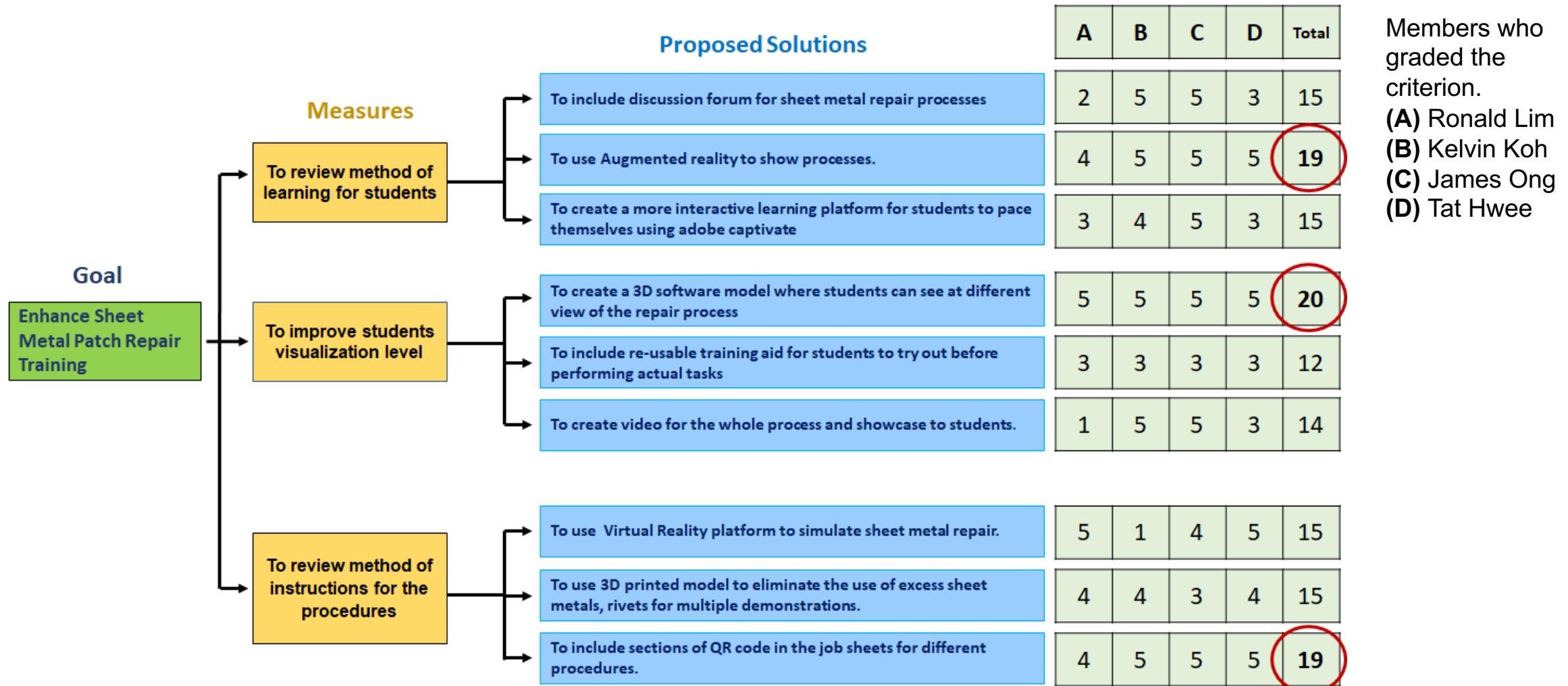
- The cost of implementation needs to meet the required outcome without exceeding too much as compared to our target setting under measurables.

D

##### Benefits to students

- The solution will need to benefit all students performing sheet metal repair to enhance learning environment and outcome.

### 3B. DESCRIBE THE METHOD,TOOLS AND CRITERIA USED TO SELECT THE FINAL SOLUTION(S) AND EXPLAIN TEAM'S ANALYSIS OF DATA TO VALIDATE THEM.



### 3B. DESCRIBE THE METHOD,TOOLS AND CRITERIA USED TO SELECT THE FINAL SOLUTION(S) AND EXPLAIN TEAM'S ANALYSIS OF DATA TO VALIDATE THEM.

#### Validation of Final Solutions

Final Solutions	Advantages	Disadvantages	Achievable and Valid
To use Augmented reality to show processes.	<ul style="list-style-type: none"> <li>Enhanced learning</li> <li>Increased accessibility</li> <li>Increase experiential learning compared to conventional methods</li> </ul>	<ul style="list-style-type: none"> <li>Required surface anchor</li> <li>Need a AR enabled device (Handphones, Tablet etc.)</li> </ul>	
To create a 3D software model where students can see at different view of the repair process	<ul style="list-style-type: none"> <li>Enhance visualization</li> <li>Reduce wastage of hardware and resources.</li> <li>Easy referencing when in doubt</li> </ul>	<ul style="list-style-type: none"> <li>Maybe time consuming to create the model</li> </ul>	
To include sections of QR code in the job sheets for different procedures.	<ul style="list-style-type: none"> <li>Less words and more engaging</li> <li>Quick and convenient to access information.</li> </ul>	<ul style="list-style-type: none"> <li>Requires QR code scanning devices</li> </ul>	

### 3C. EXPLAIN WHY THE FINAL SOLUTION(S) WERE INNOVATIVE

#### Incremental Innovation

Addition of QR codes in job sheets for accessibility

- I.) Less words, less intimidating
- 2.) Allows repeatability and pacing

#### Process Innovation

Usage of 3D modelled animated feature of work process to enhance visualization

- I.) Reduce approx. 25% of time taken to complete task

#### Disruptive Innovation

Addition of AR features in job sheet change the way student learns

- I.) Reduce material wastage with less mistakes
- 2.) More interactive

# INVOLVEMENT OF STAKEHOLDERS IN SELECTION OF FINAL SOLUTION

<b>Thian Eng Poh</b>	<b>Elvin R.</b>	<b>Ronald Lim</b>	<b>James Ong</b>	<b>Ng Tat Hwee</b>	<b>Kelvin Koh</b>	<b>Students</b>
<u><b>Team Manager</b></u> Helped to facilitate discussions between staff and senior management.	<u><b>Facilitator</b></u> Provided advice on the effectiveness of solution.	<u><b>Team Leader (Lead team and develop solution)</b></u> <ul style="list-style-type: none"> <li>• Discuss and brainstormed on solutions</li> <li>• Contributed in selection of final solution</li> <li>• Performed lesson observation</li> </ul>	<u><b>Member (Research and Analysis)</b></u> <ul style="list-style-type: none"> <li>• Discuss and brainstormed on solutions</li> <li>• Contributed in selection of final solution</li> <li>• Proposed the criterion on solution selection</li> </ul>	<u><b>Member (Research and Analysis)</b></u> <ul style="list-style-type: none"> <li>• Performed analysis and validation on final solution</li> <li>• Contributed in selection of final solution</li> <li>• Address concerns</li> </ul>	<u><b>Member (Research and Data collection)</b></u> <ul style="list-style-type: none"> <li>• Discuss and brainstormed on solutions</li> <li>• Contributed in selection of final solution</li> <li>• Consolidate feedbacks and address concerns</li> </ul>	<ul style="list-style-type: none"> <li>• Participate in trials and feedback</li> </ul>

### 3D. DESCRIBE HOW THE VARIOUS TYPES OF CONCERNS WERE IDENTIFIED AND ADDRESSED BY THE TEAM; AND EXPLAIN HOW STAKEHOLDER BUY-IN WAS ENSURED.

Stakeholders	Concerns	Addressing the concerns
Management	<ul style="list-style-type: none"> <li>• Is there any additional cost incurred</li> <li>• Any safety concerns</li> <li>• Can it be integrated to AR goggles</li> </ul>	<ul style="list-style-type: none"> <li>• No additional cost incurred as the features are software-based.</li> <li>• No safety concerns as there were no powered tools and sharp objects involved.</li> <li>• Will be extended to AR goggles after a few more trial runs</li> </ul>
Teaching staff	<ul style="list-style-type: none"> <li>• Is the new process user friendly</li> <li>• Can the interactivity and experience be further improved.</li> </ul>	<ul style="list-style-type: none"> <li>• Yes, minimum of a mobile device is needed to scan the QR code</li> <li>• Yes, it can be improved by adding more interactivity features in the AR software</li> </ul>
Students	<ul style="list-style-type: none"> <li>• Is the 3D animated model editable</li> </ul>	<ul style="list-style-type: none"> <li>• Yes, it can be editable to add more models in Fusion 360</li> </ul>

### 3D. DESCRIBE HOW THE VARIOUS TYPES OF CONCERNS WERE IDENTIFIED AND ADDRESSED BY THE TEAM; AND EXPLAIN HOW STAKEHOLDER BUY-IN WAS ENSURED.

#### Stakeholders

#### Feedback

#### Obtained Buy-in

Management

- The managers were satisfied with the idea and the project was done at minimal cost
- The managers favored the idea was customizable



Teaching Staff

- Trial was carried out and the staff spent less effort to clarify the process
- Teaching staff noticed that the students learning become more self-directed



Students

- Students find it easier to comprehend with the animated AR
- Students feel more enthusiastic with the different learning platform



# DEVELOPED SOLUTION

## JOB SHEET

Course :	Nitec in Aerospace Technology	Module Code :	AM2003FP
Module :	Airframe Maintenance	Duration :	FT- <u>26 hours</u>
Job No	7	SIO	C1-10, C6-40
Job Title : Repair airframe structure			

### Tools, Equipment & Materials

1 Bucking Bar	6 Microstop
2 Rivet Gun	7 Cleco set and holder
3 Flush rivets	8 Paper
4 Rivet set	9 File
5 Drill Gun	10 Sheet metal

### Instructions

1. Perform rivet planning on a piece of template. (Refer to the chart below for number of rivets).
2. Transfer the mark out template on the sheet metal.
3. Remove damaged area (Surface cracks/holes)



<https://adobe Aero.app.link/rW4fWW6ZqGb>

4. Fabricate the following for the patch repair to size
- Doubler
  - Filler



<https://adobe Aero.app.link/e044T75KsGb>

5. Perform drilling, countersinking and select the correct rivet size for riveting.



<https://adobe Aero.app.link/PccimdlNsGb>

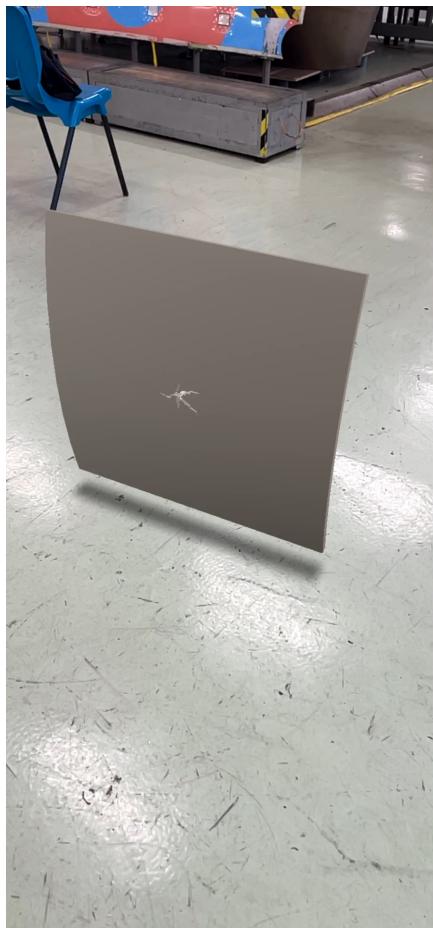
New Job sheet

## Students using the enhanced features

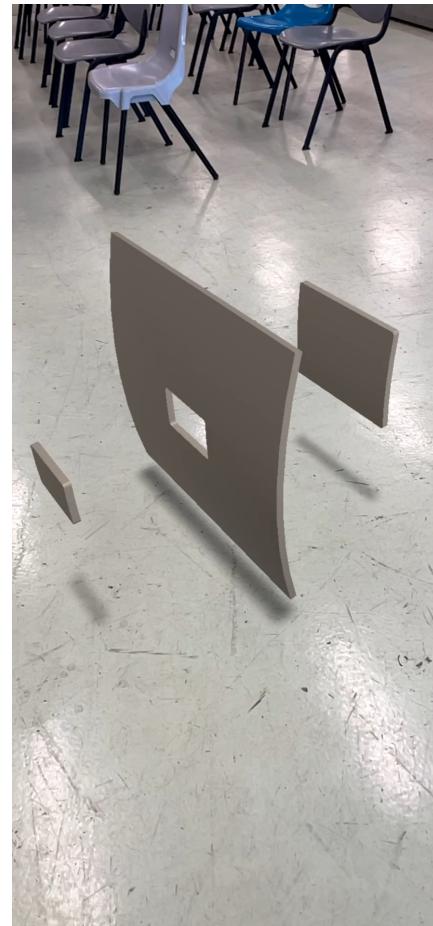


## DEVELOPED SOLUTION

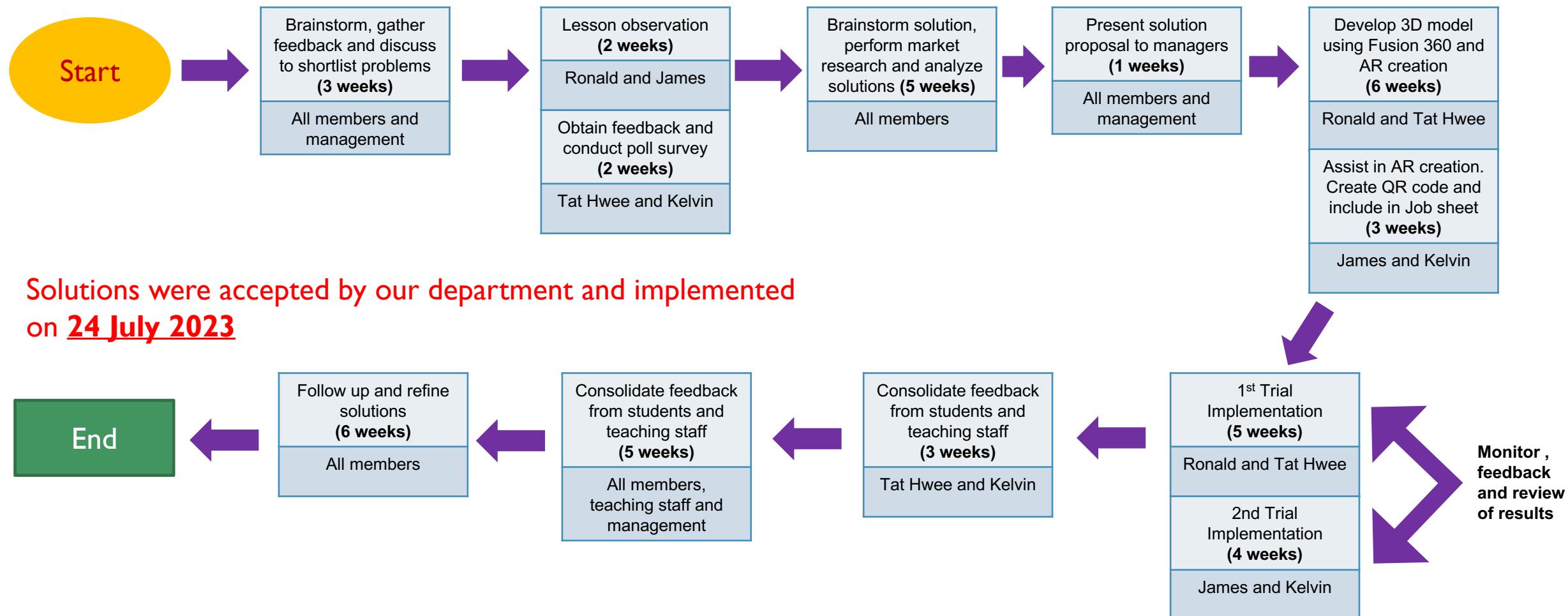
Sample video of  
AR on removal



Sample video of  
AR on repair

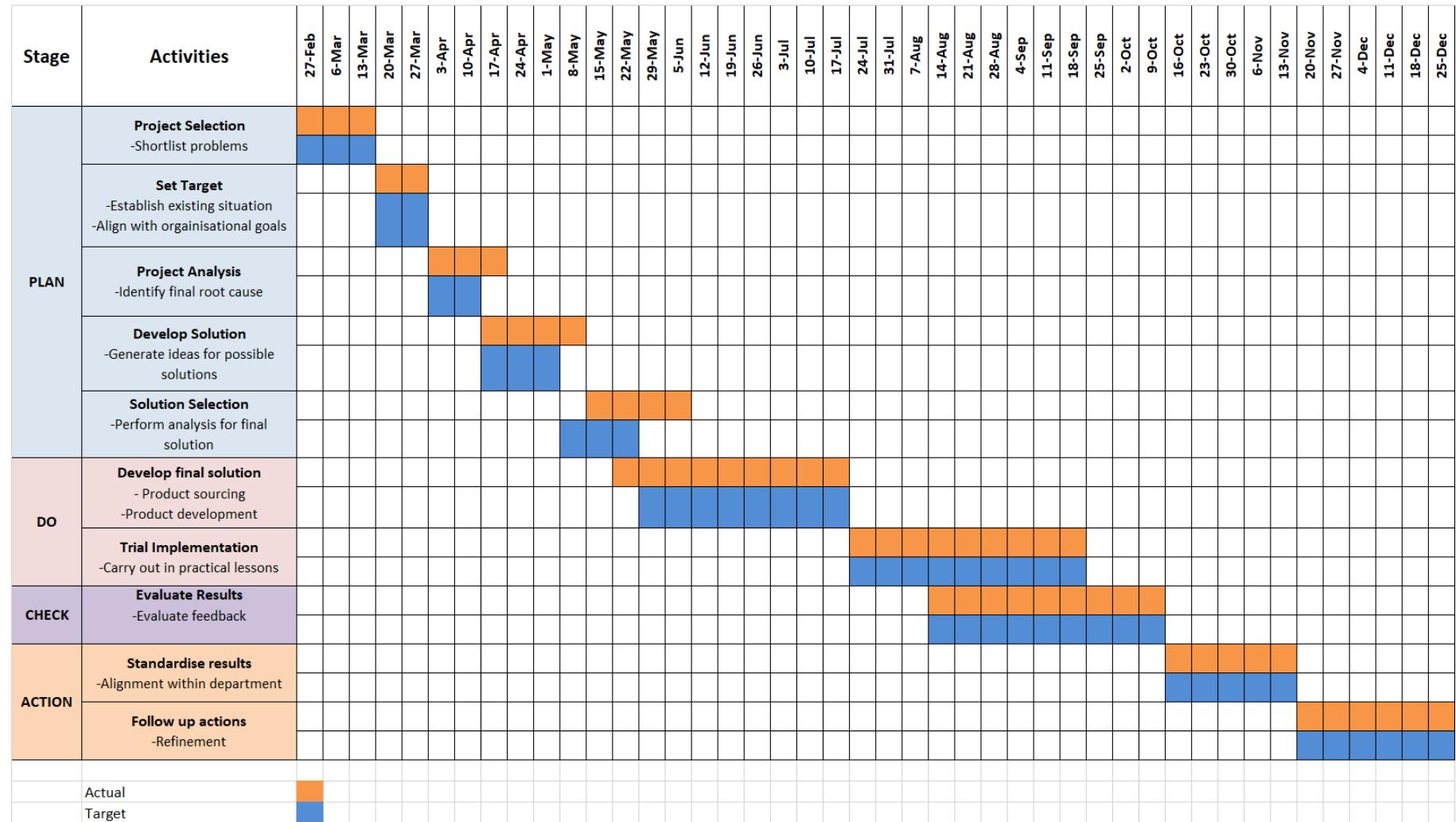


### 3E. DESCRIBE THE PLAN DEVELOPED BY THE TEAM TO IMPLEMENT ITS SOLUTION(S); AND INDICATE THE TYPES OF INTERNAL AND EXTERNAL STAKEHOLDER INVOLVEMENT IN IMPLEMENTATION.



**3E. DESCRIBE THE PLAN DEVELOPED BY THE TEAM TO IMPLEMENT ITS SOLUTION(S); AND INDICATE THE TYPES OF INTERNAL AND EXTERNAL STAKEHOLDER INVOLVEMENT IN IMPLEMENTATION.**

- For project management and tracking



## 3F. DESCRIBE THE CREATION AND INSTALLATION OF PROCEDURE AND SYSTEM FOR MEASURING AND SUSTAINING RESULTS OVER TIME.

### Standardization

**Record of standardization (ROS)**

- A 6 monthly ROS will be conducted to all module lecturers on the new features and method of delivery

**Familiarization session**

- A familiarization will be conducted during term breaks for demonstration so that all staff are aligned with the procedures

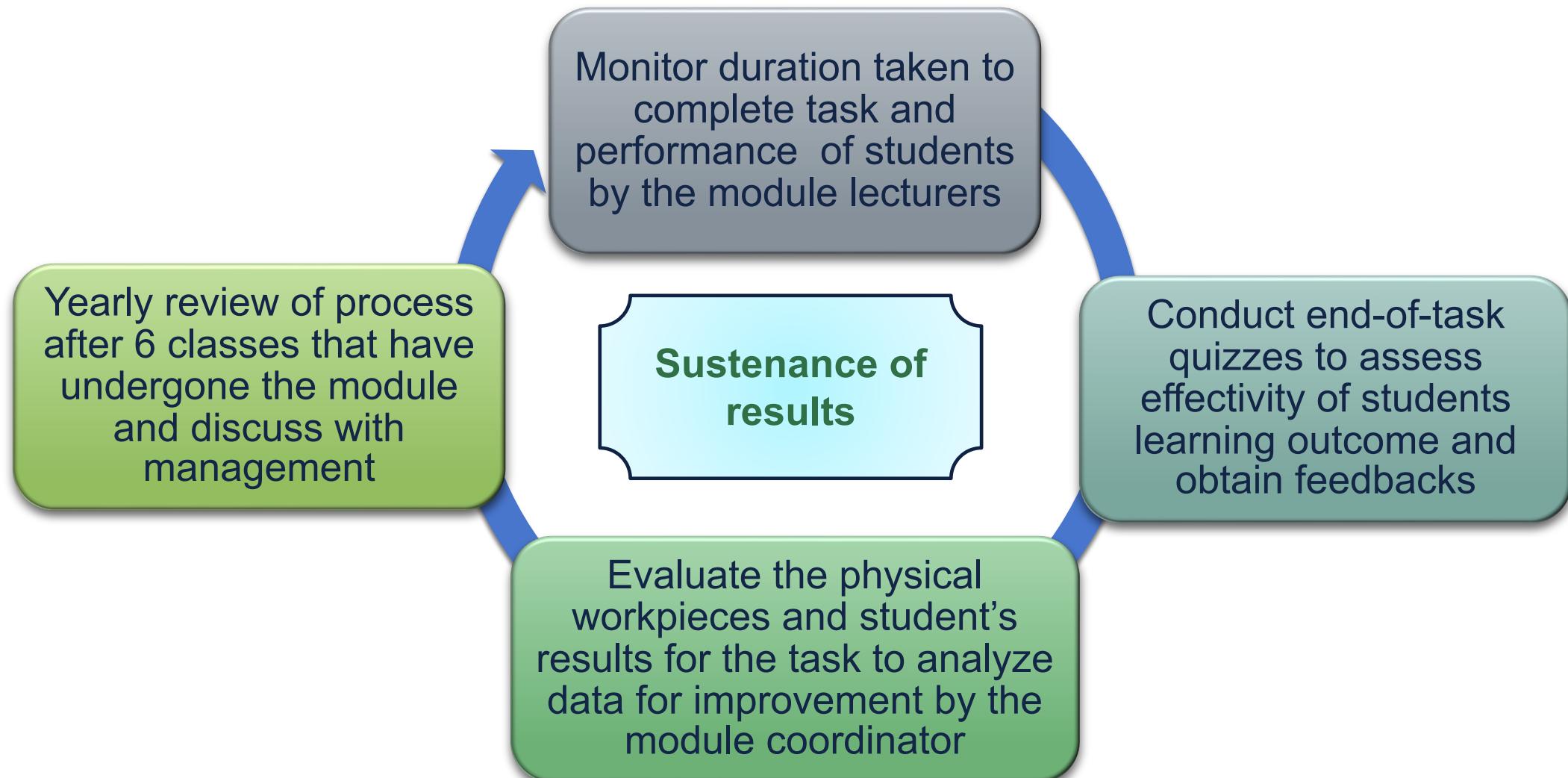
**EasiShare drive**

- Job sheets and reference materials are included in a EasiShare common drive for standardization

**Standard operating procedures**

- Standardize among all students using guidelines on using AR and any precautions involved

### 3F. DESCRIBE THE CREATION AND INSTALLATION OF PROCEDURE AND SYSTEM FOR MEASURING AND SUSTAINING RESULTS OVER TIME.



# AEROLUTION DYNAMICS

## 4. RESULTS

## 4A. DESCRIBE THE TYPES OF TANGIBLE AND INTANGIBLE RESULTS THAT WERE REALIZED

### Tangible Results



### Cost Savings

Total Savings: Total Savings:  
 $(\$7,424.00 + \$10,600.00 + \$6,000.00) - (\$750 + \$400) = \$22,874$

Savings for 5 years:  
 $\$22,874 + 4 \times (\$7,424.00 + \$10,600.00 + \$6,000.00) = \$118,970$

Savings			Cost of implementation
Rivets	Sheet metal	Man-hours to troubleshoot and guidance	Man-hour cost
\$5.80 / piece Average of 128 pieces per class for 10 classes $\$5.80 \times 128 \times 10 = \$7,424.00$	\$530/ piece (48" X 12") Average of 2 pieces per class for 10 classes $\$530 \times 10 \times 2 = \$10,600.00$	\$50 per man-hour 2 staff per class for 3 hour for 2 lessons for 10 classes $2 \times 3 \times 2 \times 10 \times \$50 = \$6,000.00$	Man-hour cost of 3D-modelling: 15 hours X \$50/hour = \$750 Man-hour cost of creating AR: 8 hours X \$50/hour = \$400

## 4A. DESCRIBE THE TYPES OF TANGIBLE AND INTANGIBLE RESULTS THAT WERE REALIZED

### Tangible Results

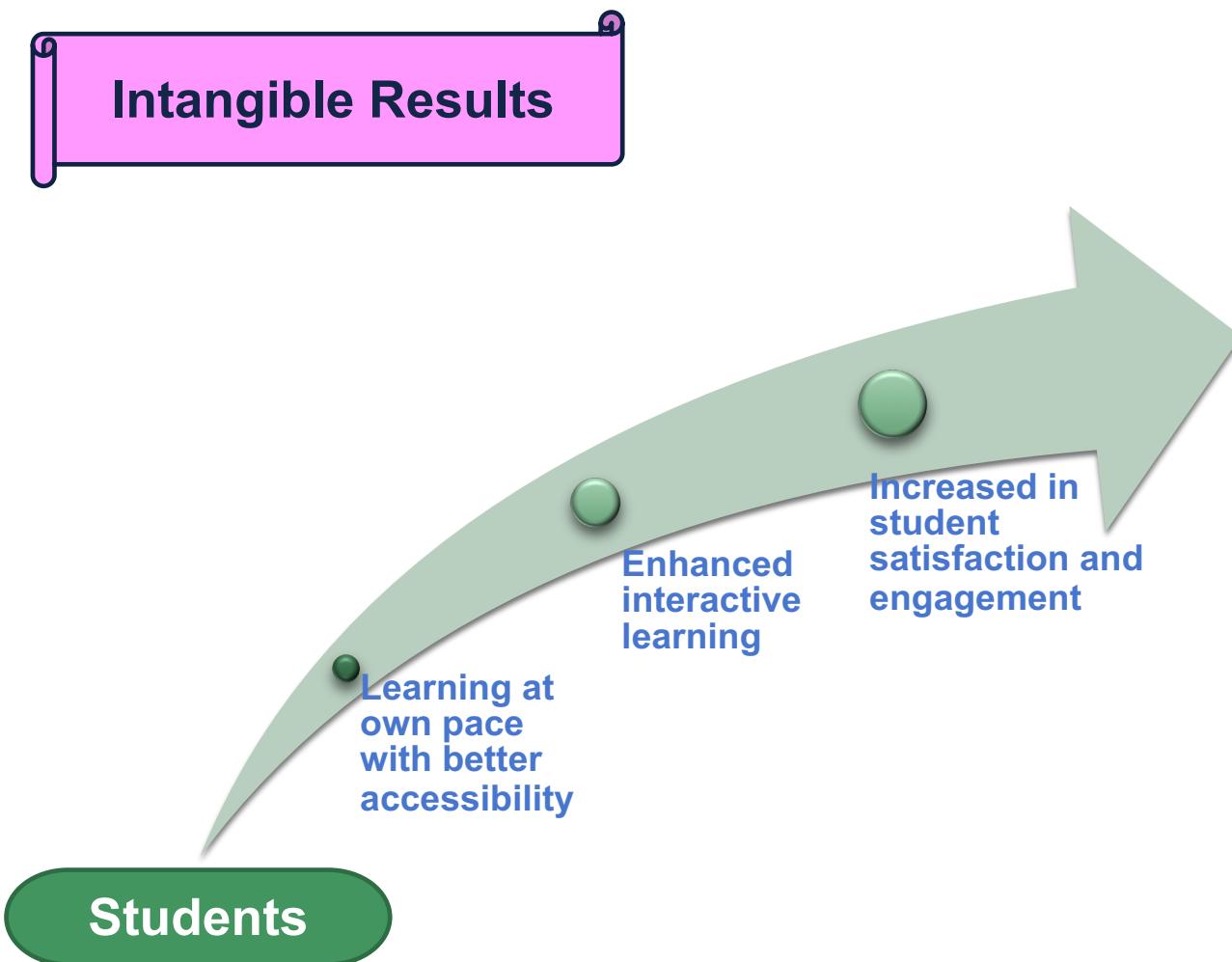
#### Time Savings

- Completion of practical task was reduced by an average of 4 hours. Students has less doubts and commit less mistakes

#### Material Savings

- There are about an average of 20% reduction in usage and wastage of materials as students are able to refer to the AR process consistently and identify errors early on.

## 4A. DESCRIBE THE TYPES OF TANGIBLE AND INTANGIBLE RESULTS THAT WERE REALIZED



## 4B. EXPLAIN HOW THE PROJECT RESULT(S) ACHIEVED ARE LINKED WITH THE ORGANIZATION'S GOALS, PERFORMANCE MEASURES AND/OR STRATEGIES



### Set Target

Reduce material(Sheet metal) wastage by 20%

Reduce time taken to complete sheet metal patch repair by 20%

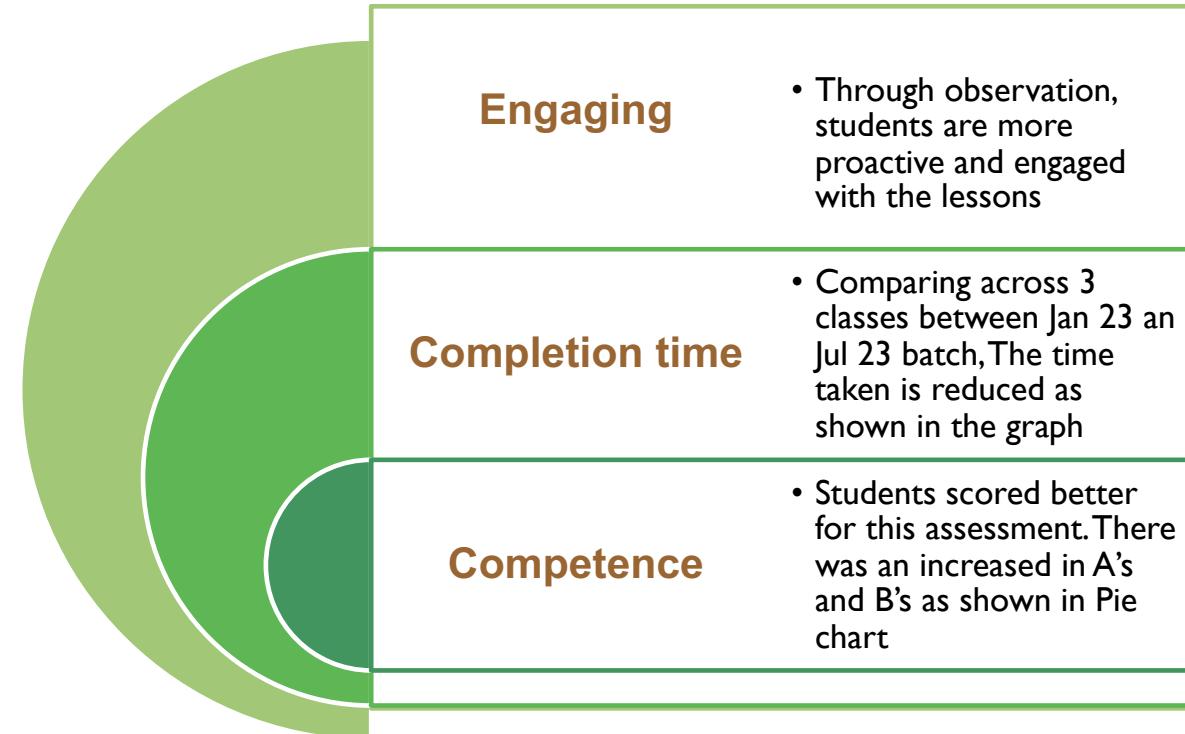
### Project target

Material wastage met the set target of 20% reduction

Completion of task was reduced by an average of 6 hours. Reduction of about 18%

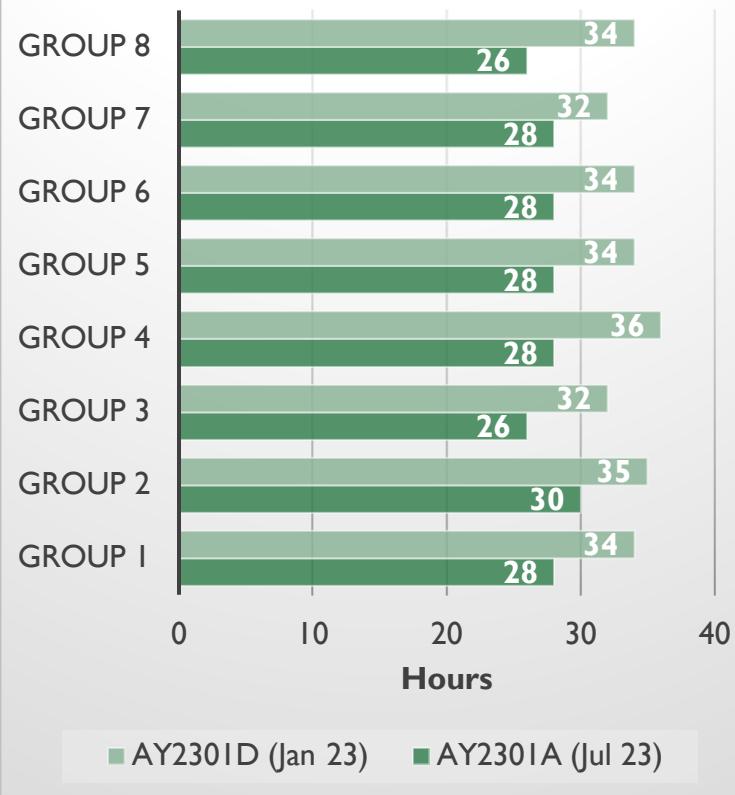


### Implementation results

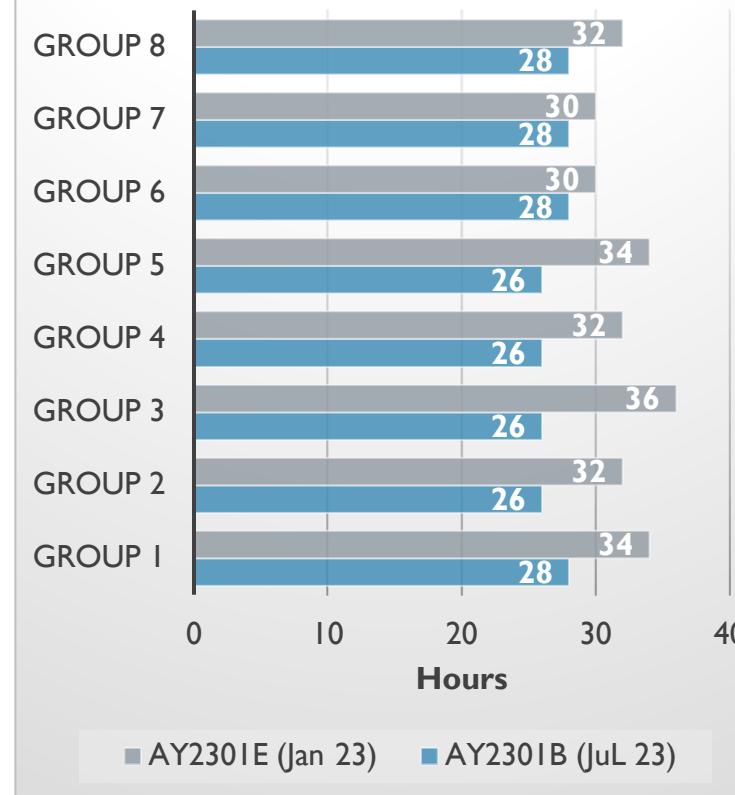


## 4B. EXPLAIN HOW THE PROJECT RESULT(S) ACHIEVED ARE LINKED WITH THE ORGANIZATION'S GOALS, PERFORMANCE MEASURES AND/OR STRATEGIES

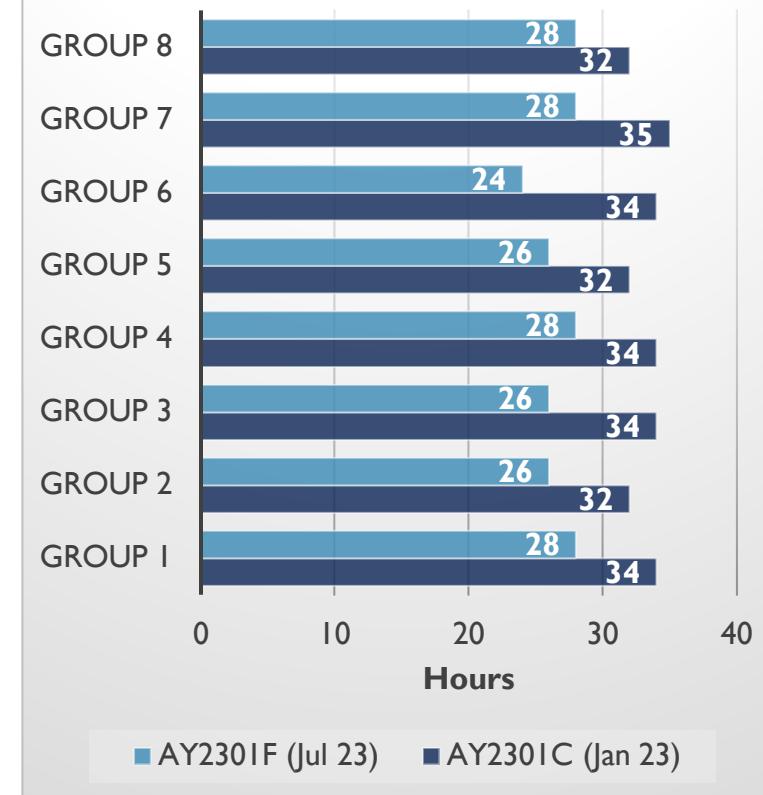
**AYA and AYD**



**AYB and AYE**



**AYC and AYF**

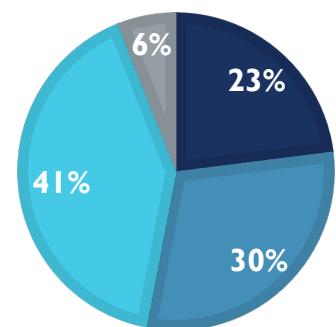


Comparison between Jan 23 and Jul 23 classes after implementation on the duration of task

## 4B. EXPLAIN HOW THE PROJECT RESULT(S) ACHIEVED ARE LINKED WITH THE ORGANIZATION'S GOALS, PERFORMANCE MEASURES AND/OR STRATEGIES

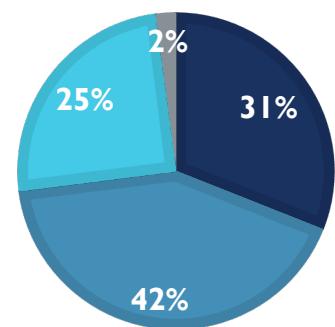
PERCENTAGE OF STUDENTS (CLASS D, E, F) - JAN 2023

■ Grade A ■ Grade B ■ Grade C ■ Grade D



PERCENTAGE OF STUDENTS (CLASS D, E, F) - JAN 2023

■ Grade A ■ Grade B ■ Grade C ■ Grade D



**Increased in  
A's and B's**



### Variation of results achieved

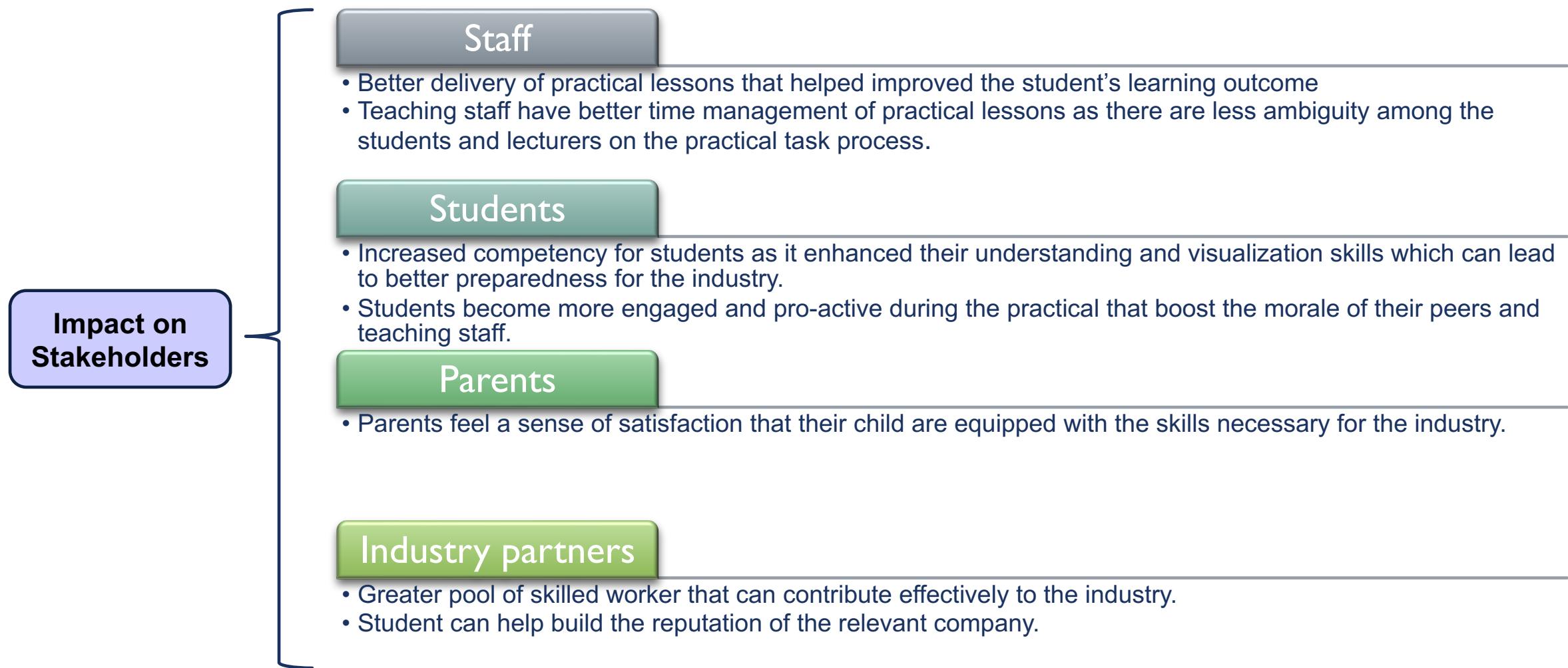
#### Completion time

- Slight deviation in time taken as student spent an amount of time exploring and playing with AR

#### Competency

- There were still reasonable number of students who scored lower as there were elements of hand-skills needed that technology cannot replace.

## 4C. DESCRIBE THE OVERALL IMPACT OF THE PROJECT ACHIEVEMENTS TO ORGANIZATION AND STAKEHOLDERS

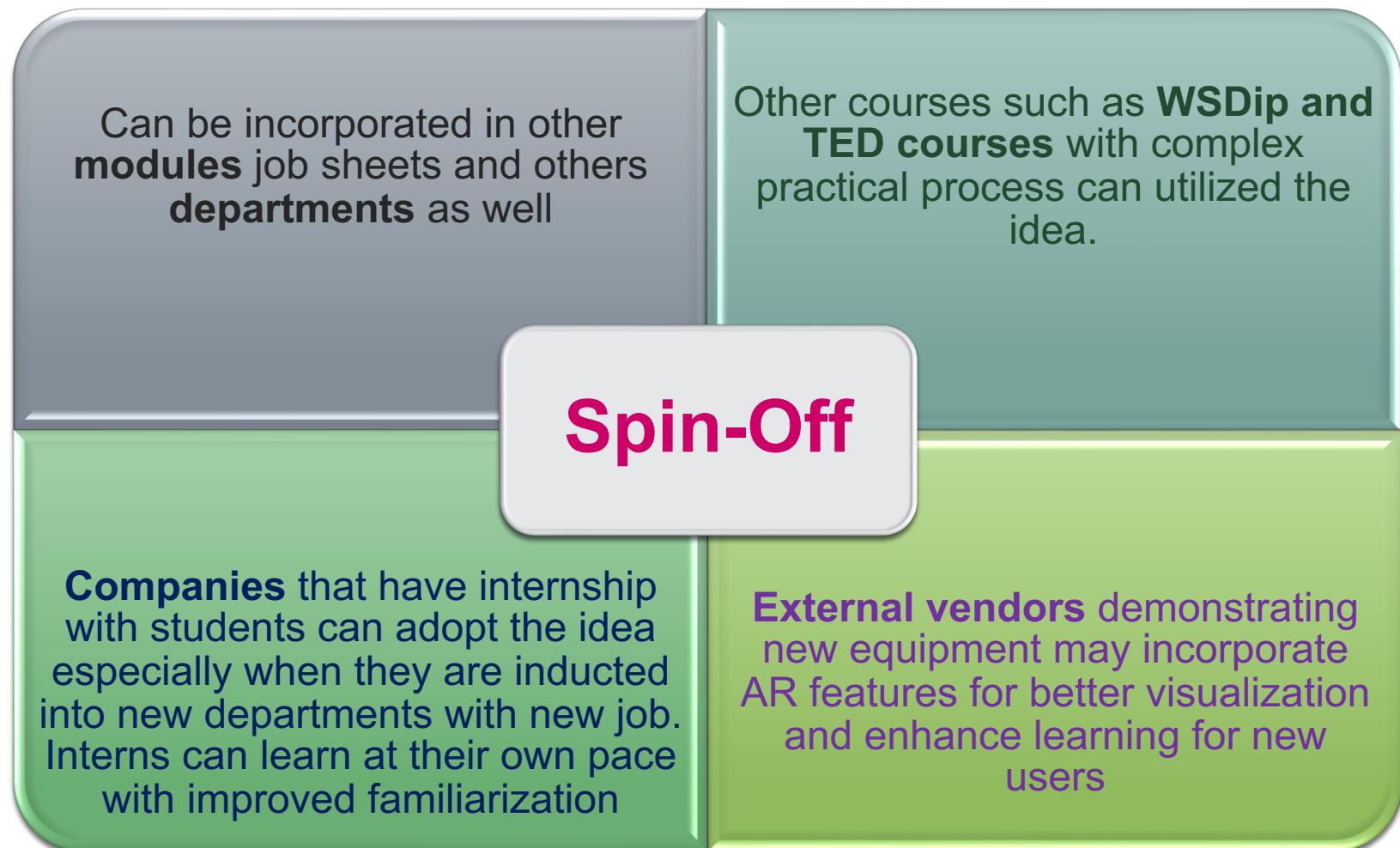


## 4C. DESCRIBE THE OVERALL IMPACT OF THE PROJECT ACHIEVEMENTS TO ORGANIZATION AND STAKEHOLDERS

### Impact to organization

- **Add value to organisation's mission and objective**
  - Students feedback that they felt more motivated, easier to acquire knowledge and understanding with the new features added to the practical task. This is in line with ITE Mission Create Opportunities for Students and Adult Learners to Acquire Skills, Knowledge and Values for Employability and Lifelong Learning
- **Cost effectiveness**
  - Management and teaching staff complimented that the implementation was able to carried out at low cost and effective for students to achieve learning outcomes. It contributed cost savings for the organization.
- **Recognition and professionalism**
  - Enhanced training increased the students competency and add value towards employability. Students will be proficient in their trade areas. The organization will benefit for the recognition producing quality workers in the long run.

## 4D. DESCRIBE HOW THE RESULTS OF THE PROJECT HAVE CREATED SPIN-OFF FOR OTHER OPPORTUNITIES AND / OR DISPLAY CONTINUAL IMPROVEMENT EFFORTS.



## AEROLUTION DYNAMICS

### 5. TEAM MANAGEMENT

## 5A. EXPLAIN HOW THE TEAM MEMBERS WERE SELECTED AND HOW THEY WERE INVOLVED THROUGHOUT THE PROJECT

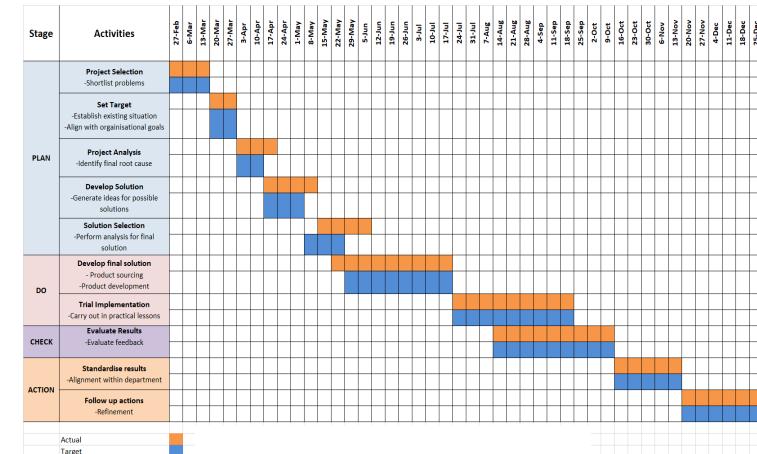
Photo	Team Members (Designation)	Selection Criteria for Member	Involvement in Project
	Thian Eng Poh (Course Manager)	<ul style="list-style-type: none"> <li>Has led and facilitated staff project team that has won many awards since the establishment of this TEA team</li> </ul>	<p>Team Manager</p> <ul style="list-style-type: none"> <li>Provided advice during project implementation and set objectives for the team to achieve</li> <li>Engaged representatives from the senior management in our project solution</li> <li>Endorsed project budget and purchases</li> </ul>
	Elvin R. (Section Head)	<ul style="list-style-type: none"> <li>A wealth of experience leading the team to win Gold award at Team Excellence Assessment annually</li> <li>A strong, supportive motivator cum facilitator to teaching staff in the Aerospace Technology Department</li> </ul>	<p>Team facilitator</p> <ul style="list-style-type: none"> <li>Provided guidance and post queries for the team to be constantly putting on the thinking hat to seek simple and yet innovative solutions to approach problems that all teaching staff face in the department</li> <li>Helped to seek budget approval</li> <li>Guided and reviewed project report</li> </ul>
	Ronald Lim (Lecturer)	<ul style="list-style-type: none"> <li>Possess a wide range of experience on airframe maintenance and repair</li> <li>In depth knowledge of sheet metal (riveting, drilling and others) work</li> <li>Has a good command of language for presentation and report writing</li> </ul>	<p>Team Leader</p> <ul style="list-style-type: none"> <li>Coordinated and assigned tasking to team members to contribute</li> <li>Led team in using tools to perform analysis and brainstorming</li> <li>Prepare the final project report and presentation</li> </ul>

## 5A. EXPLAIN HOW THE TEAM MEMBERS WERE SELECTED AND HOW THEY WERE INVOLVED THROUGHOUT THE PROJECT

Photo	Team Members (Designation)	Selection Criteria for Member	Involvement in Project
	Ng Tat Hwee (Lecturer)	<ul style="list-style-type: none"> <li>Possess a wide range of experience on aircraft maintenance</li> <li>In depth knowledge of composite repair work</li> <li>Experienced with project management in previous workplace</li> </ul>	<p>Project leader</p> <ul style="list-style-type: none"> <li>Follow up on the tasks delegated to members, reviewed data collected, schedule project, identified and verified root causes, final project writing and presentation.</li> </ul>
	James Ong (Senior Lecturer)	<ul style="list-style-type: none"> <li>Possess a wide range of Licensed Aircraft Engineer experience on airframe and engine maintenance</li> <li>Has in depth engineering and analytical skillset</li> <li>Has a good command of language for presentation and report writing</li> </ul>	<p>Member</p> <ul style="list-style-type: none"> <li>Conducted surveys, implement and developed solutions for the project</li> <li>Data collection, schedule project identified and verified root causes, report writing and presentation</li> </ul>
	Kelvin Koh (Lecturer)	<ul style="list-style-type: none"> <li>Possess a wide range of experience on aircraft engine maintenance and repair</li> <li>In depth knowledge of aviation component repair processes</li> <li>Has in depth engineering and analytical skillset</li> </ul>	<p>Member</p> <ul style="list-style-type: none"> <li>Conducted surveys, implement and developed solutions for the project</li> <li>Data collection, schedule project identified and verified root causes, report writing and presentation</li> </ul>

## 5B. EXPLAIN HOW THE TEAM MANAGED ITS PERFORMANCE TO ENSURE IT WAS EFFECTIVE AS A TEAM

- Utilization of a Gantt Chart to effectively plan, schedule and manage for ensuring completion of project on time.
- As a result of having a common goal in eagerness to improve teaching effectiveness and betterment towards student's learning outcome, we are motivated to perform effectively as a team to complete this project.
- Supportive management team in providing guidance and advice on funds approval.



## 5B. EXPLAIN HOW THE TEAM MANAGED ITS PERFORMANCE TO ENSURE IT WAS EFFECTIVE AS A TEAM

- **Team Cohesiveness:** Participated in team bonding activities such as hydroponics vegetables planting – germination to harvesting and Airbus A320 Simulator Flying as well as team bonding lunch.
- **Capability Development:** Researching for innovative ideas and solutions in education training and cross sharing of experiences for team learning.



# AEROLUTION DYNAMICS

