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THE READINESS OF BANTING POLYTECHNIC'S AIRCRAFT MAINTENANCE STUDENTS FOR ONLINE COMPOSITE REPAIR TEACHING AND LEARNING

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Abstract

The swift progression of technology and the growing dependence on digital platforms in education have required the evolution of traditional teaching techniques into more adaptable, online-based options. Aircraft Maintenance Engineering is a field that necessitates extensive practical experience, especially in the repair of composite materials, an essential competency for aviation students. This study examines the readiness of students at Banting Polytechnic Selangor, Malaysia for the shift to online learning, with particular emphasis on composite repair education, a crucial component of their Aircraft Maintenance Engineering curriculum. The main goal is to evaluate students' preparedness and perspectives regarding the transition from conventional in-person education to online formats, while pinpointing critical aspects that affect their adaptability. This study aims to investigate the degree to which contemporary digital learning tools and tactics correspond with the actual requirements of composite repair training and how educators might enhance online instruction for technical courses. A mixed-methodologies strategy was employed, combining qualitative and quantitative data collection methods. A standardized survey was administered to Aircraft Maintenance Engineering students at Banting Polytechnic Selangor, Malaysia, aimed at assessing their technical preparedness, motivation, self-regulation skills, and proficiency using digital learning tools. Furthermore, interviews were conducted with educators and industry representatives to provide insights into the opportunities and obstacles associated with online composite repair training. The gathered data were examined to discern trends and themes concerning

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students' perspectives of online learning, their access to essential technologies, and their confidence in developing practical abilities via virtual platforms. This study investigates the influence of institutional support on online technical education and how policy modifications may enhance student engagement and skill development. The study's findings reveal that although the majority of students have a basic comprehension of online learning tools and platforms, they encounter considerable difficulties in mastering specialized skills such as composite repair in a completely online environment. Identified key issues encompass insufficient hands-on practice chances, limited practical simulation tools, and disparate levels of student self-motivation. While students typically value the flexibility and accessibility of online education, some individuals voiced apprehensions over the efficacy of distant instruction in technical disciplines necessitating close engagement with materials and equipment. Moreover, differences in internet access and digital skills among students have resulted in inconsistencies in learning results, hence exacerbating the transition to online education. This research underscores the necessity for educational institutions, including Banting Polytechnic Selangor, to confront these problems by incorporating sophisticated digital technologies such as virtual reality (VR) and augmented reality (AR) to replicate real-world composite repair scenarios. Moreover, it underscores the necessity of improving students' self-regulation abilities and offering adequate technological assistance to facilitate effective interaction with educational resources. It is essential to create hybrid learning models that integrate online theoretical training with in-person practical sessions to enhance skill acquisition. The study finds that although online learning offers considerable advantages in Aircraft Maintenance Engineering education, a customized strategy is crucial for effectively equipping students with specialized skills such as composite repair in a virtual setting. This research offers insights that can assist educators and policymakers in enhancing the delivery of technical education within the changing digital learning environment and aid in the formulation of more effective remote training methods for practical

Keywords: Digital Education, Aviation Maintenance Engineering, Composite Material Repair, Student Readiness, Virtual İnstructions.

INTRODUCTION

The integration of technology in education has significantly transformed modern learning environments, providing enhanced flexibility, accessibility, and enriched learning experiences. Digital tools and educational resources have improved classroom dynamics, making the teaching-learning process more engaging and effective. (Haleem, A et.al. 2022).The COVID-19 pandemic accelerated the shift towards online learning, compelling many educational institutions to adopt digital platforms for both theoretical and practical training. This rapid transition highlighted several challenges, particularly in fields requiring hands-on, skill-based training. In technical and vocational education, the practical component is integral, and the move to online courses has posed difficulties in delivering essential hands-on experience. (Khasawneh, M.A.S. 2024). Aircraft Maintenance Engineering (AME) is one such field where students must acquire specialized practical skills to repair and maintain aircraft components, including composite materials. Composite materials are crucial in modern aircraft construction due to their strength, lightweight properties, and durability. Mastering the repair of these materials is vital for aviation safety and maintenance efficiency. Traditional training methods have predominantly been hands-on, conducted in physical workshops to provide the necessary tactile experience. This reliance on direct interaction with materials and tools raises concerns about the effectiveness of teaching such skills through online platforms.

Banting Polytechnic, a notable educational institution in Malaysia, offers a Diploma in Aircraft Maintenance Engineering. This program is designed to produce graduates with the knowledge and

competent skills required in the field of aircraft maintenance engineering. As part of its efforts to modernize teaching methods and meet evolving student needs, PBS has incorporated online learning into its curriculum, including for complex technical subjects such as composite repair. While online learning offers benefits like flexible scheduling and resource accessibility, it also presents significant challenges for AME students who need to acquire practical, hands-on skills in a digital environment.

This shift to online learning raises important questions about the readiness of AME students at PBS to effectively engage with and succeed in online training, particularly in the area of composite repair. Key considerations include students' technological preparedness, motivation, self-regulation skills, and confidence in using digital tools for practical learning. Additionally, the adequacy of online learning platforms and tools in meeting the practical needs of teaching complex technical skills is a critical concern.

The goal of this research is to evaluate the readiness of Aircraft Maintenance Engineering students at Banting Polytechnic in learning composite repair online. By assessing factors such as students' technological preparedness, motivation, self-regulation, and confidence in using digital tools for practical learning, this study aims to provide a comprehensive understanding of the challenges and opportunities associated with online education in this technical field. Furthermore, the study will explore how well existing online platforms and learning resources align with the requirements of composite repair training and what improvements can be made to better support students' learning experiences.

Given the practical and safety-critical nature of composite repair in aviation, the findings from this study will have significant implications for the future of online technical education. Insights gained from this research could inform strategies to enhance the delivery of AME courses, ensuring that students are not only prepared with theoretical knowledge but also able to acquire the practical skills necessary for success in the aviation industry. Moreover, this study will contribute to the broader conversation about the effectiveness of online learning in technical education, providing valuable lessons for other institutions facing similar challenges in teaching hands-on skills through digital platforms.

1. PROBLEM STATEMENT

Lack of Coverage in Module 6 Materials & Hardware Syllabus for the Topic of Composite Repair

Currently, Banting Polytechnic's Module 6 syllabus under the Materials & Hardware course, the coverage of composite materials is insufficient. While the syllabus introduces composite materials, it mainly focuses on basic theoretical concepts, with limited emphasis on the practical skills needed for composite repair, which is critical in the field of Aircraft Maintenance Engineering (AME). Composite repair is an advanced skillset that involves complex processes such as damage assessment, material preparation, lay-up procedures, curing techniques, and final inspections. Unfortunately, these practical skills are largely absent from the curriculum, leaving students without the hands-on experience required to competently engage with composite-based materials used in modern aircraft and other high-tech industries, such as automotive and wind energy.

The lack of focus on practical composite repair skills means that students are not exposed to the essential tools, techniques, and procedures used in the repair and maintenance of composite materials. Without this exposure, students graduate with a limited understanding of the real-world applications of their theoretical knowledge, which undermines their ability to meet industry standards and reduces their employability. As composite materials become increasingly critical in aviation for their light weight and strength, students without the necessary skills will find themselves at a significant disadvantage, unable to compete in the job market for roles that demand expertise in composite repair.

Limited Resources for Practical Training in Composite Repair at Banting Polytechnic

Another significant barrier to effective composite repair training at Banting Polytechnic is the institution's lack of adequate resources to provide the hands-on practical training necessary for mastering composite repair techniques. Unlike theoretical subjects, which can be taught through textbooks and online lectures, composite repair requires specialized equipment, materials, and facilities that are simply not available at the institution. The training involves numerous processes, such as material preparation, resin mixing, lay-up techniques, curing, and final inspection. To properly teach these skills, students need access to specialized tools, including vacuum systems, cleanrooms, curing ovens, and diagnostic equipment, all of which are essential for the accurate repair of composite materials.

Unfortunately, the current resource limitations of the institution prevent students from gaining direct exposure to these tools and techniques. Due to these constraints, students are unable to carry out essential tasks that form the backbone of composite repair. This results in a significant gap in practical training—students leave the institution with theoretical knowledge of composite repair, but without the hands-on experience necessary to perform these tasks in the workplace. As a result, they are inadequately prepared for the real-world demands of the aviation industry and may struggle to find employment in roles that require expertise in composite materials.

Given the significant challenges in providing hands-on practical training, it is crucial to explore alternative solutions. Online learning interfaces and virtual training environments could offer a promising avenue for addressing this gap. By leveraging technologies such as virtual reality (VR), augmented reality (AR), and interactive simulations, institutions can create immersive learning experiences that mimic real-world composite repair tasks. These digital tools can complement existing theoretical coursework and provide students with valuable practice in a controlled and scalable manner, even without access to physical facilities and equipment. The development of such online learning tools could help overcome resource limitations and better prepare students for the demands of the industry.

In summary, the lack of coverage in the curriculum for composite repair and the insufficient resources for practical training present significant challenges for students at Banting Polytechnic. These issues undermine students' ability to develop the practical skills required for success in the aviation industry, particularly in the area of composite repair. There is a critical need for both curricular reform and innovative teaching tools, such as online learning platforms and virtual simulations, to bridge the gap between theoretical knowledge and practical application in this specialized field. Addressing these issues is vital to ensuring that students are fully prepared for the demands of modern aviation maintenance and related industries.

2. CONCEPTUAL FRAMEWORK

The proposed study aims to address the gaps in the current Module 6 syllabus under the Materials & Hardware course at Banting Polytechnic, specifically focusing on the insufficient coverage and practical training related to composite repair. Composite materials are increasingly used in the aviation industry due to their high strength-to-weight ratio, corrosion resistance, and design flexibility. However, the current curriculum fails to equip students with the essential hands-on skills required to repair these materials effectively. To bridge this gap, a conceptual framework has been developed to illustrate the key variables affecting student readiness and employability in this domain which is shown in Figure 1.

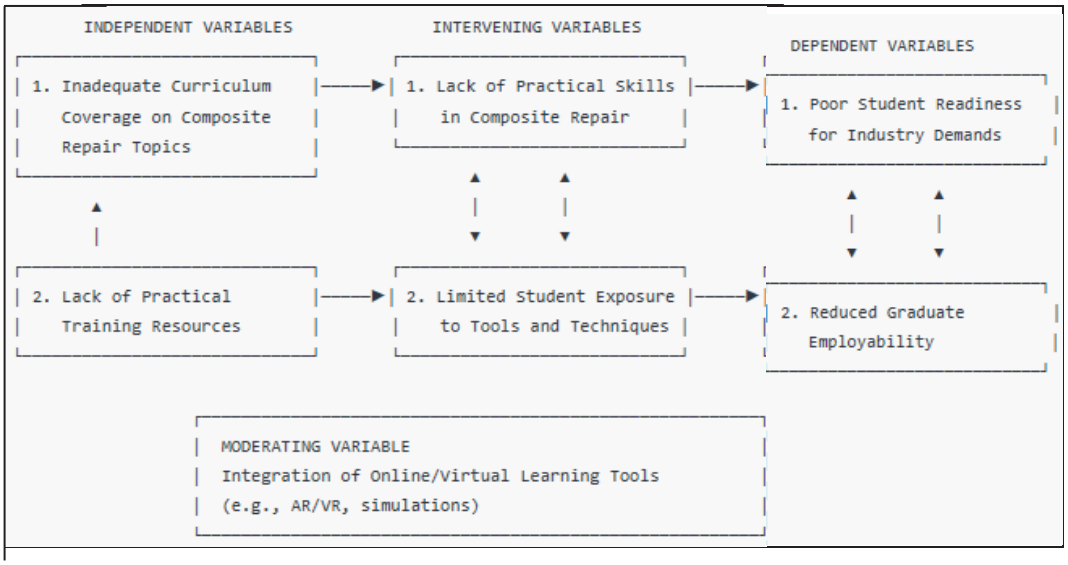

Figure 1. Conceptual framework on the readiness for online composite repair teaching and learning

Elaboration of the Conceptual Framework (Figure 1)

2.1. Independent Variables

These are the root causes of the problem:

- **Inadequate Curriculum Coverage on Composite Repair Topics**

o The current Module 6 syllabus offers only basic theoretical knowledge of composite materials without emphasizing **hands-on composite repair procedures** (e.g., lay-up, curing, inspection).

- **Lack of Practical Training Resources**

o Banting Polytechnic lacks **specialized equipment** (like curing ovens, vacuum bags, and clean rooms) needed for students to gain real-life experience in composite repair.

2.2. Intervening Variables

These are the direct consequences of the independent variables that lead to the core issue:

- **Lack of Practical Skills in Composite Repair**

o Students are unable to practice real-life composite repair processes, leading to a **skills gap** between academic knowledge and industry requirements.

- **Limited Student Exposure to Tools and Techniques**

o Without access to proper training environments, students miss out on **tactile learning** and the ability to **work with industry-standard tools**.

2.3. Dependent Variables

These are the observed outcomes or effects:

- **Poor Student Readiness for Industry Demands**

o Students graduate with a **theoretical understanding only**, making them less confident and effective in professional repair settings.

- **Reduced Graduate Employability**

o The industry requires composite repair skills, and students without practical experience are **less competitive** in the job market, especially in aviation and related fields.

2.4. Moderating Variable

This variable influences the strength or direction of the relationship between the independent and dependent variables:

- **Integration of Online/Virtual Learning Tools**

o The adoption of **AR/VR, interactive simulations, and digital labs** can mitigate the effects of limited resources and curriculum gaps by offering **virtual practice environments** that replicate real-world repair scenarios.

This conceptual framework provides a structured lens through which the issues surrounding composite repair training can be analyzed and addressed. By identifying the critical gaps in the curriculum and training infrastructure, and proposing the strategic use of online learning technologies, this study outlines a pathway toward modernizing technical education at Banting Polytechnic. Ultimately, the framework seeks to enhance student preparedness and ensure graduates are competitive and competent in the evolving aerospace and aviation industries.

3. RESEARCH METHODOLOGY

To understand the readiness of students at Banting Polytechnic for learning composite repair online, an online survey was administered to assess various aspects of students' preferences, familiarity with digital learning tools, and confidence in mastering composite repair techniques through virtual platforms. The survey was conducted using Google Forms, a versatile and efficient tool that enables the creation of surveys with diverse question formats, including multiple-choice, open-ended, and Likert scale questions. Google Forms simplifies the process of distributing and collecting responses, offering the added benefit of automatic data collection, which is subsequently organized into Google Sheets. This allows for easy data analysis, particularly through the use of visual aids like charts and graphs, which helped in the analysis of the survey results.

The survey was administered to a sample of 24 participants from Banting Polytechnic. These participants were primarily students enrolled in the Aircraft Maintenance Engineering (AME) program, with representation from multiple semesters. A small portion of the responses also came from lecturers and Training Instructors/LAEs, who offered their professional insights regarding the practical aspects of teaching composite repair and the potential benefits of online learning tools. The data is shown in Figure 2.

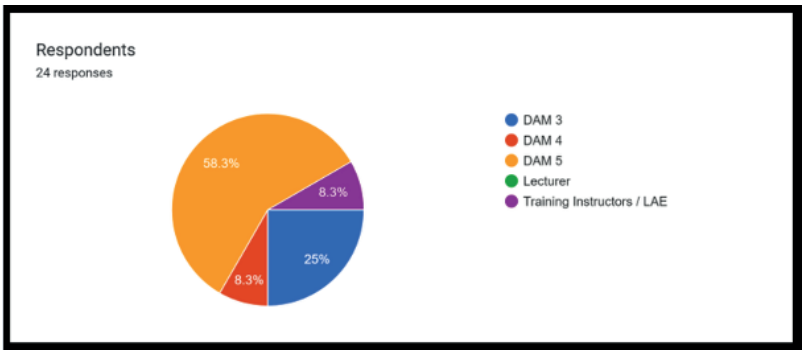

Figure 2. Respondents

It is revealed that 50% of respondents participated in online learning sessions or modules once a week, while 29.2% engage twice a week. These results suggest that many students are already accustomed to online learning, demonstrating that there is a strong base of potential users who could benefit from an online learning platform for composite repair. Figure 3 clearly indicates the above explanation.

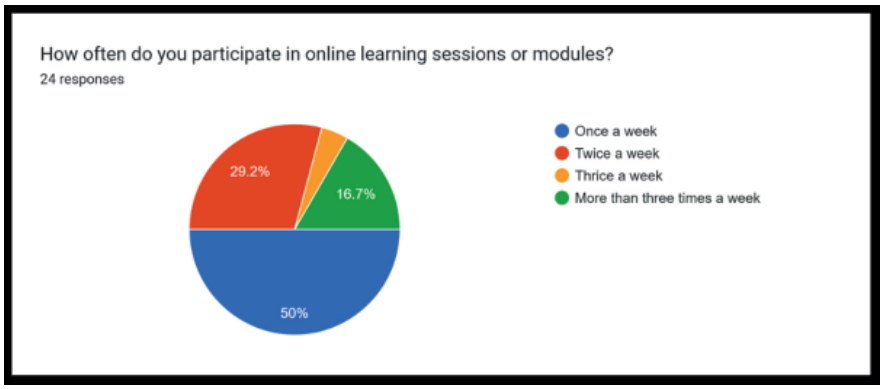

Figure 3. Online learning session

On the question on device preferences, it is shown in Figure 4 about the devices where the participants who are the students of Aircraft Maintenance Engineering, use to access online learning content. Laptops emerged as the most preferred choice (79.2%), followed by smartphones (75%), suggesting that students value flexibility and portability when engaging with digital learning materials. This insight is crucial when designing an online platform, as it suggests that content should be optimized for mobile devices and laptops to maximize accessibility.

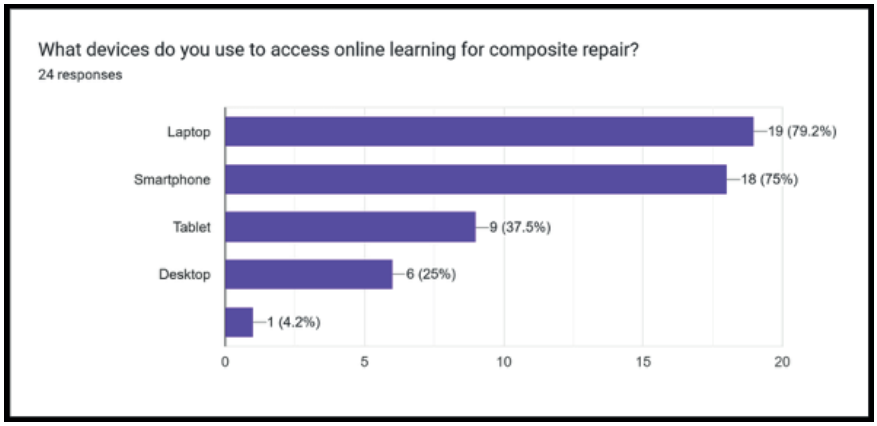

Figure 4. Devices used

Moving on, the survey also touched on how students felt about the clarity of online resources for composite repair. While a majority (66.6%) found the resources clear, 25% of respondents strongly disagreed with the clarity of online content. This indicates that there is a need for improvement in how online materials are presented, as some students may struggle to fully comprehend the content. It is clearly indicated in Figure 5 below.

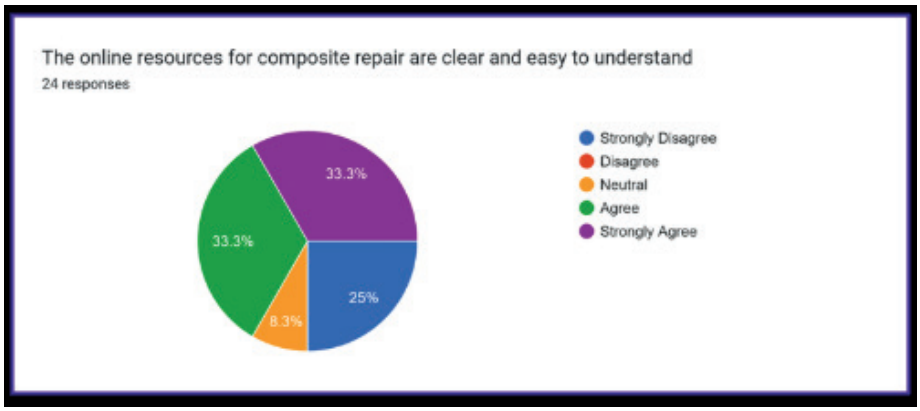

Figure 5. The understanding of Online Resources

The pie chart in Figure 6 presents the results of a survey question: "The online learning platform is easy to navigate"**,** it shows that 45.8% (strongly agreed) of the respondents felt that the platform is easy. This indicates a high level of satisfaction and ease of use among nearly half the participants. 25% of the respondents showed further positive sentiment in navigating the online platform at ease. 12.5% & another 12.5% of respondents disagreed and strongly disagreed that the online learning platform is easy to navigate and showed significant dissatisfaction and do face some challenges in using the platform. Whereas another 12.5% stayed neutral, suggesting indifference or uncertainty about the platform's usability. The majority of users (over 70%) find the online learning platform easy to navigate, suggesting it is generally well-designed and user-friendly. However, a combined 25% either disagree or strongly disagree, indicating there is room for improvement to ensure accessibility for all users.

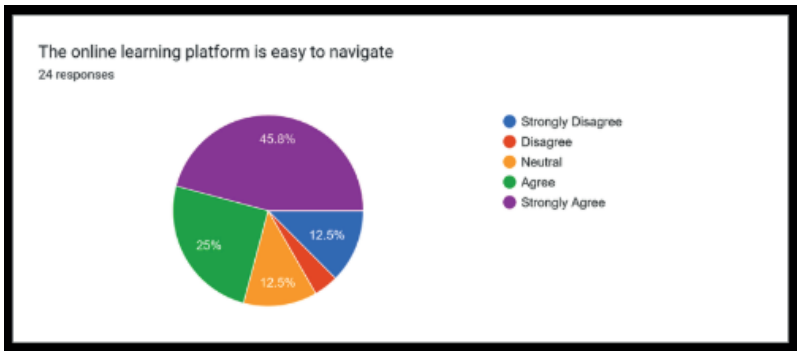

Figure 6. Online platform easy to navigate

The pie chart in Figure 7 illustrates responses to the statement: "I feel confident in learning composite repair through online modules"**.** Half of the respondents (50%) strongly agree, showing a high level of confidence in learning composite repair through the online modules. This indicates strong satisfaction and effectiveness of the learning materials for many users. 25% which is a quarter of the participants agree, reinforcing the positive perception of the online modules. This clearly shows that combined with "Strongly Agree," a total of 75% of respondents feel confident in their learning. 12.5% which is a small portion of respondents feel neutral, possibly indicating uncertainty or the need for more clarity/

support. 12.5% of the respondents disagreed which reflects a minor share of users who do not feel confident using the modules, suggesting a gap in understanding or engagement. The overall sentiment is very positive, with three-quarter (75%) of respondents expressing confidence in learning composite repair through online modules. The minimal neutral and negative responses suggest the online content is generally effective, though a small subset may benefit from additional support or resources to boost their confidence.

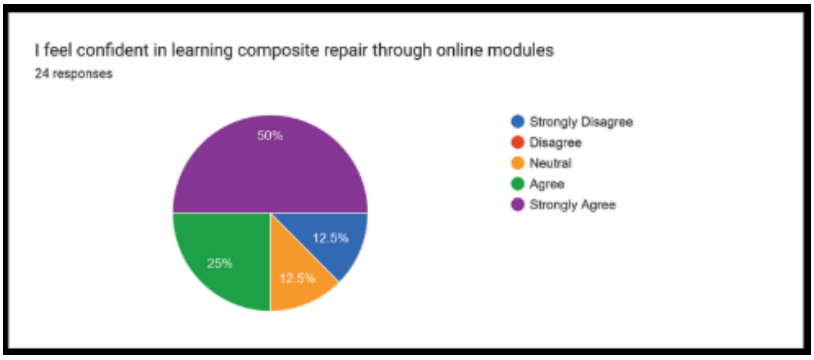

Figure 7. Confidence in learning composite repair through online modules

The pie chart in Figure 8, shows responses to the statement: "The online learning environment is suitable for practical learning in composite repair"**.** 45.8% which is nearly half of the respondents strongly believe that the online environment is suitable for practical learning in composite repair. This indicates a strong level of trust and approval in the online format for hands-on subjects. One-quarter or 25% of the participants agree, reinforcing the positive sentiment which together with "Strongly Agree," a solid 70.8% of respondents find the online environment suitable for practical learning. A moderate portion of respondents **(**16.7%) remain neutral, possibly indicating they are uncertain about the effectiveness or may not have experienced enough practical application to form an opinion. A small portion of the respondents (12.5%) strongly disagreed, highlighting a minority who may have concerns about the practicality of online learning in this context. The majority of respondents **(**over 70%**)** believe that the online environment is suitable for learning practical composite repair skills. However, the presence of 16.7% neutral and 12.5% strongly disagreeing indicates that there are still some doubts or limitations perceived by a minority, suggesting that while the system works well for most, enhancements may be needed to address the concerns of a few.

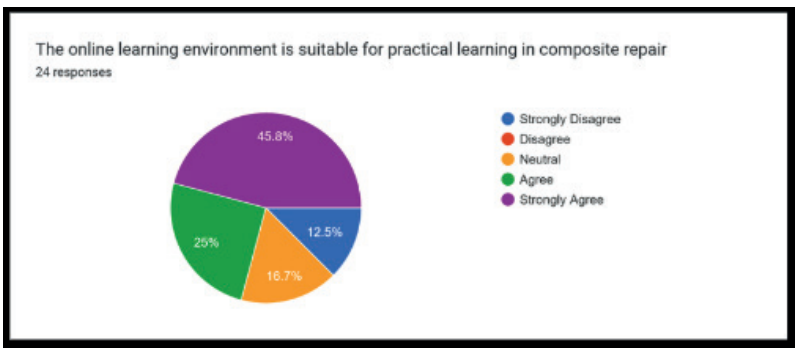

Figure 8. Suitability of the online learning environment for practical learning in composite repair

The bar chart, Figure 9 presents responses to the question on "How does online composite repair training support continuous learning on skills development for aviation students in Banting Polytechnic?". It is

based on feedback that includes multiple options that respondents could select. The analysis is shown below:

1. **Provides on-demand resources for skill refreshment anytime (100%)**

o All 5 respondents (100%) selected this option.

o This highlights the most valued feature of the online training—flexibility and access to learning materials at any time.

2. **Offers step-by-step modules to build and reinforce repair techniques (60%)**

o 3 out of 5 respondents (60%) appreciated the structured approach to learning, indicating the importance of guided, instructional content.

3. **Uses quizzes and assessments to track progress and mastery (40%)**

o 2 respondents (40%) noted that assessments help them measure understanding and retention, suggesting this is a beneficial but slightly less emphasized component.

4. **Keeps students updated on the latest industry practices and standards (40%)**

o Also selected by 2 respondents (40%), this shows some recognition of the training's relevance to current industry trends, though it's not the top priority for all.

In summary, the on-demand access to resources is the most universally appreciated aspect of the training, followed by step-by-step learning modules. While quizzes and industry updates are valued, they appear to be secondary to flexibility and clear instructional support. This feedback can guide future improvements by enhancing interactivity and real-time updates, while maintaining strong foundational content.

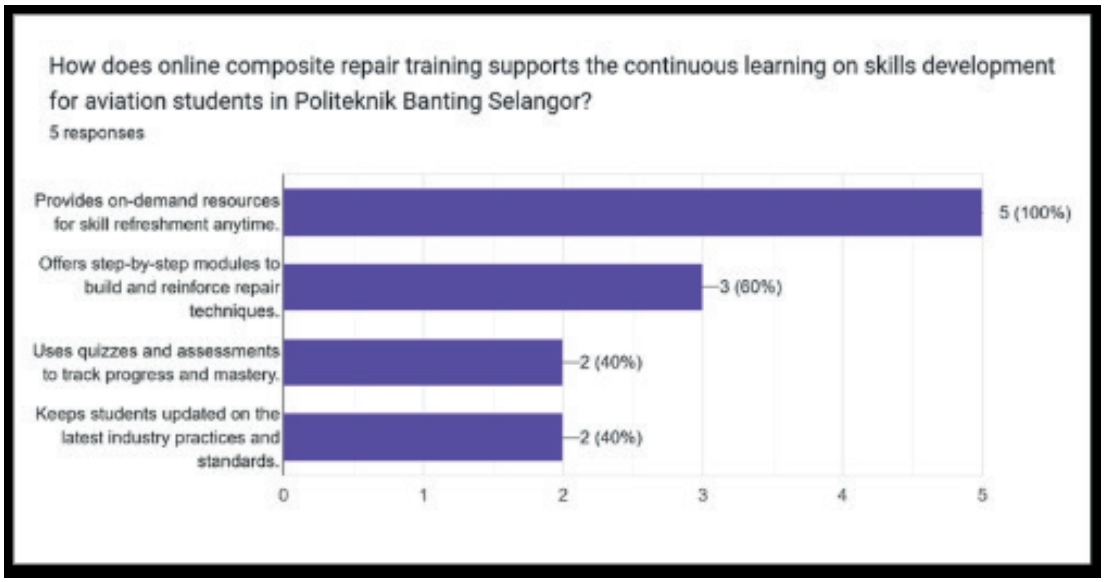

Figure 9: Online composite repair training support continuous learning on skills development for aviation students

The bar chart in Figure 10 shows responses to "How does online composite repair education improve practical understanding through interactive tools and simulations in Banting Polytechnic Aircraft

Maintenance Students?". The comprehensive analysis is shown below:

1. **3D models for better material understanding (80%)**

o Selected by 4 out of 5 respondents, this is the most favoured feature.

o This shows that visual, spatial learning tools significantly help students grasp complex composite repair concepts.

2. **Hands-on simulations for virtual practice (60%)**

o Chosen by 3 respondents, this highlights the importance of simulated practice in building hands-on skills in a digital environment.

3. **Anytime access for flexible learning (60%)**

o Also selected by 3 participants, this reinforces the high value placed on flexible, self-paced learning formats.

4. **Real-time feedback for skill improvement (40%)**

o Chosen by 2 respondents, this suggests that while feedback is appreciated, it may not yet be as central or widely experienced as other features.

In summary, the bar chart highlights that 3D models and virtual simulations are key in enhancing students' practical understanding of composite repair. The ability to **access** content anytime is also a strong contributor to the learning experience. Although real-time feedback is valued, it may benefit from further development or emphasis to support skill refinement. These insights suggest that combining interactive, flexible, and visually-rich content is effective in training aircraft maintenance students online.

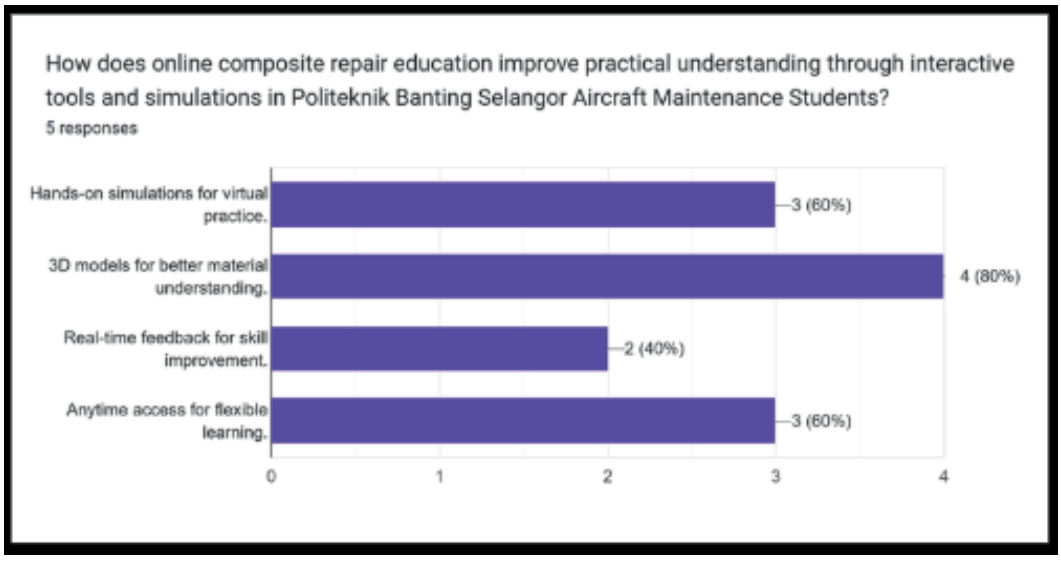

Figure 10. Online composite repair education improve practical understanding through interactive tools and simulations (items)

The bar chart in Figure 11 displays the responses to the statement "How does online composite repair education improve practical understanding through interactive tools and simulations in Banting Polytechnic Aircraft Maintenance students?"**.** The analysis is shown as below"

- **Score 5 (Strongly Agree): 18 respondents (75%)**

o The overwhelming majority strongly agree that online composite repair education significantly improves practical understanding through interactive tools and simulations.

o This highlights high satisfaction with the current digital educational approach.

- **Score 4 (Agree): 5 respondents (20.8%)**

o A further portion agrees with the statement, reinforcing the overall positive perception.

- **Score 3 (Neutral): 1 respondent (4.2%)**

o Only one participant responded neutrally, suggesting a very small degree of uncertainty or lack of experience with the tools.

- **Scores 1 and 2 (Disagree/Strongly Disagree): 0 respondents (0%)**

o No participants expressed disagreement, indicating no negative perception regarding the effectiveness of the interactive features.

To summarize, a strong 95.8% (23 out of 24 respondents) either agreed or strongly agreed that interactive tools and simulations in online composite repair education enhance practical understanding**.** The complete absence of disagreement, coupled with a high rate of strong agreement, suggests that the program is highly effective and well-received among the aircraft maintenance students at Banting Polytechnic.

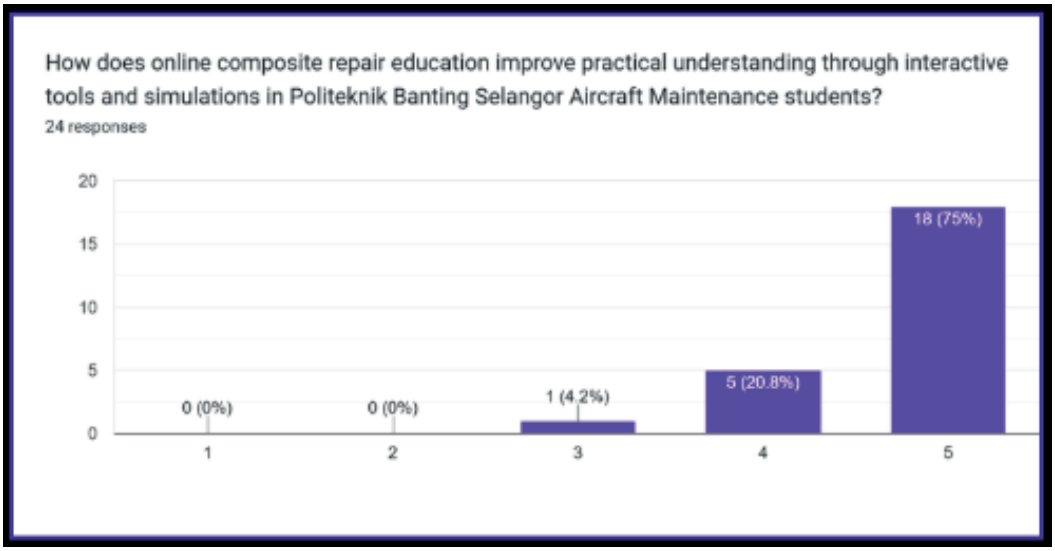

Figure 11. Online composite repair education improve practical understanding through interactive

The respondents also shared their invaluable comments/suggestion/opinion on how to improve the online composite repair education to be delivered among the students of Aircraft Maintenance Engineering to be more interactive. The analysis of the picked data is shown below and also in Figure 12:

• **83.3% (20 respondents)** suggested adding more interactive games to enhance engagement in composite repair education.

- **58.3% (14 respondents)** recommended including additional notes to support and reinforce learning.
- **50% (12 respondents)** proposed creating a dedicated application for improved accessibility and user experience.
- **4.2% (1 respondent)** mentioned the possibility of using virtual reality (VR) for a more immersive learning environment.
- **4.2% (1 respondent)** gave positive feedback, stating it is a good project.

The overall insight provides **t**he feedback which strongly highlights a demand for:

- Increased interactivity
- More supplementary learning resources
- Introduction of immersive and innovative tools to enhance the overall online learning experience.

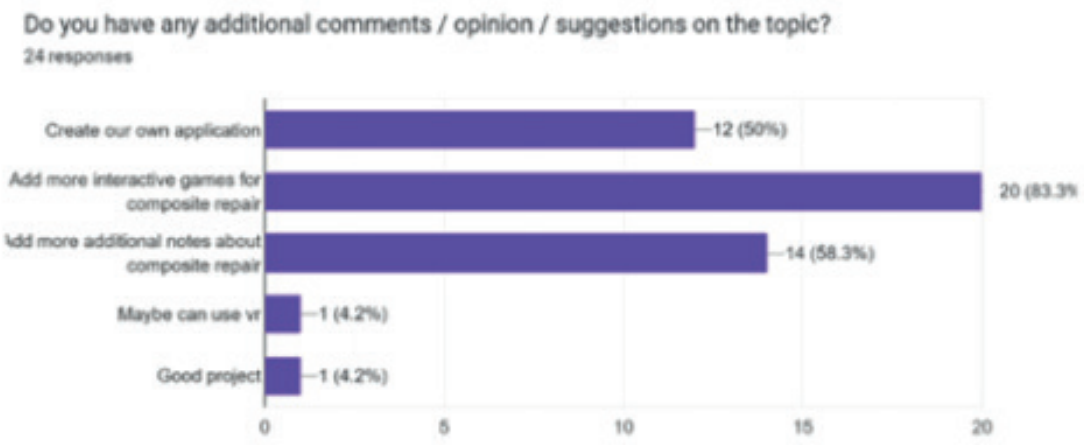

Figure 12. Additional comments/suggestion/opinion on the topic

5. DISCUSSION AND CONCLUSION

Based on the survey responses from Banting Polytechnic students, several key recommendations emerge to improve the effectiveness and appeal of online learning for composite repair. These recommendations reflect students' desire for more engaging, accessible, and practical learning tools that align with industry standards and support both theoretical understanding and hands-on skills development.

5.1. Enhancing Interactivity in Learning Modules

A strong recommendation from students (83.3%) is to increase the interactivity of learning modules through gamified elements and virtual simulations. Gamification—through quizzes, digital badges, challenges, and game-based tasks—makes learning more engaging and encourages active participation. Interactive tools such as drag-and-drop components, scenario-based decision-making, or digital repair simulations can replicate hands-on tasks in a risk-free, virtual space.

In technical disciplines like composite repair, interactive simulations allow students to visualize and practice complex procedures such as fiber layup, curing, or damage assessment. These tools improve

concept retention and give students a sense of accomplishment that can motivate continued learning. Furthermore, gamified assessments with immediate feedback can help identify knowledge gaps and reinforce key learning points.

5.2. Providing Supplementary Resources

Over half of the respondents (58.3%) expressed the need for additional educational materials to supplement online modules. These resources should be designed to accommodate different learning styles—text-based summaries for readers, video tutorials for visual learners, and infographics for quick reference. Suggested materials include step-by-step guides, real-world examples, glossaries of terms, and downloadable notes.

These add-ons would help clarify complex repair techniques and allow students to reinforce classroom learning at their own pace. The inclusion of case studies and common repair scenarios could further bridge the gap between theory and real-world application.

5.3. Developing a Dedicated Mobile Application

With 50% of students recommending a mobile app, it's clear that mobile accessibility is key. A dedicated app for composite repair learning would allow students to study on-the-go and access content across devices, making it easier to incorporate learning into their daily routines. The app could feature bite-sized lessons, short videos, quizzes, and practice tasks optimized for mobile viewing.

An app would also support offline access, benefiting students with limited or inconsistent internet connectivity. Push notifications could be used to keep students on track with reminders, deadlines, and updates. This level of flexibility and convenience aligns with modern educational expectations and supports continuous learning.

5.4. Integrating VR and AR Technologies

Though only a small percentage (4.2%) mentioned VR and AR, these emerging technologies offer transformative potential for technical education. Virtual Reality (VR) can simulate a realistic repair environment where students interact with digital tools and materials, helping them understand spatial arrangements and step-by-step procedures. Augmented Reality (AR), on the other hand, can overlay repair instructions onto physical components, guiding students during in-person practice.

For example, AR glasses could provide real-time annotations or highlight safety procedures while students work with actual composite parts. These technologies may require upfront investment, but they offer scalable, immersive learning solutions that can replicate real-world complexity without physical materials—making them highly valuable in resource-limited settings.

5.5. Improving Feedback and Assessment Mechanisms

To ensure effective learning and skill development, feedback must be timely and specific. Students indicated a desire for more immediate feedback on their performance during simulations or quizzes. Automated feedback can guide students through their mistakes and reinforce learning outcomes. Detailed feedback could include corrective suggestions, explanations, or references to review materials.

Additionally, integrating short assessments after each module would allow students to self-check their understanding before moving on. Peer review activities, mentor assessments, or collaborative feedback sessions could also enrich learning by offering diverse perspectives and deeper insight into student performance.

5.6. Incorporating Industry Updates and Case Studies

To make online learning more relevant and aligned with professional practice, students (40%) recommended the inclusion of current industry trends and real-world case studies. Incorporating updates about new materials, repair technologies, regulations, and maintenance protocols will help students connect classroom learning with the dynamic landscape of aviation maintenance.

Case studies drawn from the aviation or automotive sectors can showcase how theoretical knowledge is applied in real scenarios. For example, reviewing a real incident involving composite damage and its repair process could provide invaluable insight into practical decision-making. Interviews with industry experts or virtual site tours of repair facilities would further expose students to the working environment and expectations.

5.7. Ongoing Platform Evaluation and Improvement

To ensure the online learning platform remains effective and aligned with student and industry needs, continuous improvement is essential. Feedback from students, instructors, and industry partners should be regularly collected through surveys, analytics, and performance tracking. These insights can help identify technical issues, content gaps, or outdated practices that require revision.

A structured evaluation cycle—perhaps at the end of each semester—could inform curriculum updates, new module development, or technology integration. It is also recommended that the institution form a dedicated task force to monitor the platform's usability, assess student engagement levels, and implement upgrades based on evolving educational technologies.

The survey findings reveal a strong preference among Banting Polytechnic students for learning composite repair through online platforms. Students value the flexibility, accessibility, and interactive features of online education, which allow them to access learning materials anytime, participate in simulations, and use tools that enhance their understanding of a traditionally hands-on field.

Online learning supports continuous, self-paced education, benefiting students with varied schedules or limited access to in-person classes. Virtual simulations offer a realistic, immersive environment for practicing composite repair techniques, bridging the gap between theory and practice. These digital tools also reflect current industry standards, helping students stay updated with modern materials and repair methods—thus improving job readiness.

While challenges remain in replicating real-world tactile experiences, the study suggests that thoughtfully designed online platforms can effectively supplement traditional methods. A hybrid learning model—combining online modules with hands-on workshops—emerges as the most promising approach. Platforms like Base Comp Hub, offering interactive content, 3D simulations, and real-time feedback, can enhance technical training when paired with physical practice sessions.

Student feedback also emphasizes that quality matters. Clear content, intuitive navigation, and engaging features like interactive games and industry updates significantly impact their learning experience. The preference for online learning is not just about convenience but also about the richness and relevance of the educational tools provided.

In conclusion, online training holds great potential to transform composite repair education in Aircraft Maintenance Engineering. With the integration of interactive features and flexible delivery, institutions like Banting Polytechnic can better prepare students for the demands of the aviation industry. By adopting a hybrid approach and continually refining online tools based on student input, an educational institution can shape a skilled, adaptable workforce equipped for the future of aircraft maintenance.

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