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RESEARCH ARTICLE

Bridging Real and Simulated Flight Training: A Quantitative Evaluation of BSAT Students' Experiences at Indiana Aerospace University

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Abstract

This study evaluated the effectiveness and perceived differences between actual and simulated flight training among Bachelor of Science in Aviation Technology (BSAT) students at Indiana Aerospace University (IAU) for Academic Year 2023–2024. Employing a descriptive quantitative research design, the researchers gathered data from 50 aviation students through structured surveys using a five-point Likert scale. The goal was to determine how each training mode—simulated and actual—contributed to student learning, skill development, and readiness for real-world aviation scenarios. The findings revealed that students strongly agreed that actual and simulated flight training were practical in building flying competencies. The educational setting at IAU successfully integrated both modalities, offering consistent instruction and reinforcement of aviation concepts. High weighted mean scores across all indicators, particularly in training, educational attainment, and flight experience, confirmed the program's effectiveness. Students noted significant benefits in their practical skills, understanding of aviation theory, and overall flight preparedness due to combined exposure to real and virtual environments. Despite the overall effectiveness of the program, areas for improvement were identified. These included improved simulation realism, updated flight instruments, better replication of in-flight conditions, and tighter alignment between theoretical and simulation instruction. The study recommends investing in advanced full-motion simulators, incorporating VR/AR systems, and updating training protocols to enhance the fidelity and instructional value of simulator experiences. By addressing these areas, IAU can further strengthen its curriculum and better equip its students for the complex demands of modern aviation.

Keywords: *flight simulation, aviation education, pilot training, flight experience, simulator realism*

Introduction

Flight simulators have become an essential component of aviation training programs across Southeast Asia, including countries like Singapore, Indonesia, and Thailand. These simulators are used as foundational tools to prepare students before they transition to actual flight training. In the Philippines, particularly in Mactan, several aviation schools employ a similar methodology in which simulator-based instruction precedes real flight experiences. The rationale for this approach is supported by Suarez et al. (2021), who emphasized that the use of flight simulators significantly reduces the risk associated with early-stage flight training while enhancing learning outcomes in controlled environments.

However, despite their benefits, discrepancies often exist between simulated and real flight experiences, with many students reporting that lessons learned in simulators are not effectively translated to actual flying due to the lack of realism or insufficient instrumentation in simulators.

At Indiana Aerospace University (IAU), students in the Bachelor of Science in Aviation Technology (BSAT) program rely heavily on simulators as part of their curriculum. However, issues such as unrealistic simulator environments and limited integration with actual flight instruments have posed challenges in achieving continuity between simulation and real-world flight conditions. Studies such as that by Zhang (2022) and Myers et al. (2018) highlight key limitations of flight simulators, including simulator sickness, lack of motion feedback, high maintenance costs, and system complexity. These challenges can hinder training effectiveness and student engagement. Additionally, the Civil Aviation Authority of the Philippines (CAAP), following the International Civil Aviation Organization (ICAO) standards, permits a portion of flight training to be conducted using simulators, making optimizing simulation quality a critical priority for aviation schools in the country.

Given these concerns, this study aims to evaluate the differences between simulated and actual flight training experiences of BSAT students at IAU. The goal is to identify gaps that affect student preparedness and propose an action plan to enhance flight simulators' realism and instructional effectiveness. The researchers, who are aviation students with extensive experience in both flight simulation and actual training, seek to contribute practical recommendations to improve the integration of simulation into aviation education, ultimately promoting safer, more effective, and cost-efficient pilot training.

Research Question/ Objectives

This study aims to evaluate the actual flight and simulated flight experience of Bachelor of Science in Aviation Technology students at Indiana Aerospace University for the A.Y. 2023-2024 and to propose an action plan. This study sought to:

1. Evaluate the actual flight and simulated flight experience of BSAT students at IAU regarding flight experience, educational attainment, and experience.

Methodology

Research Design

The study employed a descriptive quantitative research design to evaluate the differences between actual flight and simulated flight training among BSAT students at Indiana Aerospace University (IAU). This approach enabled the researchers to systematically gather and analyze numerical data through surveys, to identify measurable disparities in student experiences. The research focused on obtaining quantifiable responses using a structured questionnaire, emphasizing statistical interpretation over subjective judgment. Data collection procedures emphasized face-to-face interactions, ensuring that participants' insights were grounded in their direct experiences with both types of flight training.

Participants/Respondents

The research was conducted at Indiana Aerospace University, located in Lapu-Lapu City, Cebu—recognized as the largest aviation school in Central Visayas and one of the top aviation institutions in the Philippines. The institution is known for its commitment to producing competent aviation professionals through both academic excellence and practical training. BSAT students were selected as respondents based on their licensing levels and their exposure to both simulation and actual flight training. These participants were considered the most appropriate for the study, as they had firsthand experience in comparing the two training modalities.

Procedure

Data were gathered through a researcher-made questionnaire, which consisted of four sections. The first section recorded the demographic profile of respondents, including age, gender, and year level. The second section evaluated their experiences with actual and simulated flights using a five-point Likert scale ranging from "Strongly Disagree" to "Strongly Agree." The researchers analyzed the responses using statistical tools such as weighted mean, ranking, and simple rates to identify trends and assess perceptions.

Ethical Considerations

Ethical considerations were strictly followed throughout the research process. Respondents provided informed consent, and their participation was voluntary. Confidentiality was maintained, and the study focused solely on aviation students to ensure relevance to the BSAT training curriculum.

Results

Flight Training

The flight training program at Indiana Aerospace University is structured to meet CAAP requirements, guiding students through pilot licensing stages. Each level builds on the last, enhancing both flight proficiency and decision-making, particularly in emergencies. However, as noted in the study "Comparing Training Effects of Virtual Reality Flight Simulation to Conventional PC-Based Flight Simulation" (Tianxin Zhang, 2022), challenges like simulator sickness and adaptation to the simulator environment remain.

Table 1. *Flight Training*

Aspects	*Weighted Mean*	*Description*
Practical experiences in an actual aircraft significantly improves confidence in flying competencies.	4.78	Strongly Agree
Simulator training offers valuable experience in handling various inflight scenarios and emergencies.	4.7	Strongly Agree
The quality of flight instruments used in simulated training meets the expectations for the effective application in actual flight.	4.28	Strongly Agree
The student's simulated flight training provides a conducive learning environment in understanding the concept of actual flight training.	4.28	Strongly Agree
Flight simulation effectively replicates real-world flying conditions, contributing positively to the respondent's learning experience.	4.16	Agree
Average Weighted Mean	4.4	Strongly Agree

Legend: 4.21 - 5.00 - Strongly Agree; 3.41 - 4.20 – Agree; 2.61 - 3.40 – Neutral; 1.81 - 2.60 – Disagree; 1.0 - 1.80 - Strongly Disagree

Educational Attainment

Simulators is a basic requirement to obtain pilot license it allows certain experiences, based on individual abilities, and practice of non-standard scenarios, like weather conditions. (Vladimir Socha et al.,2016) This study will explore the interaction between hours of flight simulator training with the actual time of flying to assess how well simulated flight experience compares with real flight experiences.

Table 2. *Educational Attainment*

Aspects	*Weighted Mean*	*Description*
The simulated flight training helps bridge gaps in theoretical knowledge and practical application in aviation education.	4.62	Strongly Agree
The simulated flight experience offered the BSAT students' valuable practical skills and insights for their actual flight training.	4.56	Strongly Agree
The learning environment provided during the student's training has effectively supported understanding the aviation principles and practices.	4.5	Strongly Agree
Simulated flight experience in an educational setting meets the needs and expectations of aviation students.	4.46	Strongly Agree
The student is satisfied with the level of realism in the simulated flight experience composed to actual flight training.	4.1	Agree
Average Weighted Mean	4.45	Strongly Agree

Legend: 4.21 - 5.00 - Strongly Agree; 3.41 - 4.20 – Agree; 2.61 - 3.40 – Neutral; 1.81 - 2.60 – Disagree; 1.0 - 1.80 - Strongly Disagree

Experience

IAU flight training offers a learning path that begins with the foundations in the Student Pilot License (SPL) stage and progresses to the Private Pilot License (PPL), Commercial Pilot License (CPL), and Instrument Rating (IR). Table 3 provides an overview of the student's flight training experience.

Table 3. *Experience*

Aspects	*Weighted Mean*	*Description*
The student's flying experiences effectively prepared them for the challenges encountered during subsequent training phases.	4.68	Strongly Agree
Debriefing provided after simulated flights contributed to a better learning experience.	4.67	Strongly Agree
The combination of real flight experiences and simulation practice during the student's training significantly enhanced their overall flying skills.	4.44	Strongly Agree
The learnings in simulated training were applied to the actual flight in terms of weather conditions and environmental factors.	4.22	Strongly Agree
The level of interaction control in the simulation closely mirrors real life flight experiences.	3.88	Agree
Average Weighted Mean	4.38	Strongly Agree

Legend: 4.21 - 5.00 - Strongly Agree; 3.41 - 4.20 – Agree; 2.61 - 3.40 – Neutral; 1.81 - 2.60 – Disagree; 1.0 - 1.80 - Strongly Disagree

Conclusion

The study concluded that Bachelor of Science in Aviation Technology (BSAT) students at Indiana Aerospace University perceived both actual and simulated flight training as equally effective in developing their aviation skills. The findings revealed a strong agreement among students that the educational environment successfully integrates real and simulated flight experiences. The consistent teaching methodologies and clearly defined learning objectives in both modalities contributed to a seamless and balanced flight training curriculum. Moreover, students reported that the learning experience was equally enriched by both approaches, indicating that simulated and actual training mutually reinforce one another without leaving gaps in skill acquisition or conceptual understanding.

Despite the overall effectiveness of the training environment, the study identified areas for enhancement, particularly in terms of simulation fidelity and technical instrumentation. To address a mismatch in interaction control, it is recommended that the university invest in advanced full-motion simulators capable of replicating the physical and mechanical forces experienced during actual flight. Simulators should be upgraded regularly, integrating VR/AR systems to provide highly realistic, immersive environments that mimic real-world cockpit visuals and flight dynamics. In addition, outdated flight instruments should be replaced with CAAP-certified equipment to ensure precision and responsiveness in both real and simulated training environments.

To further bridge the gap between theory and practice, simulation-based exercises should be more closely aligned with classroom instruction. Flight simulations must immediately follow theoretical lessons to help students apply abstract concepts in real-time scenarios, strengthening the practical relevance of their academic learning. Enhancing simulators with advanced weather engines and emergency response features can also expose students to diverse, high-stakes conditions that prepare them for unpredictable in-flight situations. By implementing these recommendations, Indiana Aerospace University can further elevate its flight training program, ensuring its students are well-equipped for the dynamic demands of the aviation industry.

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