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RESEARCH ARTICLE

Evaluating the Educational Impact of Google Classroom and Altimeter as Digital Learning Tools

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Abstract

Digital learning platforms play a crucial role in modern education, particularly in technical programs like Aircraft Maintenance Technology (AMT). This study, titled "Evaluating the Educational Impact of Google Classroom and Altimeter as Digital Learning Tools," assessed the accessibility, usability, and learning effectiveness of these platforms at Indiana Aerospace University (IAU). A quantitative method was employed, surveying 100 randomly selected third-year AMT students during the 2024–2025 academic year through a self-created Google Forms questionnaire. A five-point Likert scale was used to measure student perceptions, and the data were analyzed using frequency, percentage, weighted mean, and ranking. Results showed that students generally agreed that the platforms supported independent learning and academic engagement. However, they also faced challenges such as frequent downtime, lag despite stable internet, a lack of backup systems, and minimal academic improvement. In response, the researchers recommended and implemented several measures, including hiring IT personnel, optimizing content for low-bandwidth environments, conducting stress tests, and standardizing platform content delivery. Additional outputs included offline-accessible resources, mirrored course files, real-time monitoring tools, and feedback mechanisms to improve platform performance and student experience. The study emphasizes the need for continuous improvement of digital learning platforms to ensure reliability, accessibility, and educational effectiveness in blended learning environments.

Keywords: *learning effectiveness, learning tools, modern education*

Introduction

Digital learning platforms have become a central part of education worldwide. In the Philippines, particularly in Cebu's aviation schools, such as Indiana Aerospace University (IAU), platforms like Google Classroom and Altimeter are widely used for teaching Aircraft Maintenance Technology (AMT). Google Classroom, integrated with Google Workspace, supports task distribution and feedback, while Altimeter, IAU's internal platform, caters specifically to AMT students. Despite their potential, both tools face challenges. Students report inconsistent internet access, low digital literacy, frequent downtimes, lack of real-time communication, and poor navigation problems that limit student engagement and learning efficiency.

This study is grounded in five educational theories to assess these platforms: Cognitive Load Theory, which emphasizes minimizing distractions to enhance processing; Media Richness Theory, which relates to how well a platform supports rich communication; Sociocultural Theory, which highlights the role of peer interaction; Self-Determination Theory, which focuses on autonomy and motivation; and Cultural-Historical Activity Theory, which considers the broader institutional context. These frameworks enable a more in-depth examination of how Google Classroom and Altimeter function as tools in a blended, technical learning environment.

Despite their frequent use, the platforms face issues such as increased cognitive load, lack of interactive features, and low system reliability. These shortcomings affect not only student performance but also the development of practical skills crucial to AMT training. Limited studies have evaluated their effectiveness, which this research seeks to address by comparing both platforms and identifying ways to improve their use in technical education.

This research is significant for improving digital learning in AMT. It evaluates the impact of Google Classroom and Altimeter on learning outcomes and proposes improvements based on user experience. The goal is to enhance engagement, minimize disruptions,

and create a more effective learning environment tailored for aviation students.

The study specifically aims to (1) evaluate accessibility and usability of both platforms, (2) assess their impact on student engagement and learning, (3) identify recurring issues, especially with Altimeter, and (4) explore how integrating Google Classroom can improve overall learning. Findings will guide recommendations to optimize digital tools for AMT students.

Research Question/ Objectives

The main purpose of this study was to evaluate the effectiveness of Google Classroom and Altimeter as digital learning tools for the 3rd year Aircraft Maintenance Technology students of Indiana Aerospace University from the Academic Year 2024 - 2025. Specifically, it sought to answer the following sub-problems:

1. Evaluate the educational impact of Google Classroom and Altimeter as digital learning tools in terms of;
    1.1. learning effectiveness; and
    1.2. learning tools?
2. Rank the problems encountered by the third–year Aircraft Maintenance Technology from the Batch Academic Year 2024-2025.

Methodology

Research Design

The quantitative research method is a systematic investigation that uses numbers and statistics to understand patterns, relationships, or behaviors. This method will be used to compare Google Classroom and Altimeter as complementary learning platforms among 3rd-year Aircraft Maintenance Technology students of Indiana Aerospace University for A.Y. 2024-2025. The data collected will be statistically analyzed to determine which platform offers better support for blended learning.

Participants/Respondents

The total number of respondents was 100 third-year Aircraft Maintenance Technology students out of a total population of 290. The respondents were selected through simple random sampling during the 2024–2025 academic year. The researchers randomly chose participants directly from the list provided by the school registrar, ensuring that each individual has an equal chance of being selected.

Instrument

A self-constructed survey questionnaire will be used to collect data and will be administered through Google Forms for convenience and accessibility. The survey consists of two sections: (1) Evaluating Learning Effectiveness and Learning Tools, and (2) Identifying Problems Encountered. The questionnaire includes multiple-choice items and statements rated on a five-point Likert scale, where 5 means "Strongly Agree" and 1 means "Strongly Disagree." Respondents will be selected through random sampling to ensure a fair representation of the target population. The survey link will be distributed online through Facebook Messenger. Participants will be informed about the purpose of the study, their rights, and the confidentiality of their responses. The responses will be compiled and analyzed to address the research objectives.

Procedure

The data gathering process began with the preparation and distribution of the finalized survey questionnaire to randomly selected respondents using Google Forms. The questionnaire was shared with third-year Aircraft Maintenance Technology students of Indiana Aerospace University through their Facebook Messenger group chats to ensure accessibility. Respondents were selected through random sampling to ensure that each student had an equal chance of being included in the study. Before answering the questionnaire, participants were informed about the purpose of the research, were assured of the confidentiality of their responses, and were reminded that participation was voluntary and that they could withdraw from the study at any time without penalty. Clear instructions were provided within the form to guide respondents in answering each item. The researchers monitored the response submissions and allowed ample time for participants to complete the form. Once all responses were collected, the data were organized, encoded, and analyzed using statistical tools to evaluate the effectiveness of Google Classroom and Altimeter as complementary learning platforms.

Data Analysis

The statistical treatment of data utilized a five-point Likert scale with corresponding numerical ranges, descriptive equivalents, and interpretations to assess the effectiveness of Google Classroom and Altimeter as complementary learning platforms. To interpret the responses, the study applied frequency to determine how often each response was selected, rate or percentage to calculate the proportion of each response relative to the total, weighted mean to compute the average score for each item based on the assigned values of the Likert scale, and ranking to identify and prioritize the most significant aspects based on the weighted mean scores. These statistical tools were used to evaluate the core variables of the study, namely accessibility, usability, student engagement, and learning effectiveness, ensuring a comprehensive and objective analysis of how both platforms functioned in supporting the learning process of third-year Aircraft Maintenance Technology students.

Ethical Considerations

All participants involved in the survey were provided with a clear explanation of the study's purpose, procedures, and any potential risks.

All data collected from the questionnaires were anonymized and stored in a secure database, with access limited to the research team. Participants' identities were not disclosed in the study's findings or any reports. They were informed that their involvement was voluntary and that they could withdraw from the study at any time without affecting their academic standing or university relationship. Efforts were made to ensure that the questionnaire was non-intrusive and did not cause any undue stress or discomfort to participants. If any emotional distress arose during the study, appropriate support and resources were provided. The research team ensured that all findings were presented accurately, and any limitations or biases in the study were disclosed in the final report. Researchers also disclosed any potential conflicts of interest. Participants were given the opportunity to review the information collected from them before it was used in the study, ensuring they had control over their contributions. The study's findings aimed to evaluate the effectiveness of Google Classroom and Altimeter in supporting engagement, accessibility, and academic performance among third-year Aircraft Maintenance Technology students, ultimately contributing to the improvement of digital learning platforms at the university. These ethical principles were essential for maintaining trust and integrity in academic research, and by following these guidelines, the research was conducted responsibly and respectfully, promoting fairness and protecting participants throughout the study.

Results and Discussion

Learning Effectiveness

Learning effectiveness refers to the extent to which educational tools achieve outcomes such as improved understanding, retention, and effective knowledge application. Digital learning reflects how platforms like Google Classroom and Altimeter support student engagement, performance, and independent learning. Effective platforms reduce distractions (Cognitive Load Theory), offer rich communication and timely feedback (Media Richness Theory), and enable collaborative learning (Sociocultural Theory). They also foster autonomy and motivation (Self-Determination Theory) and shape learning through institutional context (Cultural-Historical Activity Theory). These theories collectively inform the assessment of the impact of digital tools on student learning in technical education.

Table 1 presents the perceptions of aviation students regarding learning effectiveness.

Table 1. *Learning Effectiveness*

Indicators	*Weighted Mean*	*Description*
1. I can study independently because the learning materials are readily available on the platforms.	4.06	Agree
2. The content shared through Google Classroom and Altimeter helps me better understand the lessons.	3.99	Agree
3. I feel more motivated to complete tasks when instructors use these platforms for class activities.	3.97	Agree
4. My academic performance improves when both or either of the platforms are used consistently and effectively.	3.91	Agree
5. In case one platform is unavailable, the other still allows me to continue learning without disruption.	3.91	Agree
Average Weighted Mean	3.97	Agree

Legend: 4.21-5.00 = Strongly Agree, 3.41-4.20 = Agree, 2.61-3.40 = Neutral, 1.81-2.60 = Disagree, 1.00-1.80 = Strongly Disagree

Learning Tools

Learning tools are digital platforms that deliver, manage, and access educational content, while also enabling communication between students and instructors. In this study, tools like Google Classroom and Altimeter support instruction by organizing resources, assignments, and feedback in both synchronous and asynchronous settings.

Table 2 presents the perceptions of aviation students regarding learning tools.

Table 2. *Learning Tools*

Indicators	*Weighted Mean*	*Description*
1. Google Classroom and Altimeter perform reliably when my internet connection is stable.	4.09	Agree
2. It is convenient to upload and submit school requirements through either platform.	4.05	Agree
3. I can access Google Classroom and Altimeter without difficulty using my personal device.	3.94	Agree
4. I rarely encounter system downtimes or technical errors while using these platforms.	3.82	Agree
5. The interface of both platforms is easy to use even without prior instruction.	3.81	Agree
Average Weighted Mean	3.94	Agree

Legend: 4.21-5.00 = Strongly Agree, 3.41-4.20 = Agree, 2.61-3.40 = Neutral, 1.81-2.60 = Disagree, 1.00-1.80 = Strongly Disagree

Several educational theories shape their effectiveness. Cognitive Load Theory stresses a simple, user-friendly design to prevent overload. Media Richness Theory emphasizes features such as multimedia and real-time feedback to facilitate clear and engaging instruction.

Sociocultural Theory highlights the importance of collaboration, which some platforms lack. Self-Determination Theory emphasizes flexibility and autonomy in learning, while Cultural-Historical Activity Theory views these tools as products of institutional and social contexts. Together, these theories guide the evaluation of digital tools in technical education.

Problems Encountered

The problems encountered in the use of Google Classroom and Altimeter include inconsistent access across devices, difficult navigation, unreliable performance even with a good internet connection, frequent technical issues and downtime, challenges in submitting tasks, insufficient learning content, lack of student motivation, limited organized resources, and minimal academic improvement.

Table 3 presents the problems encountered during the evaluation of the Educational Impact of Google Classroom and Altimeter as Digital Learning Tools.

Table 3. *Problems Encountered*

Indicators	*Frequency*	*Rank*
Frequent downtimes and technical issues make it difficult for students to rely on Google Classroom and Altimeter.	53	1
When one platform becomes unavailable, students are unable to continue learning effectively, showing a lack of backup support.	50	2
Even under stable internet conditions, the platforms often perform poorly or lag.	48	3
The materials provided through Google Classroom and Altimeter do not enhance students' understanding of the lessons.	41	5
The use of these platforms has not led to improvements in students' academic performance.	41	5
The interface of Google Classroom and Altimeter is not user-friendly without prior instruction.	41	5
Students feel unmotivated to accomplish tasks when instructors use these platforms.	38	7
Uploading and submitting requirements through the platforms is complicated and inconvenient.	35	8
Students are unable to access Google Classroom and Altimeter easily on their personal devices.	34	9
Google Classroom and Altimeter fail to support students in independent study.	28	10

The ranking of issues in using Google Classroom and Altimeter reveals key challenges affecting students' learning. The most significant problem is the frequent occurrence of downtimes and technical issues, which occur at a frequency of 53.

The second-highest problem occurs at a frequency of 50. When one platform becomes unavailable, students are unable to continue learning effectively.

The third-highest problem occurs at a frequency of 48. It is that even under stable internet conditions, the platforms often perform poorly or lag.

The fourth highest problem is with a frequency of 41. It is that the materials provided through Google Classroom and Altimeter do not enhance students' understanding of the lessons.

The fifth highest problem is with a frequency of 41. It is that the use of these platforms has not led to improvements in students' academic performance.

Conclusion

The study revealed that Aircraft Maintenance Technology students consider Google Classroom and Altimeter effective tools for supporting their learning. They highlighted the platforms' usefulness in providing easy access to study materials and facilitating communication with instructors. Students also agreed that these tools enhanced their engagement and improved their understanding of lessons, demonstrating their importance in strengthening digital learning experiences. However, technical issues, limited interactivity, and gaps in academic impact were noted, pointing to areas where improvements are needed to maximize their effectiveness.

To address the identified challenges, the study recommends that institutions collaborate with technical teams to reduce downtime, resolve system glitches promptly, and optimize platform performance under varying internet conditions. Backup learning options, such as downloadable content or alternative platforms, should also be made available to ensure continuous learning in the event of disruptions. Furthermore, course materials on Google Classroom and Altimeter should incorporate interactive and practical activities to deepen student understanding. Instructors are encouraged to closely monitor student progress and provide targeted academic support to ensure that the use of these platforms translates into measurable improvements in performance.

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