

A Study on Finger Dexterity and Two Hand Coordination with Effectiveness Reference of Aviation Students

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Abstract — Finger dexterity and two-hand coordination are critical motor skills for aviation professionals, influencing their ability to manage aircraft controls, interpret flight instruments, and perform maintenance tasks. This study aimed to evaluate the effectiveness of these skills among aviation students aged 17 to 24 years. A total of 200 students (100 males and 100 females) participated in standardized tests measuring finger dexterity and two-hand coordination. The results indicate that female students exhibited superior finger dexterity, with 74% completing right-hand tasks within 2–3 minutes compared to only 23% of males. Similarly, 73% of females completed left-hand tasks efficiently, whereas only 16% of males achieved the same performance. In two-hand coordination tests, results were more balanced, with 41% of males and 40% of females completing the task within 0–1 minute. However, 5% of males and 8% of females required additional training. The findings underscore the necessity of integrating dexterity and coordination exercises into aviation training programs. Regular assessments, targeted training, and physical fitness integration are recommended to enhance these essential motor skills, ensuring aviation students develop the necessary capabilities for professional success.

Keywords — Handgrip coordination, Mental ability, Finger dexterity test board, Aviation students, Physical activities.

1. Introduction

In the aviation industry, professionals must possess exceptional hand-eye coordination, finger dexterity, and physical endurance to perform their duties efficiently. Pilots, air traffic controllers, and maintenance personnel rely on precise motor skills for operational success and safety. Finger dexterity and two-hand coordination are critical in ensuring that aviation students develop the necessary skills to meet the industry's demands. This study examines the effectiveness of finger dexterity and two-hand coordination among aviation students, providing insights into how these abilities impact their overall performance and longevity in the profession. By assessing these skills through structured tests, this research aims to highlight their significance in aviation training programs.

2. Significance of the Study

This study is significant as it sheds light on the role of finger dexterity and two-hand coordination in shaping the careers of aviation students. Aviation professionals must develop superior motor skills to manage aircraft controls, interpret flight instruments, and perform intricate maintenance tasks. By analyzing these motor skills, the study emphasizes the need for physical fitness and cognitive ability in aviation training. The findings will provide aviation institutions with valuable data to enhance training programs, incorporate physical fitness assessments, and encourage the development of hand coordination skills among students. Additionally, this research contributes to existing literature on aviation ergonomics and human factors.

3. Objectives of the Study

The study aims to achieve the following objectives:

1. To evaluate the finger dexterity and two-hand coordination of aviation students.
2. To analyze the impact of finger dexterity on the overall performance and efficiency of aviation students.
3. To assess the relationship between hand coordination and health-related fitness components such as muscular strength, endurance, and flexibility.
4. To provide recommendations for integrating physical fitness training into aviation education programs.

4. Research Methodology

The research utilized a quantitative approach, employing standardized dexterity and coordination tests to assess aviation students' performance. A sample group of aviation students aged 17 to 24 years was selected for the study. The tests included:

- **Finger Dexterity Board Test:** This test measured the speed and accuracy of fine motor movements, assessing the students' ability to manipulate small objects efficiently.
- **Two-Hand Coordination Board Test:** This test evaluated the students' ability to use both hands simultaneously in performing complex tasks, determining their level of coordination and response time.
- **Health-Related Fitness Assessment:** The study also measured key physical fitness variables such as

muscular strength, endurance, and flexibility of the fingers and hands to establish their correlation with dexterity and coordination.

Data was collected through direct observations and test results, which were analyzed statistically to determine patterns and correlations among the variables.

5. Results and Discussion

This chapter presents the analysis and interpretation of the data collected from aviation students to assess their finger dexterity and two-hand coordination. The study was conducted on 200 aviation professionals, comprising 100 males and 100 females, within the age range of 17 to 24 years. The results provide insights into the efficiency of hand and finger strength, as well as the speed and accuracy of movements essential for aviation-related tasks.

6. Finger Dexterity Test Results

The finger dexterity test results indicate significant differences between male and female aviation students in terms of hand efficiency. The test was conducted using both right and left hands, with time recorded for completion.

- **Male Participants:**
 - Right-hand performance: 23% completed within 2–3 minutes, while the majority (77%) required additional training.
 - Left-hand performance: 16% completed within 2–3 minutes, indicating that most require improvement in speed and accuracy.
- **Female Participants:**
 - Right-hand performance: 74% completed the task within 2–3 minutes, demonstrating strong dexterity skills.
 - Left-hand performance: 73% completed within the stipulated time, indicating a high level of efficiency.

These results suggest that female participants generally exhibit greater finger dexterity compared to their male counterparts. Training programs should focus on improving the hand efficiency of male students to enhance their aviation-related skills.

6. 1 Two-Hand Coordination Test Results

The two-hand coordination test was performed using a standard two-hand coordination test pad with a star pattern. The objective was to assess the ability to guide a stylus along a defined path while minimizing errors.

- **Male Participants:**
 - 41% completed the test within 0–1 minute, demonstrating strong coordination skills.

- 5% took 3–4 minutes, indicating the need for further training.

- **Female Participants:**

- 40% completed the test within 0–1 minute, showcasing strong coordination skills.
- 8% took 3–4 minutes, highlighting areas for improvement.

The findings reveal that both male and female students exhibited similar results in two-hand coordination, with a slight need for additional training in both groups. Developing these skills is crucial for handling aviation controls and ensuring precision in operations.

7. Discussion

The results highlight the importance of finger dexterity and two-hand coordination in aviation training. The findings indicate that:

- Female students generally exhibit higher finger dexterity skills compared to male students.
- Male students require additional training to improve hand efficiency and dexterity.
- Two-hand coordination results are relatively balanced, with minor differences between male and female participants.
- Regular training programs focusing on dexterity and coordination can enhance overall efficiency and performance in aviation-related tasks.

The study underscores the necessity of incorporating dexterity and coordination training in aviation education to ensure that students develop essential motor skills for their professional careers.

8. Conclusion

Based on the analysis and findings, the study concludes that finger dexterity and two-hand coordination are critical skills for aviation professionals. The research confirmed that female students tend to perform better in dexterity tests, while male students require additional training to improve their hand coordination. Two-hand coordination skills were observed to be similar across both groups, but improvements are still needed for a small percentage of students.

These findings reinforce the need for structured training programs to enhance motor skills in aviation students. By integrating finger dexterity and coordination exercises into the curriculum, aviation institutions can better prepare students for the physical demands of their profession.

9. Recommendations

Based on the conclusions, the following recommendations are proposed:

- *Training Programs:* Aviation institutions should implement targeted training programs to improve finger dexterity and hand coordination among students, particularly for those who require additional support.
- *Regular Assessments:* Periodic evaluations should be conducted to monitor the progress of students and identify areas that need improvement.
- *Physical Fitness Integration:* Aviation training programs should incorporate hand and finger strength exercises to enhance coordination and dexterity.
- *Awareness Programs:* Aviation professionals should be educated on the importance of hand dexterity and coordination through workshops and seminars.
- *Curriculum Enhancement:* Physical fitness and motor skill assessments should be a mandatory component of aviation training to ensure students develop the necessary skills for their profession.

By implementing these recommendations, aviation training institutions can enhance students' overall efficiency and readiness for the industry, ensuring they meet the demands of their profession effectively.

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