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ANALYZING THE AVIATION SECURITY KNOWLEDGE TEST ITEMS TO EVALUATE CADET PROFICIENCY ACROSS DIVERSE LEVELS OF VOCATIONAL SCHOOLS

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Abstract

Assessments are vital tools in education, shaping dynamic learning experiences and contributing significantly to overall learner development. In AVSEC training, mandatory tests for license acquisition are a prerequisite for both job applicants and active duty officers contingent upon achieving satisfactory scores. Potential test takers vary in level of formal vocational education with a minimum educational requirement of a high school for job applicants. This study scrutinizes the quality of the AVSEC test, evaluating elements like difficulty index (DIF), discrimination index (DI), and distractor efficiency (DE). Serving as a comprehensive evaluative tool, it provides valuable feedback on proficiency and areas for improvement.

In AVSEC item analysis, findings indicate that retaining a low category of Differential Item Functioning (DIF) may be justifiable based on item purpose. The influence of test-taker backgrounds and nuances in classical formal education is reflected in the low Discrimination Index (DI), emphasizing the need for considerations beyond intrinsic item characteristics. Challenges emerge in questions about regulations due to their overly straightforward construction, rendering the substitution of suboptimal distractors impractical. To address potential drawbacks, the training school may contemplate replacing items with similar topics, maintaining the test's purpose while enhancing item quality. This study underscores the delicate balance required in crafting effective assessments within the distinctive context of AVSEC.

Keywords: *aviation security test, cadet of vocational flight school, educational level, item analysis, knowledge assessment*

Introduction

Emerging from an arduous COVID-19 period that spanned almost three years, the aviation industry is having a tough time recovering globally. Given the substantial impact of the tourism and creative industries on the gross domestic product (kemenparekraf.go.id), leveraging tourism as a pivotal component of Indonesia's post-pandemic accelerated recovery plan holds considerable promise. By strategically promoting tourism initiatives, the country can not only invigorate its financial landscape but also contribute to the revival of a resilient and robust travel industry (Hastuti, 2022; Ha and Wong, 2023; Nurfitriana *et al.*, 2023). Since 2022, travel is now permitted under new government regulations. These regulations specifically allow the substitution of the pre-departure RT-PCR test requirement with documentation proving the completion of a full COVID-19 vaccination course, whether it's the second dose or a third dose/booster (*Regulations for Traveling to Indonesia*, no date).

The aviation industry faces a substantial task in restoring and enhancing its post-pandemic operation. As people have adopted new habits in response to the pandemic, there is a heightened requirement for additional security vigilance. Aviation security (AVSEC) is instrumental in ensuring that each stage of the journey is executed with rigorous adherence to protocols, thereby not only enhancing overall safety and protection but also improving passengers' level of satisfaction. One of the essential criteria for achieving optimal performance in AVSEC is the ability to seamlessly integrate with and adapt to the various systems and technologies that have been introduced as part of the updated security protocols implemented in response to the post-pandemic landscape. This entails proficiency in navigating and utilizing the advanced tools and technological enhancements incorporated into the security framework to ensure a robust and effective aviation security environment (Barretto *et al.*,

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2023; Hovanec *et al.*, 2023; Lopez-Valpuesta and Casas-Albala, 2023).

To adhere to these standards, competent human resources are required. The criteria for AVSEC are intricately outlined in international regulations meticulously set forth by the International Civil Aviation Organization (ICAO). Proficient personnel can be acquired through comprehensive training programs or formal educational studies. The acquisition of competent human resources involves investing in educational initiatives and training sessions that equip individuals with the necessary skills, knowledge, and expertise required for their roles (Avella, 2020). The inevitable requirement for an applicant of AVSEC is a civil aviation security personnel license which is issued by the Ministry of Transportation through the Directorate General of Civil Aviation (DGCA) with a validity period of 2 years (Sub Sektor Perhubungan Udara, 2014). Nevertheless, there exist varying tiers of formal education that students, particularly cadets, can pursue to undergo their training. These educational options may include diverse courses, specialized programs, or structured curricula designed according to the Indonesian National Qualifications Framework (INQF) (*Kerangka Kualifikasi Nasional Indonesia*, no date).

Regarding the qualifications essential for entering the field of AVSEC, the minimum formal education prerequisites are established at the high school level (angkasapurasolusi.co.id). In terms of capability, graduates with AVSEC 3-year diploma degree credentials outshine those with bachelor degrees (comparable to a 4-year diploma in vocational school), whereas bachelor degrees demonstrate heightened sensitivity. Nevertheless, the performance scores in AVSEC obtained from both education levels (3-year diploma and bachelor) consistently surpass those achieved by high school graduates, underscoring the advanced competencies instilled by higher education in the aviation security domain (Sulistiyono and Olivia, 2016). While formal education mandates a minimum of 3 years for graduation comprising a high school, a 3-year diploma, and a 4-year diploma, specialized AVSEC training is completed in less than 1 year, encompassing study, practical application, and examinations (Itsnaini and Widyanti, 2022). Consequently, the training incorporated into the curriculum can be conducted over 1 to 2 semesters resulting in comparable proficiency levels between high school and diploma graduates, given the condensed time frame for AVSEC training.

Assessment is a fundamental component of the learning process. Evaluation serves the purpose of appraising the extent to which students have absorbed and proficiently applied the content and skills presented in a given course or educational program. This entails employing diverse assessment methods to measure students' understanding, knowledge, and abilities (Roediger III, Putnam and Smith, 2011). The effectiveness of a test in capturing the desired facets of knowledge, proficiency, or understanding constitutes a fundamental consideration in the realm of assessment. To meet this criterion, the test must successfully adhere to stringent standards of item quality. This entails a meticulous evaluation of each test item to ensure that it aligns precisely with the intended construct and contributes meaningfully to the overall measurement objective (Mccowan and Mccowan, 1999).

An assessment of cadets' proficiency in AVSEC knowledge is carried out using either a written or digital test. The primary objective of this research is to thoroughly indicate the difficulty level associated with each question within the set of theory exams; a nuanced understanding of the complexity and challenges posed by each question can be gained, contributing to a comprehensive evaluation of the overall test structure and content difficulty. This study's findings will additionally analyze and understand the proficiency levels of cadets based on the educational tier they are currently pursuing. The examination aims to provide insights into how well cadets at different levels of education grasp and apply AVSEC knowledge, contributing to a comprehensive understanding of their educational preparedness in the official test.

Literature Review

Vocational Schools for Aviation

Discrepancies in educational achievements at various levels influence the proficiency of graduates. In the realm of AVSEC training, the available educational options span across various levels, encompassing completion of high school, attainment of a 1-year diploma, pursuit of a 3-year diploma, and engagement in a 4-year diploma program offered by vocational schools. Vocational schools hold a favorable position as they specialize in tailoring their educational qualifications more closely to the specific demands of the work industry (Suharno, Pambudi, and Harjanto, 2020; Pinem, 2021; Yiu *et al.*, 2022). Vocational schools, serving as establishments dedicated to cultivating human resources in aviation security are mandated to offer training programs that are aligned with international aviation regulations (Cahyadi, Oka and Masito, 2022). This encompasses aspects of collaborative governance (Hendra, Kurnianto, and Endrawijaya, 2023) such as obtaining official approval, crafting a curriculum development, ensuring instructor qualifications, providing suitable facilities, and furnishing the necessary evaluation instruments.

AVSEC competency licenses are established by international regulators, whereas Indonesian education levels are organized under the INQF. This system employs a numerical scale from 1 to 9 to standardize learning outcomes, with high school graduates positioned at level 2, 3-year diploma holders at level 5, and 4-year diploma holders at level 6. This approach ensures consistency and equivalence in assessing educational achievements across different levels. While the DGCA will conduct the competency test as the evaluator through an approved training center, schools can enhance the training system by integrating customized evaluation tools. This proactive approach aims to augment cadets' knowledge and ensure they are thoroughly prepared for the impending test.

Aviation Security Knowledge

AVSEC training is comprehensive, encompassing both theoretical and practical components, along with assessment tests. In the theoretical part, participants dive deep into security principles, regulations, and the latest technologies, gaining insight into various security threats in aviation. The hands-on practical component involves exercises and simulations mimicking real-life scenarios. Participants practice responding to threats, conducting security screenings, and managing emergencies. To assess the proficiency of participants, AVSEC training programs typically include tests and evaluations. These assessments may cover both theoretical understanding and practical application of security measures. The goal is to ensure individuals understand and can apply concepts in real-world situations. Regular testing maintains a high standard of security awareness among aviation security personnel.

The AVSEC Knowledge training material is designed based on several guidelines highlighting the role of AVSEC on safety and security in civil flight, including:

1. Minister of Transportation Regulation
   a. No PM 28 of 2021: Education Program - Security Training - National Aviation
   b. No PM 51 of 2020: Security - Aviation National
2. Annex 17: Security
3. Annex 18: The Safe Transport of Dangerous Goods by Air
4. Standard Operational Procedures of AVSEC Airport Management Unit
5. Standard Operational Procedures of Issuance and Utilization of Airport Passes
6. Module for Basic and Junior AVSEC of Civil Aviation Training Center, Curug, Center for the Development of Human Resources in Air Transportation, Department of Transportation Indonesia

The training program aims to enhance learners' proficiency in Aviation Security (AVSEC) measures

designed to prevent undesirable items or actions on civil aviation aircraft. The focus of AVSEC measures, outlined in Annex 17: Chapter 4, encompasses a range of preventive security protocols related to:

1. Access control of the airport:
   a. Restricting unauthorized access to the airside area.
   b. Performing security checks in the restricted zone.
   c. Confirming identities of individuals and vehicles in both airside and restricted areas.
   d. Conducting background checks on individuals, including non-passengers authorized for entry to the restricted area.
   e. Monitoring movement of individuals and vehicles around the aircraft.
   f. Limiting access of non-passengers and their belongings to the restricted area.
   g. Validating identity documents for aircraft crew members in airside and restricted areas.
2. Aircraft security:
   a. Conducting thorough checks or searches on aircraft involved in commercial operations.
   b. Clearing the aircraft of any items left by disembarked passengers.
   c. Prohibiting unauthorized persons from entering the flight crew compartment during flight.
   d. Safeguarding aircraft searches and checks against unauthorized interference until departure.
   e. Securing the aircraft when it is not in the restricted area.
3. Passengers and their cabin baggage:
   a. Verifying screening compliance before passengers embark on an aircraft.
   b. Confirming the eligibility of both passengers and cabin baggage for transfer, ensuring ongoing protection from unauthorized interference.
   c. Conducting re-screening in response to concerns arising from unauthorized contact from the initial screening until the boarding phase.
   d. Providing safeguarding measures throughout the transit process against unauthorized interference.
4. Hold baggage:
   a. Inspecting checked baggage prior to loading it onto the designated aircraft from the restricted area.
   b. Shielding checked baggage from screening until departure, with a subsequent screening if the non-interference status is questioned before loading.
   c. Verifying that no unchecked passenger checked baggage is loaded on board.
   d. Facilitating the uninterrupted transfer of passenger checked baggage from the originating to the departing transfer aircraft.
   e. Documenting verified checked baggage, both accompanied and unaccompanied, for the flight.
   f. Establishing protocols for managing unidentified baggage in accordance with security risk assessments.
5. Oversight of cargo, mail, and other goods:
   a. Managing the screening of cargo and mail before loading onto commercial passenger aircraft.
   b. Safeguarding cargo and mail from unauthorized tampering from screening until departure.
   c. Granting approval to regulated agents participating in security measures.
   d. Verifying the security of accepted consignments by regulated agents.
   e. Exerting control over the transportation of catering, stores, and supplies until loaded onto the aircraft.
   f. Coordinating procedures for overseeing cargo and mail with security risk assessments.
6. Managing special categories of passengers.
   a. Creating administrative protocols for passengers authorized to travel who may pose challenges.

b. Supervising operator services, encompassing programs, measures, and procedures for onboard security related to special passengers.
c. Overseeing effective security control by aligning information about special passengers with both aircraft operators and the pilot-in-command.
d. Ensuring law enforcement and authorized persons get proper permission to carry weapons on board during their duties.
e. Reviewing requests from other states to let armed personnel, like in-flight security officers, on board only if both parties agree.
f. Assuring weapons are only allowed if authorized, unloaded, and stored securely and out of reach during the flight.
g. Deploying carefully selected and trained in-flight security officers based on threat assessments and coordinating strictly confidentially with the authorities.
h. Notifying the pilot-in-command of armed individuals' numbers and seat locations.

Simultaneously, Annex 17: Chapter 18 outlines response measures for addressing unlawful interference when an aircraft is on the ground. This chapter is segmented into three essential components. Firstly, it delineates measures and strategies aimed at preventing potential issues or challenges in the discussed context. Secondly, it provides detailed actions and procedures to be executed in the event of an incident, ensuring prompt and effective responses. Lastly, it includes processes related to information exchange and formal reporting mechanisms, fostering transparency and communication within the defined scope.

Learning Assessment

Within the domain of psychology, administering a test to learners after a comprehensive training regimen is beneficial for the enhancement of long-term memory storage. This pedagogical approach not only reinforces the acquired knowledge but also fosters a deeper and more enduring understanding of the material. By engaging learners in a simulated testing environment post-training, cognitive processes are stimulated, contributing to the consolidation of information and facilitating more robust retention over an extended period (Roediger and Karpicke, 2006; Murphy, Little, and Bjork, 2023).

In the context of AVSEC training, where the primary goal is to achieve success in the AVSEC test for securing a position as a certified AVSEC professional following DGCA standards, meticulous attention to the design of the test becomes pivotal. The intricacies of this test are critical not only for assessing the comprehension of AVSEC principles but also for ensuring that individuals possess the standardized qualifications deemed necessary by the DGCA for effective and secure aviation operations (Georgiev, 2021). Thus, empirical quality tests are conducted on evaluation tool questions to ascertain their effectiveness in gauging the abilities of test takers.

Item Analysis for Aviation Security Knowledge Exams

To design questions that are both straightforward and challenging, fostering frequent student success while aligning with specific cognitive processes corresponding to learning objectives, the AVSEC Knowledge test employs 20 multiple-choice questions (MCQs) as its method of assessment. Conducting an item analysis toward this form of test is a vital process to assess the validity and reliability of items. This analysis aids in the identification of items that may require refinement or removal, contributing to the creation of a robust and high-quality MCQ bank (Butler, 2018; Kumar *et al.*, 2021).

As the prevalence of computer-based testing (CBT) continues to escalate, the assessment of cadets' knowledge in Aviation Security (AVSEC) can now be conducted through various scoring methods. Technology-enhanced items (TEIs) demonstrated testing program adaptability by extending beyond the confines of conventional dichotomous multiple-choice (MC) items, encompassing the dynamic nature of testing methodologies with a diverse array of item and response types (Betts *et al.*, 2022).

This expansion shows the ability to accommodate and assess AVSEC knowledge among cadets using a range of formats and responses. Hence, some of the CBT tests are in the form of 10 items of checkboxes.

Numerous techniques exist for assessing the quality of a test, including procedures such as conducting content validity and reliability assessments, as well as seeking input from subject matter experts. Among these methods, item analysis stands out as a systematic approach to evaluating test items, offering specific insights. This technique delves into the characteristics of individual test items, providing nuanced information on their effectiveness. By delineating details about the performance of each item, item analysis becomes a valuable tool in determining whether an item is deemed satisfactory for use, necessitates revision, or should be omitted from the test altogether (Alamoudi *et al.*, 2017; Date *et al.*, 2019). Item analysis involves a comprehensive evaluation through three key steps: difficulty index, discrimination index, and the examination of distractors. By systematically applying these three steps, item analysis provides a comprehensive understanding of the strengths and weaknesses of individual test items.

The specific thresholds for categorizing items by difficulty index, discrimination index, and distractor effectiveness may vary depending on the context of the assessment and the preferences of the test developers. It's essential to consider the target audience, the nature of the content being assessed, and the overall difficulty distribution goals for the test.

1. Difficulty Index (DIF I):

The difficulty index gauges how challenging or easy a particular test item is for the examinees. It is calculated by determining the percentage of test-takers who answered the item correctly. This step helps in understanding the overall level of difficulty associated with each item with the equation as follows:

$$DIF\ I = \frac{NC}{N} \dots (1)$$

DIF I: Difficulty Index
NC: Number of testees answer correctly
N: Number of all testees

The difficulty index is typically categorized based on the percentage of test-takers who answer a particular item correctly. The arrangement of difficulty index categories commonly includes:

a. Easy and Very Easy: High Percentage Correct: Test items falling into this category are considered relatively easy or too easy, as a substantial proportion of test-takers answer them correctly. DIF I ≥ 0.90 is categorized as Very Easy (VE) and DIF I between 0.60 and 0.89 is categorized as Easy (E).

b. Moderate or Medium: Moderate Percentage Correct: Items in this category pose a moderate level of difficulty, with a balanced percentage of test-takers answering them correctly. DIF I between 0.40 and 0.59 is categorized as Moderate (M).

c. Difficult and Very Difficult: Low Percentage Correct: Test items categorized as difficult or extremely difficult have a lower percentage of correct responses, indicating a higher level of challenge for test-takers. DIF I between 0,20 and 0.39 is categorized as Difficult (D) and DIF I $\leq$ 0.19 is considered Very Difficult (VD)

2. Discrimination Index (DI):

The discrimination index focuses on the ability of a test item to differentiate between high-performing and low-performing individuals. It is calculated by comparing the performance of the upper and lower

groups of test-takers. A high discrimination index suggests that the item effectively discriminates between individuals with different levels of knowledge or skill using this formula:

$$DI = \frac{UG}{UN} - \frac{LG}{LN} \ldots (2)$$

DI: Difficulty Index

UG: Number or correct answer from Upper Group
UN: Number of Upper Group (27% from all testees with n > 30)
LG: Number of correct answers from Lower Group
LN: Number or Lower Group (the rest of testees excluding UG)

The discrimination index is categorized based on the ability of a test item to differentiate between high-performing and low-performing individuals with these typical categories:

a. Excellent and Good Discrimination: A positive discrimination index indicates that individuals who perform well on the overall test also perform well on the specific item. This suggests that the item effectively discriminates between individuals with higher levels of knowledge or skill and those with lower levels. DI > 0.70 is categorized as High (H) while DI between 0.41 and 0.70 is categorized as Good (G)

b. Moderate Discrimination: suggests a moderate ability of the item to differentiate between high and low performers. While it still contributes to discrimination, it may not be as effective as items with higher or good discrimination values. DI between 0.21 and 0.40 is considered Moderate (M).

c. Poor or Negative Discrimination: An index in this category implies that individuals who perform poorly on the overall test perform well on the specific item, and vice versa. This suggests a problem with the item, as it does not effectively discriminate between individuals with different levels of knowledge or skill. DI for this category is between 0.00 (or negative) and 0.20.

3. Distractors Efficiency (DE):

Distractors are the incorrect options provided in multiple-choice items. Analyzing distractors involves examining how often each distractor is selected by test-takers. Effective distractors should attract attention from those who lack the required knowledge or skill, leading to their selection. Identifying poorly performing distractors is crucial for refining and improving the item. In the assessment of DE, if fewer than 5% of students select the incorrect answers, these are categorized as non-functioning distractors (NFD). On the continuum of difficulty index for MCQs, those considered excessively challenging, falling below 30%, are identified as NFDs, while those within the acceptable range of 30-70% are termed functional distractors (FD).

The DE scale spans from 0 to 100%, capturing the range of effectiveness of distractors. Specifically, the categorization of DE is based on the presence of NFDs within an MCQ. If an MCQ exhibits three or more NFDs, its DE is designated as 0%. Furthermore, DE is labeled as 33.3%, 66.6%, and 100% depending on whether the MCQ contains 2, 1, or none of these non-functioning distractors, respectively (Mahjabeen *et al.*, 2017).

In item analysis, the role of omitted answers, or items left unanswered by test-takers, is also crucial in understanding the test's effectiveness and the performance of individual items. It provides insights into the effectiveness of distractors in challenging test-takers and helps identify areas for improvement in the construction of items and the design of distractors to enhance the overall quality and validity of assessments. A good category of DE in omitted answers is ideally not exceeding 10%.

Method

In the endeavor to achieve the study's objectives to evaluate (1) the set of theory exams and appraise (2) the proficiency of tested cadets, this research employs two distinct datasets. The initial dataset comprises theory exams utilized as tools to evaluate cadets after completing a comprehensive learning program on AVSEC regulations and procedures. The second dataset encompasses the scores garnered by 300 cadets across three educational tiers (high school, 3-year diploma, and 4-year diploma) who underwent training in AVSEC regulations and procedures.

To gather the required data, a digital test was administered. The administration of the test adheres to specific procedures, including the establishment of a meticulously planned schedule. Additionally, a predefined time limit for completion is imposed to ensure consistency and standardization in the testing process. This structured approach enhances the reliability and validity of the data collected during the digital theory test.

This research utilizes a quantitative descriptive analysis focused on examining 20 multiple-choice questions (MCQs) administered to 300 cadets from vocational schools, including those from high school, 3-year diploma, and 4-year diploma programs. The evaluation includes statistical analysis to assess the difficulty index (DIF I), discrimination index (DI), and distractor effectiveness (DE) using MS Excel 2010. To support this evaluation tool, the test taker's data is also collected including level of education, motive to pursue an AVSEC career, previous experience in AVSEC training, and test score.

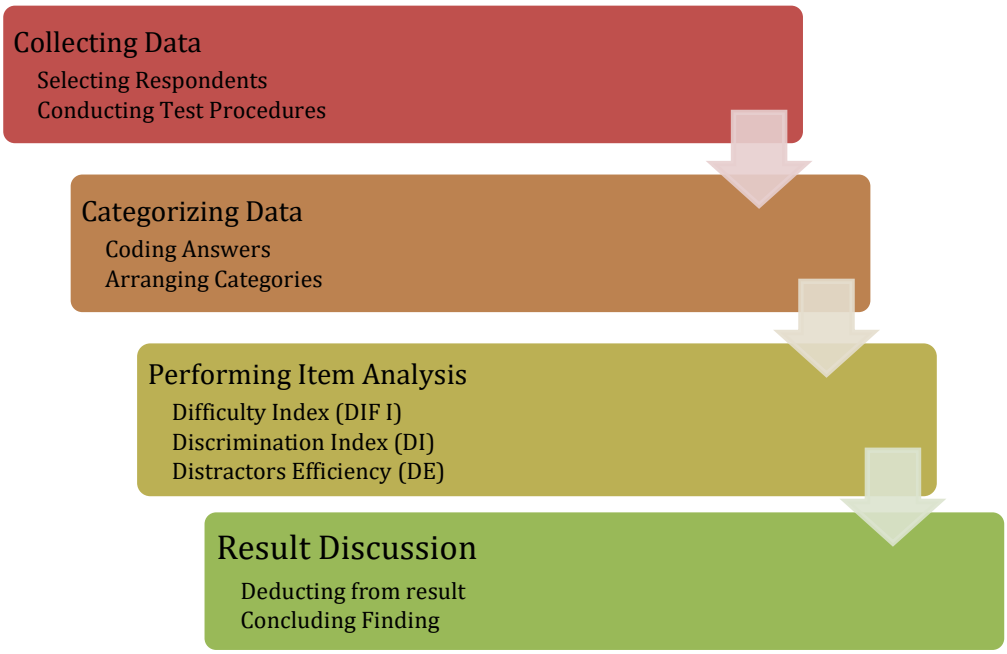

Figure 1. Research Stages

Result and Discussion

Of 300 testees, 81 are categorized as high performers and labeled as upper group (UG). Meanwhile, the rest of the testees (n=219) are labeled as low performers in the lower group (LG). Total MCQs are 20 with 40 distractors.

Table 1. Characteristics of MCQs Evaluation Criteria

Parameters	Results (%)
Difficulty Index (DIF I)	Range 21 - 91
Discrimination Index (DI)	Range 3 - 42
Distractor Efficiency (DE)	Range 8 - 42

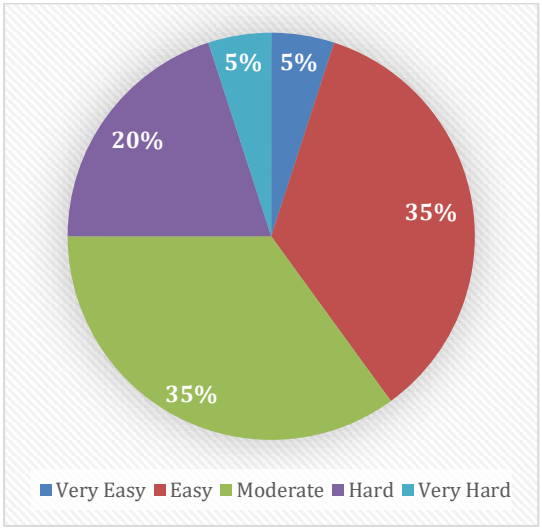

Figure 2. Difficulty Index Category

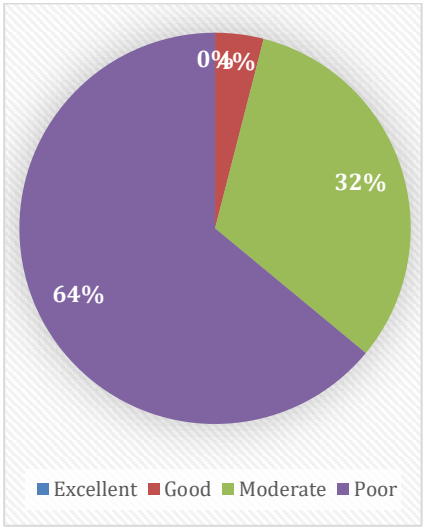

Figure 3. Discrimination Index Category

Difficulty Index Category

DIF I percentage delineates the distribution of difficulty levels among multiple-choice questions (MCQs), with a predominant concentration in the range from Easy (E) to Moderate (M). A minor fraction, constituting less than 10%, falls under the classifications of Very Easy (VE) or Very Hard (VH). In contrast, the number of questions designated as Hard (H) is twice the combined total of both Very Easy and Very Hard questions.

The meticulous determination of the distribution of the Differential Item Functioning (DIF) Index among multiple-choice questions (MCQs) in the AVSEC test, particularly in the range from Easy to Moderate categories, signifies the careful planning by the test maker. The AVSEC license stands as a crucial requirement for both prospective job applicants and individuals currently undergoing AVSEC recurrent training. Without successfully passing the AVSEC test, individuals, whether applicants or those already engaged in AVSEC activities are unable to secure or continue their roles in the security field. The heightened significance and potential consequences of this assessment make it a top priority in various processes, including recruitment and recurrent training, emphasizing the pivotal role of success in the AVSEC test within the security domain.

Taking into account the inherent characteristics of multiple-choice questions (MCQs, which are designed to provide a sense of accomplishment and challenge the test taker with a higher level of comprehension, it is deemed essential to include a limited number of very easy (5%) and very hard (5%) questions. Therefore, the presence of items categorized as very easy and very hard in the AVSEC test set is not necessarily something to be excluded. This inclusion is acceptable as long as the proportion of such items remains relatively low within the overall composition of the test.

Discrimination Index Category

In illustrating the distinction between high and low performers, the Discrimination Index (DI) percentages reveal a pronounced prevalence of items categorized as Poor, exceeding the 50% threshold. Notably, there is a complete absence of items falling into the Excellent-discriminated category. The remaining percentage is distributed among items categorized as Good and Moderate, collectively constituting a proportion below 50%. This intricate distribution underscores the nuanced discriminatory nature of the assessment, with a significant emphasis on discerning performance differences, particularly within the Low category. The Discrimination Index (DI) plays a crucial role in determining the utility of test items for future reference, with both the Moderate and Good categories ensuring their continued relevance. However, a noteworthy prevalence of items falling into the Poor DI category can be elucidated by considering the background of the test takers.

The AVSEC training program, characterized by its completion in less than one semester within the framework of formal education, follows a conventional structure with regular classes held once or twice a week. This approach differs markedly from intensive AVSEC training programs, where the emphasis is on the number of hours dedicated to instruction rather than the frequency of meetings, thus it can be achieved in a shorter time. The longer duration of AVSEC learning sessions in traditional formats tends to have an impact on participants' motivation, potentially resulting in lower levels of engagement.

Upon delving deeper into the educational backgrounds of the test takers, it becomes apparent that there is no substantial difference in the results. Despite variations in their levels of education, the AVSEC training adheres to consistent learning procedures. Test takers in the upper group exhibit diversity, encompassing individuals with backgrounds ranging from high school graduates to those holding 3-year and 4-year diplomas. This indicates that every level of education carries an equal likelihood of success in passing the AVSEC test. The uniformity in training procedures suggests that the assessment is designed to be accessible and effective across diverse educational backgrounds.

The observed low discrimination index is intricately linked to the specific conditions under which the AVSEC training is conducted. In instances where tests are administered at the end of the semester, without the provision of adequate review materials or external motivation such as punishment and reward, the discriminatory power of the test items is compromised. This underscores the importance of addressing instructional design and motivation factors throughout the course to optimize the effectiveness of assessments.

Distractor Efficiency Category

The findings of this study indicate that, for the most part, all distractors surpass the minimum percentage criterion (above 5%), categorizing them as satisfactory. Nevertheless, a subset of two distractors exhibiting considerable deficiencies can be elucidated through another facet of item analysis. The occurrence of a "bad distractor" in two multiple-choice questions (MCQ) can be attributed to the overall low level of test difficulty, resulting in a situation where the majority of test-takers provide correct answers. When the difficulty level of a test is very low, testees are more likely to answer questions correctly, and the bad distractor, designed to be less effective, becomes conspicuous as a result.

Conversely, in other MCQs with suboptimal distractors, the questions are presented in a sequential series of three, where responses are selected from the provided options. The incorrect selection of one answer in the series may cascade into subsequent incorrect responses for the others, illustrating the interconnected influence of distractors within the series. In the context of multiple-choice questions (MCQs) on aviation security (AVSEC) regulations, it's crucial to acknowledge that a suboptimal distractor, often referred to as a "bad distractor," cannot be arbitrarily replaced. This is because each distractor within a set of possible answers plays a distinctive role in evaluating the test-taker's

understanding of the regulations. The inclusion of a bad distractor is intentional and serves as a valuable aspect of the MCQ design, contributing to a nuanced examination of the test-taker's knowledge and discernment in the specific regulatory context of AVSEC.

Conclusion

The act of conducting assessments transcends being merely a component within the learning process; it emerges as a dynamic and indispensable element that significantly enhances the effectiveness of education. Assessments, when meticulously designed, serve as potent tools that furnish invaluable insights, instigate continuous improvement, and fortify the overarching growth and development of learners. In AVSEC training, both job applicants and active duty officers undergoing the mandatory 2-year recurrent training must take a compulsory test to obtain a license, and the issuance of this license is contingent upon achieving satisfactory scores on the test.

A qualified test, necessitating success in specific elements of item analysis – difficulty index (DIF), discrimination index (DI), and distractor efficiency (DE), serves as a thorough evaluative tool, offering a comprehensive assessment of a test-taker's knowledge and skills. Furthermore, it provides invaluable feedback, delineating areas of proficiency and areas requiring improvement, thereby contributing to the ongoing refinement and optimization of the assessment process
In the detailed examination of item analysis within the AVSEC context, the results reveal that the low category of Differential Item Functioning (DIF) may not necessarily be eliminated based on the specific purpose of the item. Simultaneously, the low category of the Discrimination Index (DI) is influenced by factors such as the background of the test takers and the nuances associated with training within the framework of classical formal education. These findings underscore the complexity of item analysis within AVSEC assessments, where considerations extend beyond the item's intrinsic characteristics to encompass contextual and educational variables. In the context of this study, the appearance of suboptimal distractors is associated with the construction of questions that are excessively straightforward, compounded by the inherent challenges of devising options for inquiries concerning regulations and their multifaceted components, making the substitution of these distractors unfeasible.

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