MJBEM

Malaysian Journal of Business, Economics and Management

journal homepage: https://mjbem.com.my/

Optimizing Professional Development at Civil Aviation Authority Malaysia (CAAM): Implementation of Webinar-based Learning as A Cost Effective Solution

Siti Nurulhuda Abdul Hamid*[1], and M. Reyasudin Basir Khan

[1] *Tun Razak Graduate School, Universiti Tun Abdul Razak, Kuala Lumpur, Malaysia.*

KEYWORDS

Aviation
Webinar Learning
Professional Training
Malaysia

ARTICLE HISTORY

Received 31 July 2024
Received in revised form 17 August 2024
Accepted 20 August 2024
Available online 23 August 2024

ABSTRACT

The Civil Aviation Authority of Malaysia (CAAM) is facing a significant challenge due to a backlog of training courses. This not only hinders the induction of new controllers into the workforce but also burdens the current staff. This study aims to investigate the potential impact of webinar-based learning on training effectiveness compared to traditional face-to-face learning and hybrid learning and to achieve a balance between cost efficiency and training outcomes. The study used a quantitative approach, and 135 completed questionnaires were received, resulting in a confidence level of 95%. Descriptive analysis, multiple regression, and Pearson's correlation analysis were used to analyze the collected data. The multiple regression analysis results show no significant correlation between traditional face-to-face learning effectiveness and cost-effectiveness in training programs (t-value = 0.405, p = 0.686). However, webinar-based learning proves to be more cost-effective than face-to-face methods (Sig. = 0.003). The effectiveness of webinar-based learning is not inferior to face-to-face and hybrid methods, as hybrid learning significantly impacts the dependent variable (t-value = 2.987, p = 0.003.These results suggest that Webinar-based learning is more cost-efficient than traditional face-to-face learning, making it a practical solution to reduce wait times. The study's limitations include its cross-sectional design and potential response bias, suggesting the necessity for future longitudinal studies with qualitative methods to explore these relationships further.

1. INTRODUCTION

The Civil Aviation Authority Malaysia (CAAM) oversees aviation activities, ensuring compliance with International Civil Aviation Organization (ICAO) standards. To meet industry demands, CAAM emphasizes continuous professional development. Traditionally, training was conducted in-person at the Malaysia Aviation Academy (MAvA), which offers courses for air traffic control (ATC) and non-ATC training. The extensive waiting list for in-person courses causes a backlog that impedes air traffic controllers' professional development. This backlog can cause delays in learning and implementing skills, thereby affecting the efficiency and safety of air traffic control operations. Research conducted by Smith and colleagues (2017) emphasizes the importance of timely training completion to adequately prepare air traffic controllers for their complex roles.

Recognizing the importance of continuous professional development for its workforce, CAAM has traditionally relied on in-person training sessions, workshops, and seminars conducted primarily through The Malaysia Aviation Academy (MAvA). However, due to the challenges posed by the COVID-19 pandemic, CAAM and similar organizations have begun exploring alternative learning methods, leading to an increased interest in webinar-based learning for its flexibility, accessibility, and scalability. This involves implementing innovative training methods that will enhance learning experiences and provide more opportunities for skill development for aviation professionals at CAAM. Various aspects are being considered, including evaluating different learning methods, conducting cost-effectiveness analyses, assessing the impact on training outcomes, and identifying best practices for professional development at CAAM.

*Corresponding author:
E-mail address: Siti Nurulhuda Abdul Hamid <huda4959@yahoo.com>
https://doi.org/10.56532/mjbem.v3i2.72
2948-4928/

2. LITERATURE REVIEW

2.1 Cost-Benefit Analysis of Webinar-Based Training

The theoretical foundation of Cost-Benefit Analysis (CBA) for webinar-based training is based on the principles of economic efficiency and educational effectiveness. The core idea is to assess the economic costs and benefits of educational activities conducted through webinars. Dreze and Stern (1987) provide a comprehensive framework for CBA, emphasizing its role in evaluating public sector projects, which can be adapted to assess webinar-based learning initiatives. This includes not only the direct expenses related to the technology but also the indirect costs, such as content creation and the potential increase in sales or performance improvements resulting from the training.

2.2 Face-to-face Learning

Face-to-face learning offers unique benefits that online learning may not fully replicate. While studies have shown that there might not be a significant difference in academic performance between face-to-face and online learning methods (Shawaqfeh et al., 2020), undergraduate students have expressed a preference for traditional classrooms and face-to-face interactions for completing written competencies (Shawaqfeh et al., 2020). The tangible benefits of face-to-face learning include feelings of connectedness, flexibility, and a more comprehensive educational experience (Maloney et al., 2015). Nicol et al. emphasized the positive impact of any form of online communication, whether face-to-face or text-based, synchronous or asynchronous, on online learning (Ali et al., 2021).

2.3 Webinar-based learning

Quantitative research conducted by Gegenfurtner,A., & Ebner, C. (2019) defines webinars as web-based seminars. These seminars allow participants and facilitators to communicate platforms and engage in real-time interactions through voice-over IP technology and web camera equipment. The study's findings suggest that webinars were slightly more effective than control conditions, namely online asynchronous learning management systems and offline face-to-face classroom instruction. However, the differences in effectiveness were minimal (Gegenfurtner et al., 2019). The research also highlights that webinars offer convenient access to training materials, resulting in high levels of geographical flexibility. This flexibility was greatly valued and likely contributed to the positive satisfaction scores. The existing body of research on the use of webinars in higher education and professional training reveals several areas that require further investigation.

On the other hand, quantitative research by Foo et al. (2021) suggests differently. The study comparing the efficacy of distance learning (DL) and traditional face-to-face (FF) modalities in problem-based learning (PBL) tutorials during the COVID-19 pandemic yielded significant findings. Students in the DL group had a mean total score of 37.5 ± 4.6, notably lower than the 39.0 ± 4.4 scored by their FF counterparts, with the difference being statistically significant (p < 0.001). In terms of proficiency across the five key areas—participation, communication, preparation, critical thinking, and group skills—students engaged in DL scored considerably lower than those in the FF group. This performance gap suggests that students who participated in DL PBL tutorials may not have found the online format as effective, prompting a call for further research to identify the factors contributing to these discrepancies. The overall implication is that while DL poses certain challenges and appears to be less effective in fostering proficiency in PBL, it remains a critical area for future investigation to improve its effectiveness, particularly in the context of medical education.

2.4 Hybrid Based Learning

The systematic review by Dinçer (2023) discusses the technological landscape of aviation training. Virtual reality, eye-tracking systems and computer-based training are technologies used in aviation training. It applied to flight training for fixed-wing aircraft and helicopters, aircrew training, aircraft maintenance training, business aviation training, and aviation English training. These advancements emphasized the variety of technologies that can be used in different aspects of aviation education and skill development (Dinçer, 2023). When discussing the disadvantages of computer-based training (CBT) in aviation, it is critical to recognize the possibility of trainees losing concentration. Without the presence of an instructor or the structure of a classroom environment, students may struggle to concentrate and become easily distracted by external factors (Dinçer, 2023). Another downside of CBT is the lack of time-criticality. Compared to real-time face-to-face training, instructors can mimic time-sensitive circumstances and provide instant feedback. The lack of urgency and pressure linked to time-critical decision-making results in trainees not fully understanding the necessity of fast thinking and decision-making skills for real-world aviation situations. Meanwhile, . Brudnicki et al. (2006) offered that the integration of training technologies can assist the FAA in meeting the training needs of controllers by providing standardized, self-directed instruction as well as helping the organization deal with the high number of controllers that need to be trained.

2.5 Conceptual Framework

Below is the conceptual framework for the study. This developed from the previous body of knowledge and within the interest of CAAM.

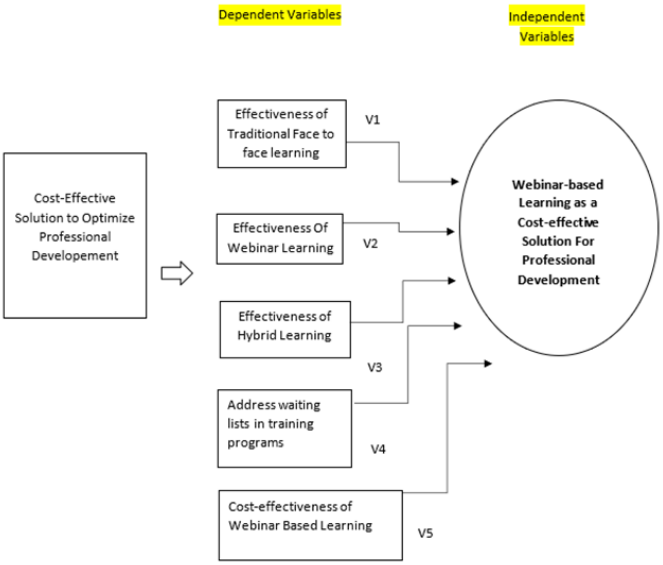

Fig. 1. Conceptual framework

3. RESEARCH METHODOLOGY

The study employs quantitative research, involving structured surveys or questionnaires distributed to Civil Malaysia Authority Malaysia (CAAM) employees. The research focuses on approximately 200 employees engaged in online training, utilizing a sampling procedure involving simple random sampling.

Data collection involves an online questionnaire designed to gather primary and secondary data, aiming to quantify the variables and gather the required data for the study. The questionnaire is divided into sections covering demography, the independent variable of Webinar-based Learning as a Cost-effective Solution For Professional Development and the dependent variables assessing the effectiveness of different learning approaches as well cost-effectiveness of the webinar-based learning. The study utilizes nominal and ordinal measurements, including Likert scales, to measure participant opinions. Furthermore, the operationalization and measurement of variables involve a combination of established scales and newly developed items tailored to the context of CAAM employees.

The study integrates control variables such as age, gender, and years of experience to address potential demographic influences on the perception of webinar-based learning. The collected data analysed using SPSS and Microsoft Excel, each offering unique advantages in quantitative analysis. SPSS is used for fundamental statistical studies, hypothesis testing, and data organization, while Microsoft Excel is employed for data administration and basic statistical analysis, along with data visualization for the effective presentation of research findings. Each method has its advantages and drawbacks, and the study's methodology ensures the reliability and validity of the collected data.

4. RESULTS AND DISCUSSIONS

4.1 Introduction

This chapter on data analysis discusses Demographic Analysis, Missing Values, Descriptive Statistics, Reliability Analysis, Exploratory Factor Analysis, Correlation Analysis and Multiple Regression Analysis.200 questionnaires in Google form were distributed to CAAM's employees who previously attended webinar courses via email and WhatsApp. 135 responses were received and are usable. Resulting 95% of Confidence Level. Then, the collected data are processed using Statistical Software for Social Science (SPSS). All the process data are presented in tables, graphs and charts.

4.2 Descriptive Analysis.

4.2.1 Are you an active Air Traffic Controller?

Among 135 respondents, there were 119 active air controllers which represents 88.1% of the demographic. Meanwhile, 16 respondents were administration staff. While the number of air traffic controllers appears higher than that of the administration staff, the overall distribution reflects a fairly representative ratio of air traffic controller and non-air traffic controller.

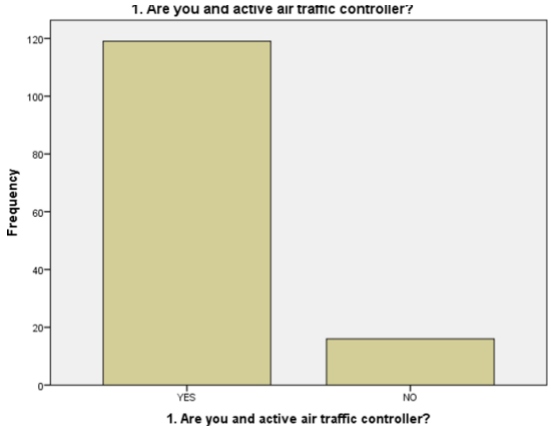

Fig. 2. Active Air Traffic Controller

4.2.2 Age Group

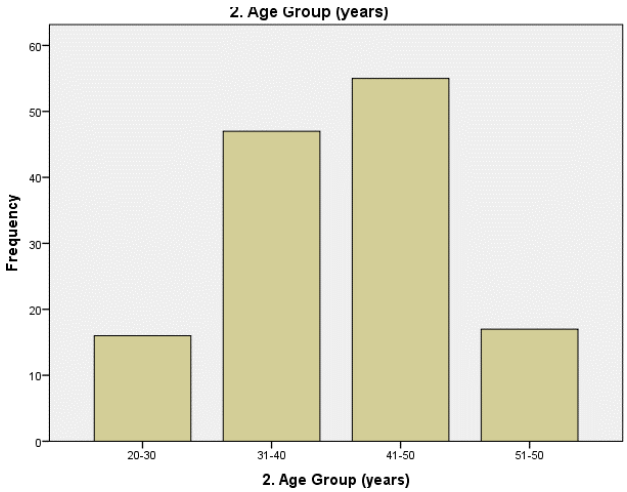

Fig. 4. Age

The data reveals that within the surveyed population, the age group 41-50 represents the largest segment, accounting for 40.7% of the total. In contrast, the age group 20-30 is identified as the minority group based on the distribution of ages. This implies that individuals aged between 41 and 50 are the most prevalent, while those within the 20-30 age bracket are the least common.

4.2.3 Grade Statistic

The demographic breakdown indicates that 64.4% of the population falls within the grade range of A19-A40, while 35.6% are classified under the A41-A54 grade. Considering that CAAM operates under the public service department, it can be inferred that the A19-A40 category likely represents individuals with the minimum qualifications of SPM or Diploma, possibly indicative of the support staff. Conversely, the A41-A54 grade, constituting the management and professional group, is associated with individuals holding at least a degree qualification. This distinction reflects a clear delineation within the demographic, with the majority falling within the support staff category and the remaining portion representing the management and professional group, thus providing insight into the occupational composition and qualifications within the organization.

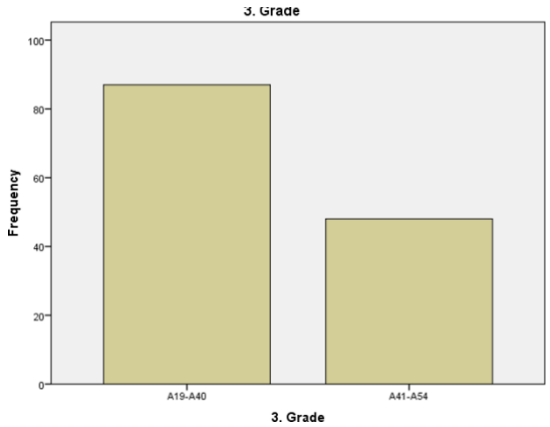

Fig. 4. Grade distribution

4.2.4 Years of Experience

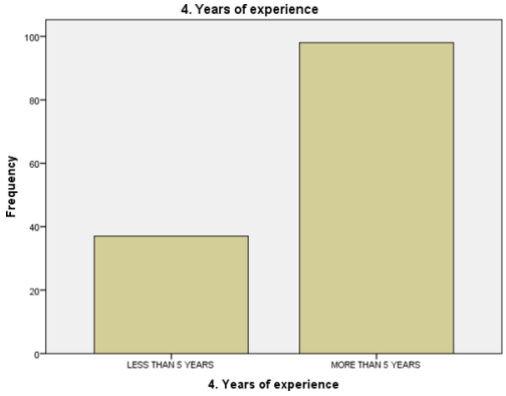

Fig. 5. Years of experience

It is noted that a significant majority, specifically 72.6%, has over 5 years of experience. This statistic suggests that a substantial portion of the surveyed individuals have accrued a considerable amount of work experience, indicating a potentially seasoned and knowledgeable workforce within the studied demographic group.

4.2.5 Gender

It is interesting to see that the gender proportion is almost balanced as the Male population represents 50.4% and the Female population represents 49.6%, indicating a relatively close distribution of male and female individuals within the population. A near-equal representation of both genders can lead to more inclusive decision-making processes, in which diverse perspectives contribute to well-rounded solutions

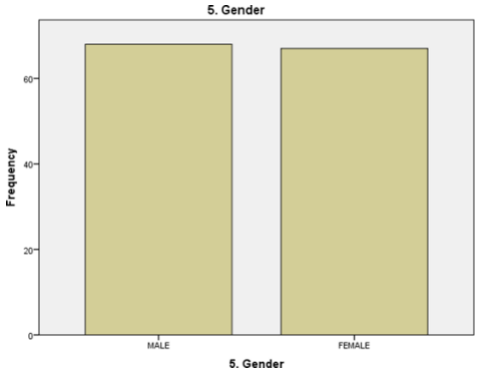

Fig. 6. Gender

4.3 Correlation Analysis

The Pearson correlation coefficient is a descriptive statistic, meaning that it summarizes the characteristics of a dataset (Turney, 2022). The independent Variable and Dependent Variables are being analysed using correlation analysis. Table 1 represent the findings.

Correlations

		Effectiveness of Traditional Face-to-Face Learning	Effectiveness Of Webinar-based Learning	Effectiveness of Hybrid Learning	Addressing The Waiting List in Training Programs	Cost-effectiveness of Webinar-based Learning
Effectiveness of Traditional Face-to-Face Learning	Pearson Correlation	1	-.028	.003	.057	.051
	Sig. (2-tailed)		.751	.972	.513	.556
	N	135	135	135	135	135
Effectiveness Of Webinar-based Learning	Pearson Correlation	-.028	1	.621**	.567**	.577**
	Sig. (2-tailed)	.751		.000	.000	.000
	N	135	135	135	135	135
Effectiveness of Hybrid Learning	Pearson Correlation	.003	.621**	1	.706**	.766**
	Sig. (2-tailed)	.972	.000		.000	.000
	N	135	135	135	135	135
Addressing The Waiting List in Training Programs	Pearson Correlation	.057	.567**	.706**	1	.969**
	Sig. (2-tailed)	.513	.000	.000		.000
	N	135	135	135	135	135
Cost-effectiveness of Webinar-based Learning	Pearson Correlation	.051	.577**	.766**	.969**	1
	Sig. (2-tailed)	.556	.000	.000	.000	
	N	135	135	135	135	135

**. Correlation is significant at the 0.01 level (2-tailed).

4.4 Multiple Regression

Regression Analysis conducted on the data gathered from the study to examine the connection of different learning method, and its cost-effectiveness in addressing the waiting list in training programs. Table 2 represent the findings.

The table provides valuable insights into the impact of each predictor variable on the cost-effectiveness of webinar-based learning and their significance levels in predicting the dependent variable. It reveals that the Effectiveness of Hybrid Learning and Addressing The Waiting List in Training Programs significantly predict cost-effective professional development. On the other hand, the Effectiveness of Traditional Face-to-Face Learning and the Effectiveness Of Webinar-based Learning do not significantly influence the outcome. Additionally, the Cost-effectiveness of Webinar-based Learning significantly impacts the dependent variable, offering valuable information regarding the predictors' significance in forecasting the cost-effectiveness of webinar-based learning.

4.5 Hypotheses result

Correlation Analysis is used to evaluate the connection between two variables to gauge the degree and direction of their relationship. Meanwhile, multiple regression analysis is used for variables; Effectiveness of Traditional Face-to-Face Learning,the Effectiveness of Webinar- based Learning, Addressing the waiting list in training programs and the Cost-effectiveness of Webinar-based Learning to determine their explanatory power. This method quantifies how well each independent variable clarifies the variations in the dependent variable.

Table 1. Findings of Pearson Correlation

		Effectiveness of Traditional Face-to-Face Learning	Effectiveness of Webinar based Learning	Effectiveness of Hybrid Learning	Addressing The Waiting List in Training Programs	Cost-effectiveness of Webinar based Learning
Effectiveness of Traditional F ace-to-F ace Learning	Pearson Correlation		-0.028	0.003	57	0.051
	Sig. (2.tailed)		0.751	0.972	0.513	0.556
	N	135	135	135	135	135
Effectiveness Of Webinar. based Learning	Pearson Correlation	-0.028	1	0.621	0.567	0.577
	Sig. (2.tailed)	0.751		0	0	0
	N	135	135	135	135	135
Effectiveness of Hybrid Learning	Pearson Correlation	0.003	0.621	1	0.706	0.766
	Sig. (2-tailed)	0.972	0		0	0
	N	135	135	135	135	135
Addressing The Waiting List in Training Programs	Pearson Correlation	0.057	0.567	0.706	1	0.969
	Sig. (2.tailed)	0.513	0	0		0
	N	135	135	135	135	135
Cost-effectiveness of Webinar-based Learning	Pearson Correlation	51	0.577	766	0.969	1
	Sig. a-tailed)	0.556	0	0	0	
	N	135	135	135	135	135
Correlation is significant at the 0,01 level (2-tailed).						

Table 2. Coefficient

			Unstandardized Coefficients		Standardized Coefficients		
			B	Std. Error	Beta	t	sigma
Model							
	1	(Constant)		0.848	0.312	2.72	0.007
		Effectiveness of Traditional Face to Face Learning		0.023	0.058	0.021	0.405	0.686
		Effectiveness of Webinar based Learning		0.430	0.054	0.054	-0.8	0.425
		Effectiveness of Hybrid Learning		0.238	0.080	0.261	2.987	0.003
		Addressing The Waiting List in Training Programs		1.464	0.211	2.486	6.926	0
		Cost-effectiveness of Webinar-based Learning	-,851		0.227	-0.879	-3.75	0
a. Dependent Variable:		Webinar-based Learning as a Cost-effectiveness or Professional Development						

5. CONCLUSION

The analysis of the study supports the hypothesis that there is a significant correlation between the effectiveness of webinar-based learning and cost-effectiveness. The data indicates that implementing webinar-based learning can lead to substantial cost savings compared to alternative learning methods, such as face-to-face and hybrid learning methods. This is supported by the correlation coefficient and multiple regression analysis, highlighting the potential advantages of webinar-based learning in terms of cost savings and overall effectiveness in professional development training programs.

Table 3. Hypotheses Results

Hypothesis	Correlation Coefficient	Multiple Regression
H1:There is a correlation between traditional face- to-face learning and its cost-effectiveness in addressing training programs for professional development.	Rejected	Rejected
H2: The implementation of webinar-based learning will result in significant cost savings compared to face-to-face and hybrid learning methods	Supported	Supported
H3= Implementing webinar-based learning will significantly reduce waiting list time for training programs compared to face-to-face and hybrid learning.	Supported	Supported
H4: The effectiveness of webinar-based learning will be lower compared to face-to-face and hybrid learning.	Supported	Supported

The research findings further endorse the effectiveness of hybrid learning, particularly in the context of integrating webinar-based learning. The study confirms that integrating webinar-based learning can lead to significant cost savings compared to both face-to-face and hybrid learning methods. Additionally, the data supports the hypothesis that implementing webinar-based learning can significantly reduce waiting list times for training programs in comparison to face-to-face and hybrid learning approaches. However, it also suggests a potential trade-off between cost savings and training effectiveness when opting for webinar-based learning over other traditional methods, highlighting the need for a balanced approach.

The study establishes the potential benefits of integrating webinar-based learning within hybrid models, emphasizing its effectiveness in cost management, addressing training program waiting times, and optimizing overall training program accessibility. By leveraging webinar-based methods, organizations can efficiently manage and reduce waiting times, thus enhancing the efficiency and effectiveness of training programs.

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